NILE BASIN INITIATIVE
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## Paper at the NBDF7 Webinar

# Water quality and sediment monitoring in the Nile Basin countries

## WQ1: Water quality monitoring

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# Global water quality issues

- One in nine people worldwide uses drinking water from unimproved and unsafe sources
- 2.4 billion people live without any form of sanitation
- Lack of sanitation is one of the most significant forms of water pollution.
- 90% of sewage in developing countries is discharged untreated directly into water bodies
- Every day 2 million tonnes of sewage and other effluents drain into the world's water
- Industry discharges an estimated 300-400 megatonnes of waste into water bodies every year

# Water quality issues

- Non-point source pollution from agriculture and urban areas often greatly increases the total pollutant load together with industrial point source pollution
- A reduction of about one-third of the global biodiversity is estimated to be a consequence of the degradation of freshwater ecosystems mainly due to pollution of water resources and aquatic ecosystems
- Re-use of wastewater in agriculture is important for livelihoods, but is associated with serious health risks

# Water quality issues in Nile Basin

- Accelerated erosion from deforestation and agricultural conversion of natural areas leading increased sediment loads
- Industrial activity concentrated along the river banks
- Agro-industries particularly sugar cane downstream part of the basin
- Industrial and domestic wastewater
- Irrigation-drainage canals as a source of multiple contaminants in part of the basin

# Basin water quality management challenges

- Water quality and sediment monitoring programs and data are limited
- Lack of funding resources for personnel and for water analysis equipment,
- No adequate or modern data acquisition and management system for receiving, processing, storing, dissemination and transmitting water resources data and information,
- Institution and human capacities for water quality analysis including detailed technical analyses and modeling tools to understand the basin-wide dynamics of water quality are scarce
- No harmonized policies/standards on water quality
- Low level of awareness and involvement of the basin's citizens in pollution prevention activities

# Nile cooperation for climate resilience (NCCR) project

NCCR project is financially supported by the World Bank through the Cooperation in International Waters in Africa (CIWA) trust fund

**Project objective:** to improve mechanisms for cooperation on water resources management and development in the Nile Basin

**Implementation agencies:** Nile-SEC, ENTRO, NELSAP-CU, NBD and LVBC,

**Period:** March 2021 and will close in November 2025

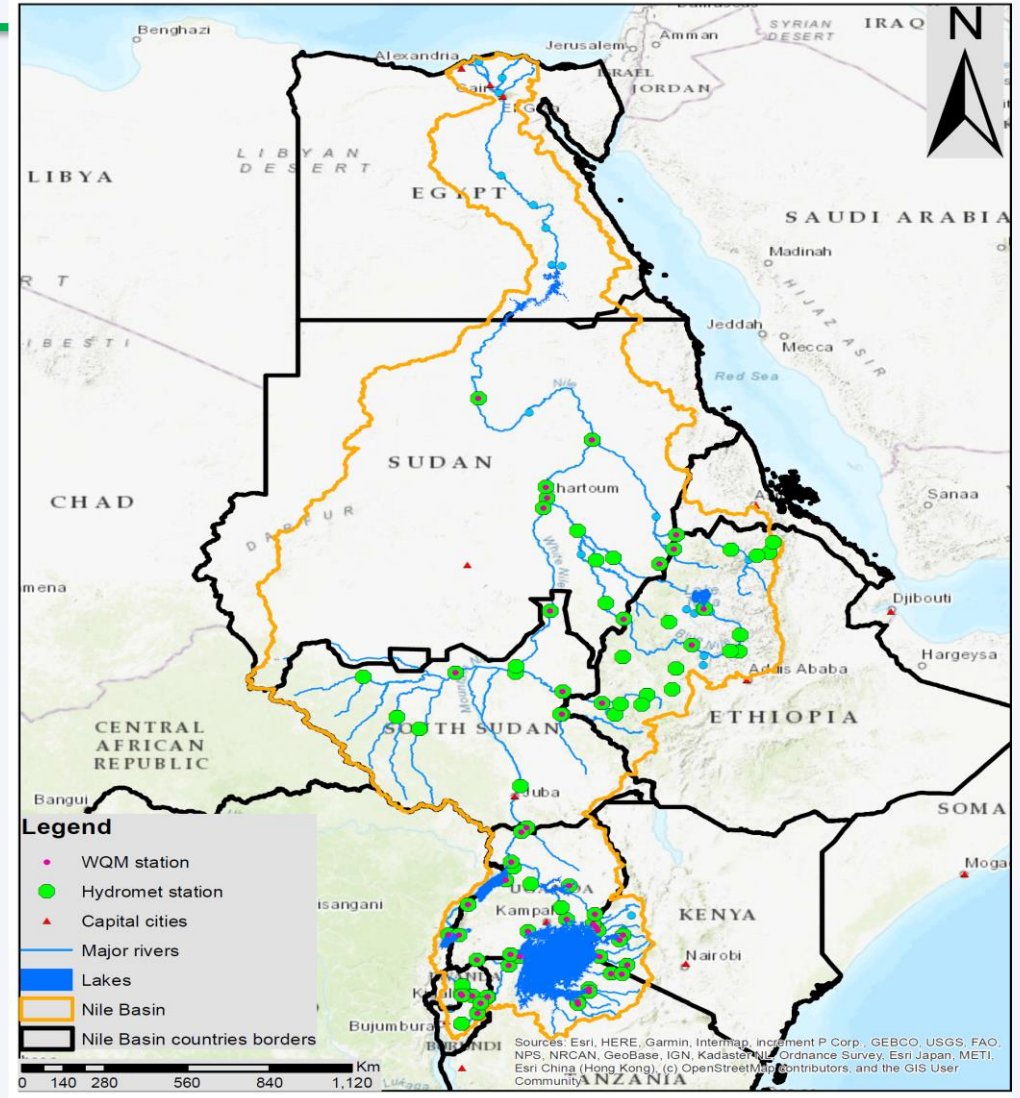
**Budget:** USD 30M

**Project five thematic areas:**

1. platform for cooperation,
2. flood and drought risk mitigation,
3. dam safety capacity building
4. Innovative information services for climate-resilient investment planning, and
5. **Water quality investment planning and prioritization.**

# NBI hydrological and WQ monitoring network

- 52 regional stations for WQ monitoring
- 43 stations sediment sampling
- 39 water quality sensors for real measurement
- Lab equipment
- WQ and sediment field kits
- Capacity building of water experts
- Water quality data base



# Objectives and methods

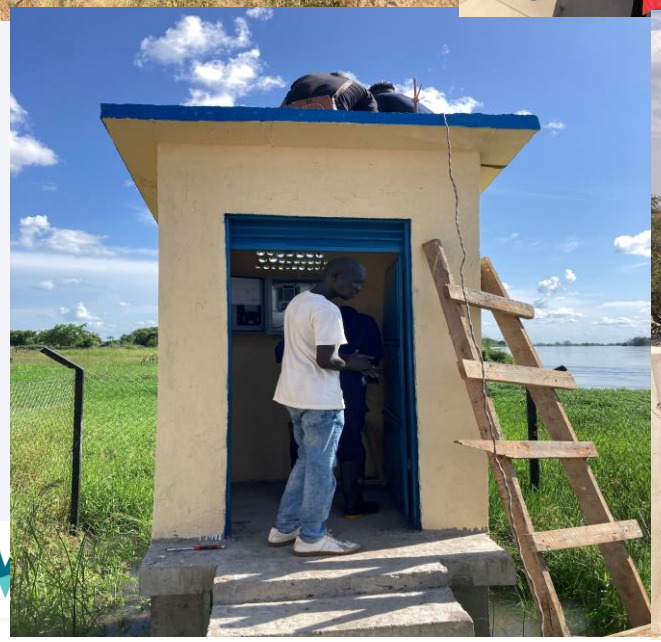
To evaluate the current state of Nile Basin countries in monitoring of the quality of water and sediment

**Methods**

- Collection of data and information on water monitoring programs and institutions in each country
- Visiting of the water quality monitoring stations and labs in NB countries
- Meeting the national water quality task teams
- Checking the availability of sediment/ water quality field kits and water quality sensors and stations

# Countries needs assessment in NB countries

| Country | Period |
|---|---|
| Burundi | 25-27 Jul |
| Rwanda | 2-5 Aug |
| Tanzania | 22-27 Aug |
| Uganda | 6-9 Sep |
| S. Sudan | 12-16 Sep |
| Sudan | 4-9 Oct |
| Ethiopia | 14-18 Nov |
| Kenya | 28 Nov-3 Dec |
| DRC | Mar 2023 |

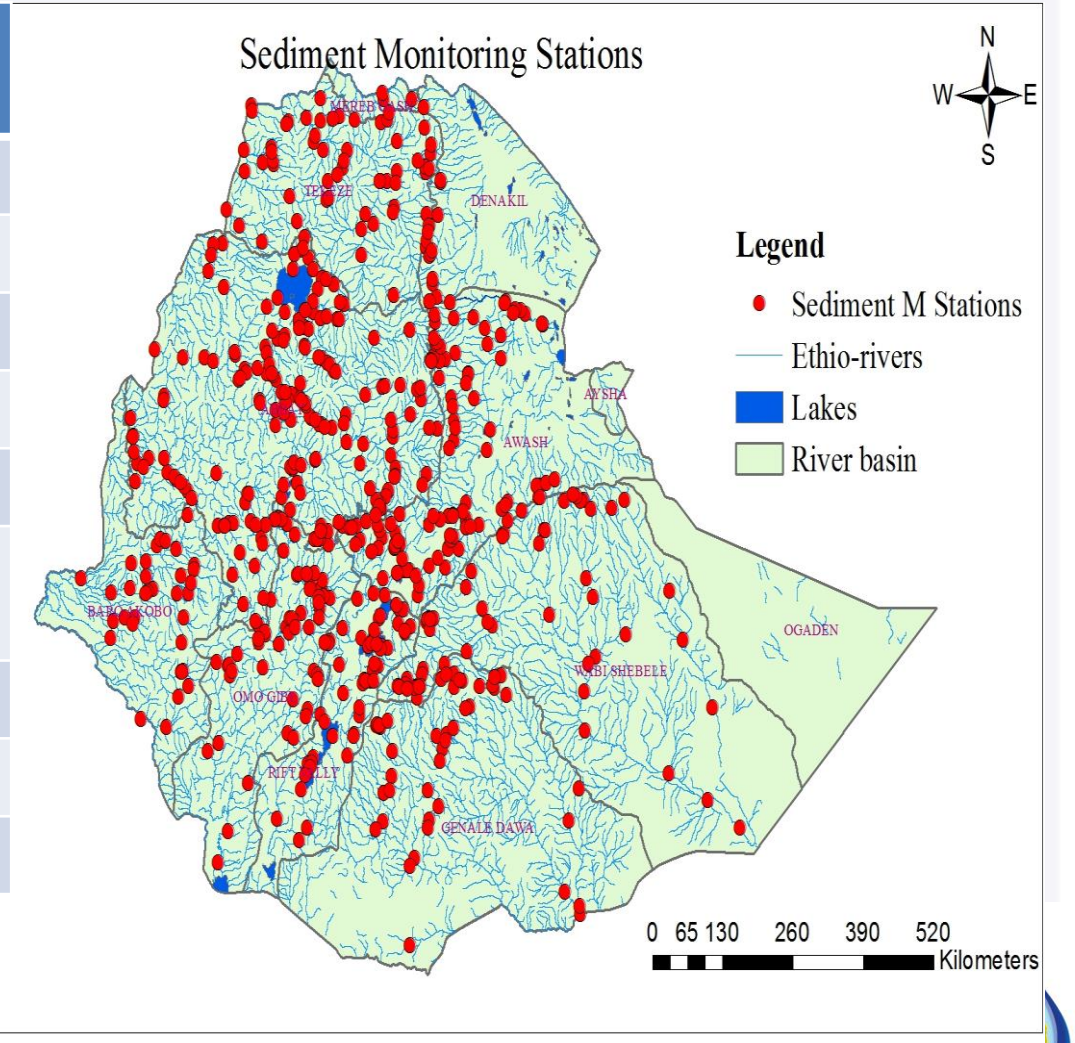



# Key findings: Monitoring tools

- Legal and institutional tools on water monitoring exist in the NB riparian countries (laws, policies and standards)
- Inconsistency of water monitoring programs in terms of monitoring frequency and monitored parameters
- Telemetric equipment for real time monitoring are found in some countries (Ethiopia, Uganda, Rwanda,)
- Data management systems are available in some countries and do not exist in the others

# Key findings: water quality and sediment monitoring

| country | Basic and field kits (Y/N) | Sediment sampling kits (Y/N) | Water Sensors (Y/N) |
|---|---|---|---|
| Burundi | Y | N | N |
| DRC | NA | NA | NA |
| Ethiopia | Y | Y | Y |
| Kenya | Y | N | N |
| Rwanda | Y | N | N |
| South Sudan | Y | N | N |
| Sudan | Y | N | N |
| Tanzania | Y | Y | N |
| Uganda | Y | N | N |



# Key findings: Water quality variables

- Basic parameters like, pH, EC, turbidity, DO, temperature, TDS and nutrient are generally monitoring in all the countries though irregularity in sampling frequency was noted
- Pesticides, microplastics, bacteriological, organic pollutants and heavy metals are not monitored in the majority of the countries
- Monitoring frequency differs among the countries, from monthly to quarterly

| Water Use | Parameters |
|---|---|
| **Primary** | Temperature, Turbidity, TDS, EC, DO, pH. |
| **Food and Beverage Industries** | Microbes (E-coli, coliforms),COD+BOD, Ammonia, TN and TP |
| **Iron manufacturing and Industrial zones** | BOD, COD, oil, metals, acids, phenols, cyanide |
| **Agriculture activities** | Pesticides, TN, TP, pH, organic matter , DO |
| **Recreational Places and Urban centers** | Pesticides, TN, TP, pH, organic matter, DO, heavy metals, microorganisms, acids, salts |

| Station type | Parameters |
|---|---|
| Surface water stations | Ph, Temp, E.C, D.O, major anions & cations, TSS, TDS, Nutrients (TN, TP, $NO_3^-$, $NO_2^-$, $PO_4^{3-}$), Flow |
| Groundwater station (incl. water supply points) | Ph, Temp, E.C, D.O, major anions & cations, TSS, TDS, Nutrients (TN, TP, $NO_3^-$, $NO_2^-$, $PO_4^{3-}$), Bacteriological (E-colli, Total coliform, streptococcus) |
| Effluent discharge points | Ph, Temp, E.C, D.O, BOD, COD, TSS, TDS, Nutrients (TN, TP, $NO_3^-$, $NO_2^-$, $PO_4^{3-}$), heavy metals |

# Recommendations

- Funding resources to implement regular water quality monitoring program in the basin are needed
- Advanced analytical equipment are needed and where they do exist (AAS, GC) lack of reagents and minor spare parts
- Initiate the transboundary water quality monitoring network is needed
- There is a need to build the capacity of water quality sampling and analysis staff in operation and maintenance of lab equipment
- Ambient water quality standard to ease the classification of ambient water as stated by SDG6.3.2 is needed

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7th Nile Basin Development Forum · Uganda 2023