Enhancing climate change adaptation in transboundary river basins

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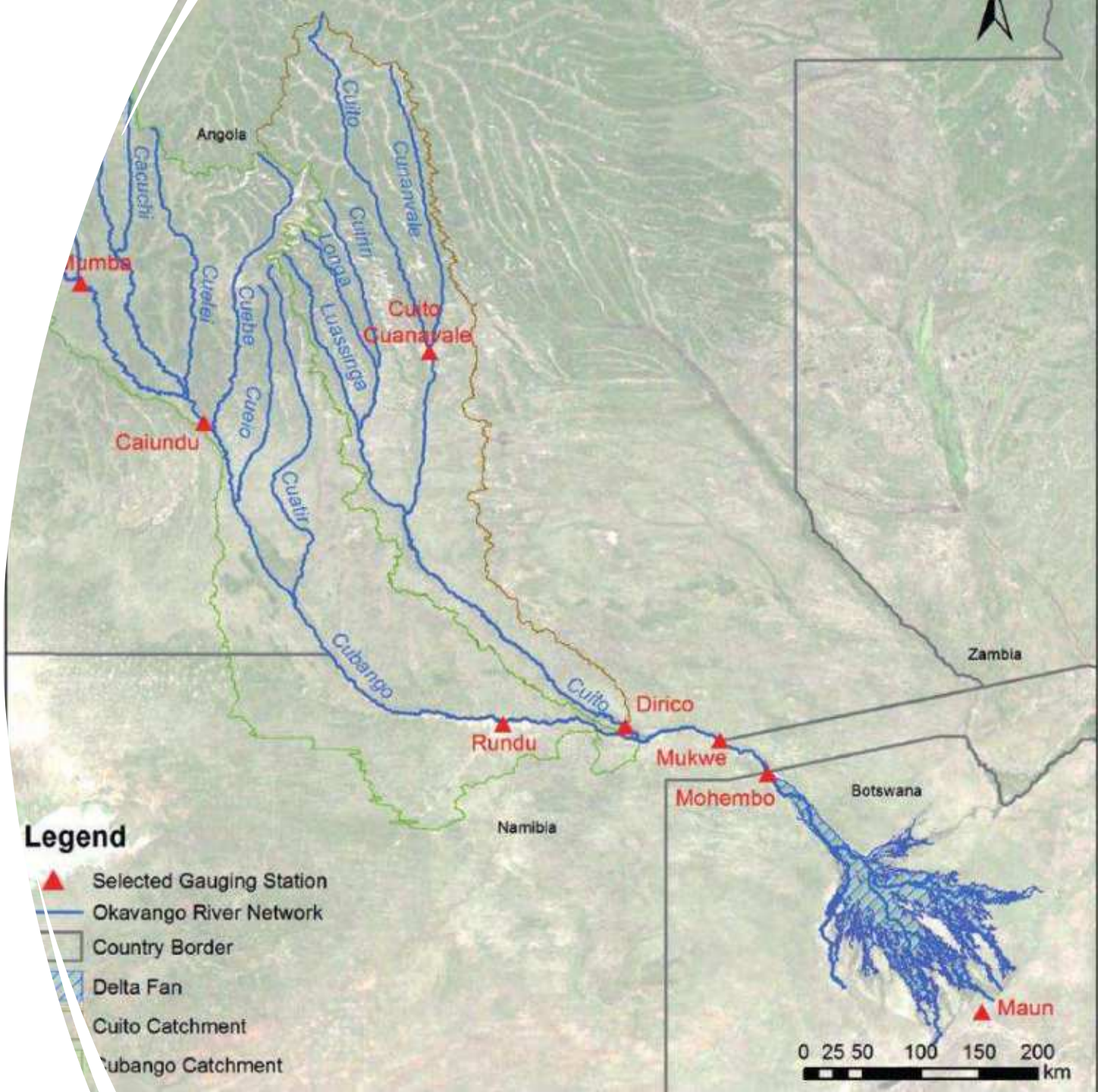
Outline

- Background
- TDA and SAP
- Overview of Livelihoods Project
- Climate Smart Horticulture Production
- Conservation Agriculture
- Environmental Monitoring
- Data Sharing Protocol
- DSS



TDA Areas of Concern and Drivers

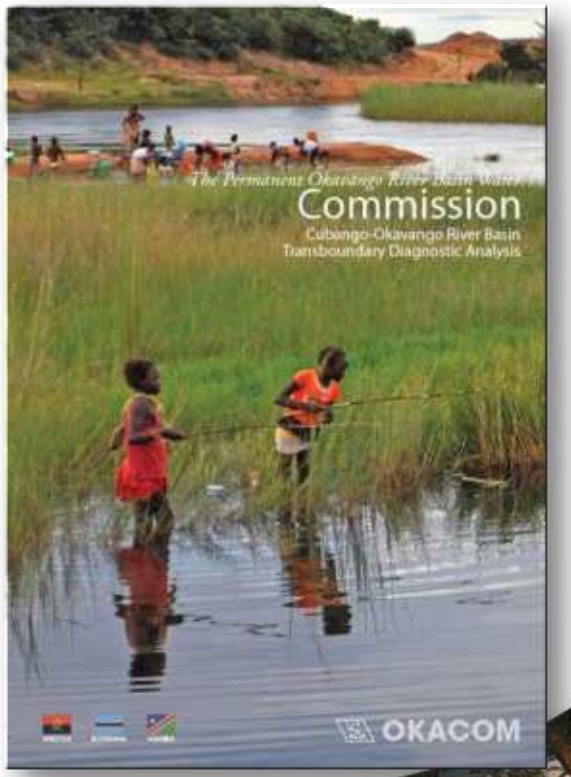
of concern

- variation and reduction of **hydrological flow**
- changes in **sediment** dynamics
- changes in **water quality**
- changes in the abundance and distribution of **biota**

driven by

- **population** dynamics
- **land use** change
- **poverty**
- **climate change**

Baseline knowledge -- owned by the riparian states



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Objective of the SAP

Promoting and strengthening integrated, sustainable management, use and development of the Cubango-Okavango basin at national and transboundary levels by:

- using **internationally recognised best practices**
- protecting **biodiversity**
- improving **livelihoods** of basin communities
- supporting **development** of basin states.

SAP Thematic Areas

Thematic Area 1: Livelihoods and socio-economic Development

Thematic Area 2: Water Resources Management

Thematic Area 3: Land Management

Thematic Area 4: Environment and Biodiversity


Livelihoods Demosntraion Project

Basin Wide Livelihoods Demonstration Projects

- **Enhancing climate change resilience through alternative agricultural practices - Conservation Agriculture in Angola- (Calai Administration Area)**
- Improving conservation and sustainable use of shared fish resources through co-management approaches in **Angola and Namibia**
- Horticulture produce in Maun-Okavango **Botswana** through climate-smart practices and linking horticultural production with the up-market tourism value chain and other local markets
- Conservation tourism through strengthened partnerships in **Namibia**

Baseline data

Lessons learnt used for upscaling

Climate Start Practices

CA - Demonstration

Conservation Agriculture (CA) is **a farming system that can prevent losses of arable land while regenerating degraded lands**.

- **Three principles of Conservation Agriculture:**
- Minimum mechanical soil disturbance. (i.e. no tillage) through direct seed and/or fertilizer placement.
- Permanent soil organic cover. (at least 30 percent) with crop residues and/or cover crops.
- Crop Species diversification.

Conservation agriculture (CA) is one of the Climate Smart Agriculture (CSA) tools that farmers are adopting to grow food even in harsh conditions.

Conservation Agriculture in Angola

- 30 CA individual CA demonstration fields each measuring 0.25ha have been fenced

- Farmer planted late. First crop failed.

- All 30 farmers received farming inputs (seed, fertilizer and implements)

Outcome 3. Environmentally-sound socioeconomic development demonstrated in the basin- Enhancing climate change resilience through alternative agricultural practices

- Delayed due to COVID 19 related travel restriction
- Prohibited timely delivery of farming inputs which were procured in Namibia (**wheelbarrows**, **hoes, fencing material, seeds and fertilizers**)
- Stringent customs requirements on the Angolan side of the boarder
- Partnership with EU to implement CA at household level -
- Thirty (**30)** lead demonstrations farmers

Outcome 3. Environmentally-sound socioeconomic development demonstrated in the basin- Enhance horticultural produce in Maun through climate-smart practices-Linking

- **Botswana**

  - 19 (11 males, 8 females) farmers
  - All the demonstration farmers have reported an increase in production
  - **All farmers embraced new hybrid seeds, new crops and new management practices.**

  - **Farmers Learnt that**
    - Climate-smart horticulture farming practices improved productivity and profitability, by enhancing production
    - Using hybrid seeds resulted in shorter growing periods, increased yields and improved crop quality

  - **Management skills**
    - Cropping plans in response markets and climatic conditions
    - Problem identification
    - Crop selection

  - **Technical skills**
    - Importance of records Keeping
    - Marketing and negotiation skills
    - Pest management skills
    - Soil fertility management
    - Maintain and trouble shoot the irrigation system

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Some of the high-quality vegetables produce by Demo farmers





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Key lessons learnt

- Mentoring is very critical – farmers had limited knowledge
- Significant uptake of climate smart agricultural practices
- Strong institutional arrangements very important
- Government ownership and meaningful engagement at the beginning the demo is very critical
- Farmers association weak and limited in capacity – very important institution
- Farmers still work as individuals largely although there is a bit of cooperation – cropping plans not observed.

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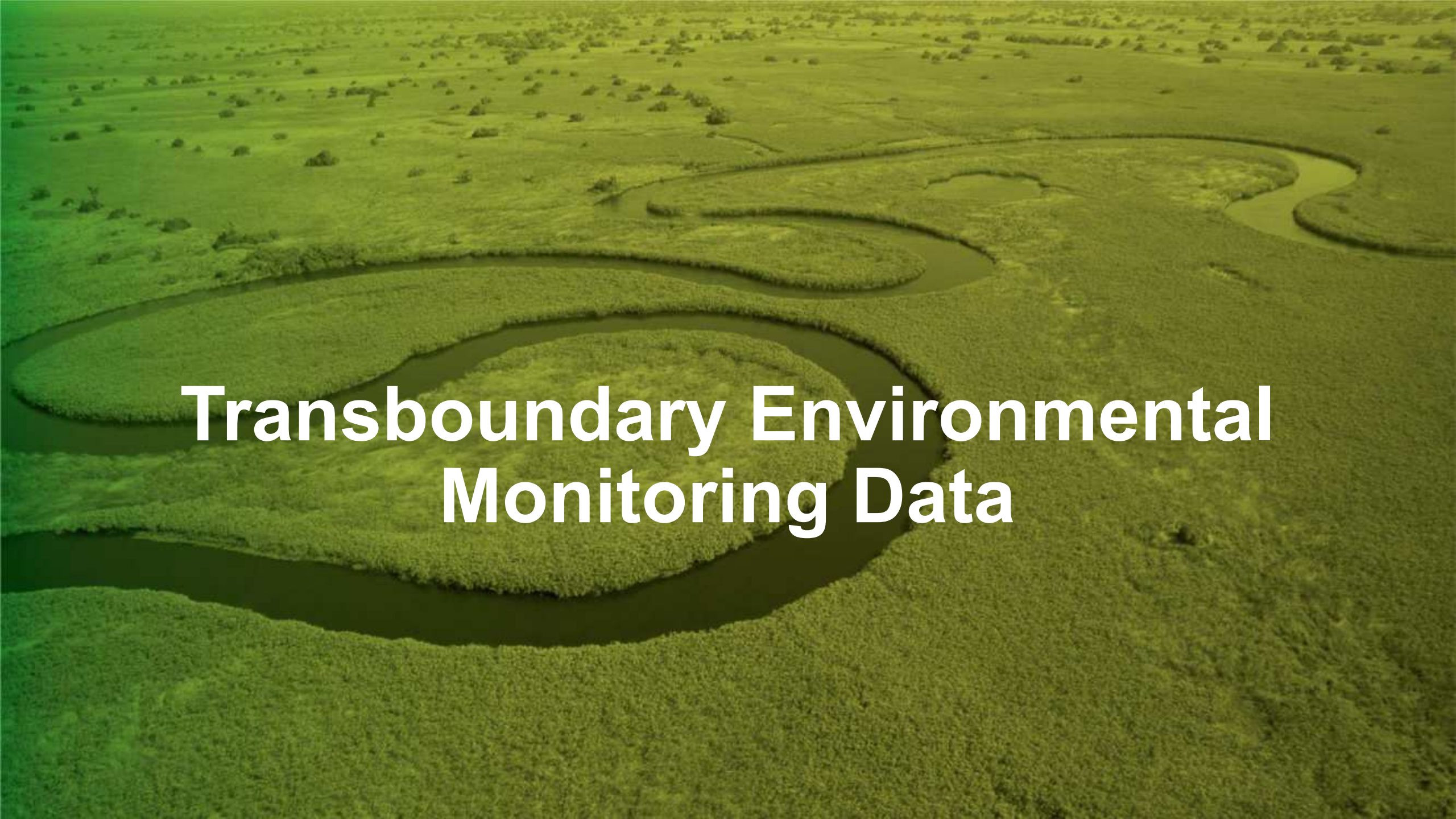
Outcome 3. Environmentally-sound socioeconomic development demonstrated in the basin- Enhancing climate change resilience through alternative agricultural practices

Challenges

- Institutional arrangements
- Community adoption of climate smart practices take tine
- Sustainability
- Upscaling to individual farmers
- Farmers need continuous support

Key CA lessons Learnt

- Farmers learnt that CA yields better the Traditional Agriculture
- Farmer learnt that CA improves soil nutrients and soil moisture holding capacity
- Farmers also learnt that CA is very labor intensive, hence the need for the need for working groups.
- The Project is not able to ascertain levels of CA uptake among the demonstration farmers.
- However farmer showed great enthusism
- There is therefore need to follow those demo farmers beyond the project lives span.


Transboundary Environmental
Monitoring Data

Threats to the Basin

Agriculture

Water Pollution

Taking cooli
power sta
returning it a
upsets

Industry

Working of metallic r
heavy use of water in
- toxic substances

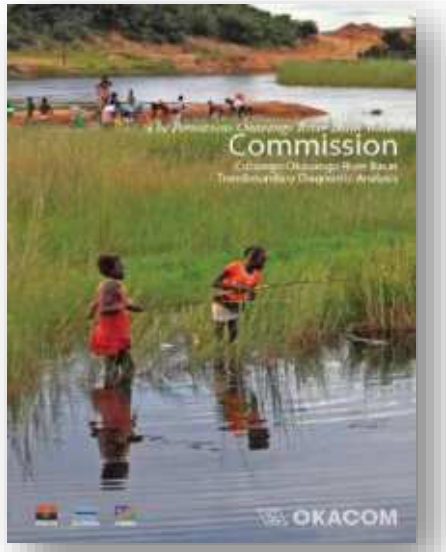
Domestic Purposes

Threats to the Basin –Poor waste management

Why Monitoring is important?

Answer?

To address concerns and their drivers as raised in the TDA



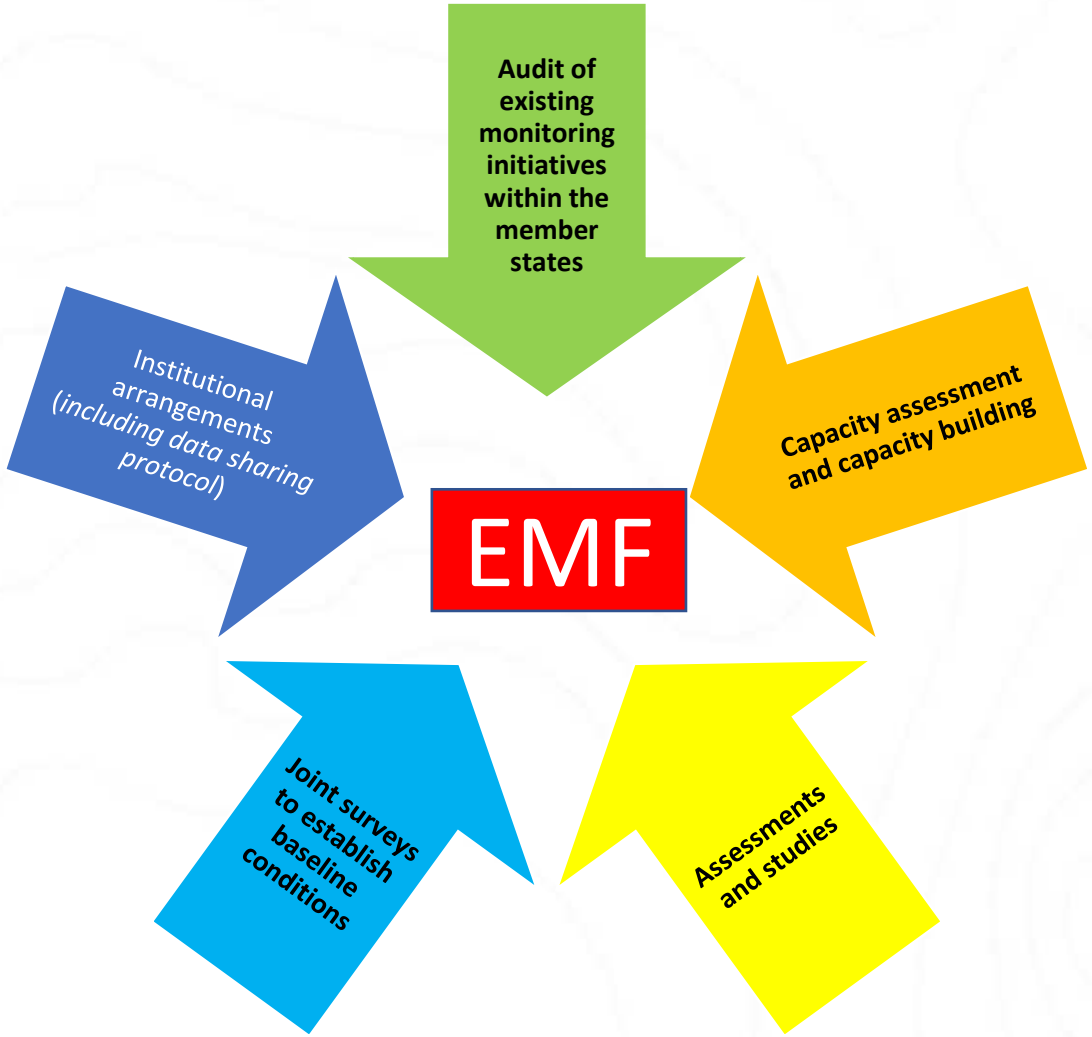
Concerns

- changes in the abundance and distribution of **biota**
- variation and reduction of **hydrological flow**
- changes in **sediment** dynamics
- changes in **water quality**

Drivers

- **population** dynamics
- **poverty**
- **land use** change
- **climate** change

The Approach



Existing Monitoring Initiatives

ANGOLA

- 1962 – 19 hydrological stations established
- Stopped working in 1975 due to civil unrest
- 6 stations resuscitated in 2005 but only measuring water level
- Currently there is no water quality, sediment and ecological morning

- NAMIBIA
- 2 functional surface water station Rundu and Mukwa
- Water quality monitoring at 13 sites. Monitoring should done twice a year (wet and dry) but not always possible due to resources constraints
- No sediments monitoring
- Some groundwater monitoring going. 20 groundwater monitoring

BOTSWANA

- Hydrological flows monitoring at Mohembo since 1933
- Daily manual gauging using ADCP and current meter on going.
- Initially there 23 stations
- 5 stations within Delta – discharge.
- 4 water levels
- SADC Hychos – not working due to equipment failure
- Water Quality monitoring since 2007
- Ecological monitoring by ORI

Training of WRTC Menongue, July 2018

Equipment training at Maun an Shakawe April 2021

Macro-invertebrates sampling training at Popa Falls (Photos by Dr Maryna Storie)



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Strengthened technical capacity of the OKACOM for joint management

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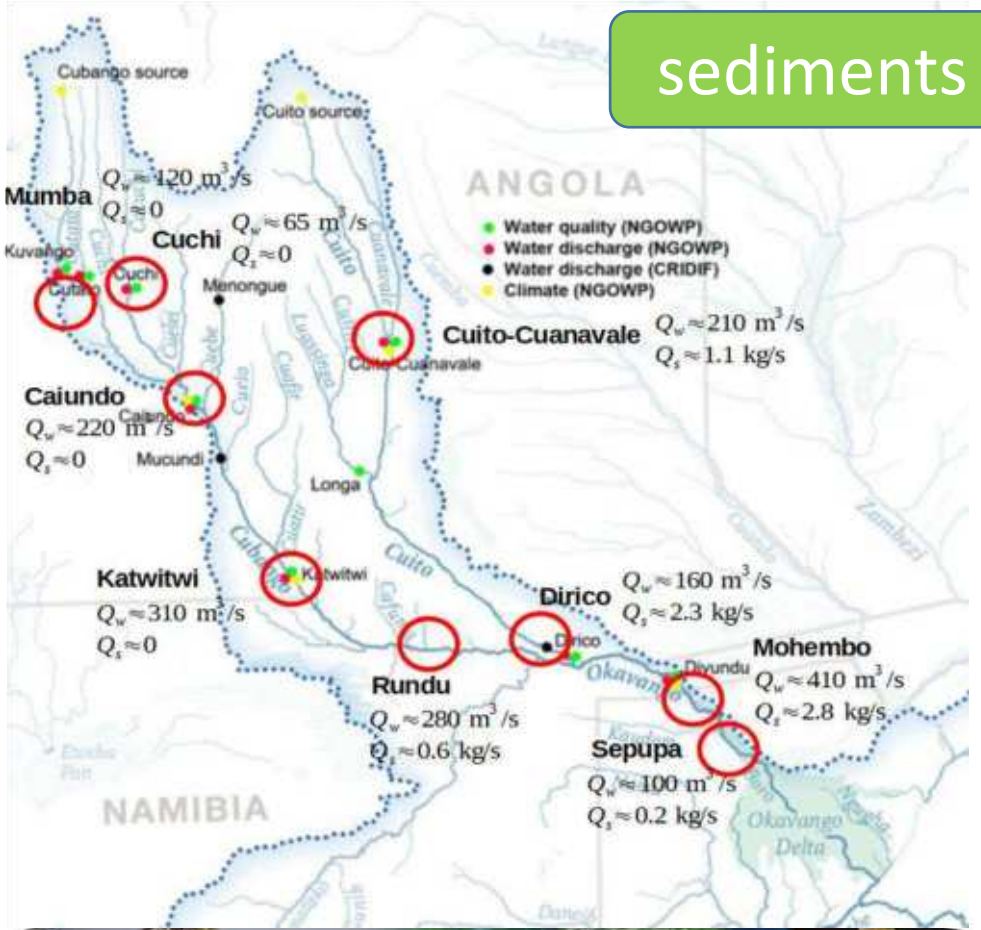
Sediments and water quality monitoring sites

sediments



Water Quality

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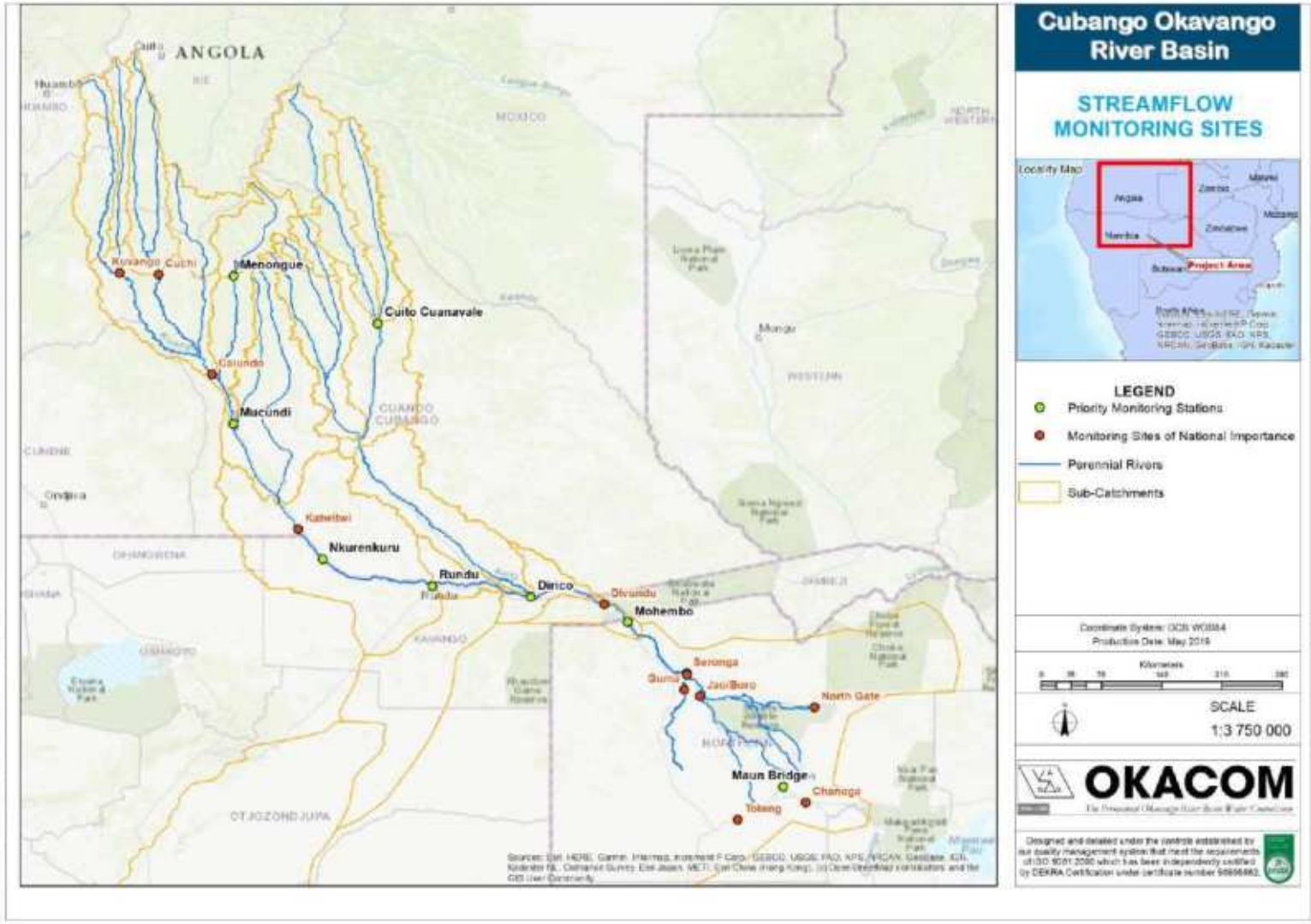
Hydromet Stations



Hydrometeorological Station

- **Maun Bridge:** streamflow monitoring site (also in Botswana) were installed and calibrated.
  - A Radar Level Sensor (RLS)
  - A telemetry cabinet which houses the data logger
  - Gauge plates (manual reading gauges)
  - Maun Bridge
- **Mohembo Site:** Civil works at the Mohembo streamflow and meteorological monitoring
- **Nkerunguru**: delayed due permits, flooding. Work postponed to August 2022

- **Cuito, Menongue, Mucundi, Dirico** – Only survyed
- Civil works not started yet
- Procurement of Company has been finalised

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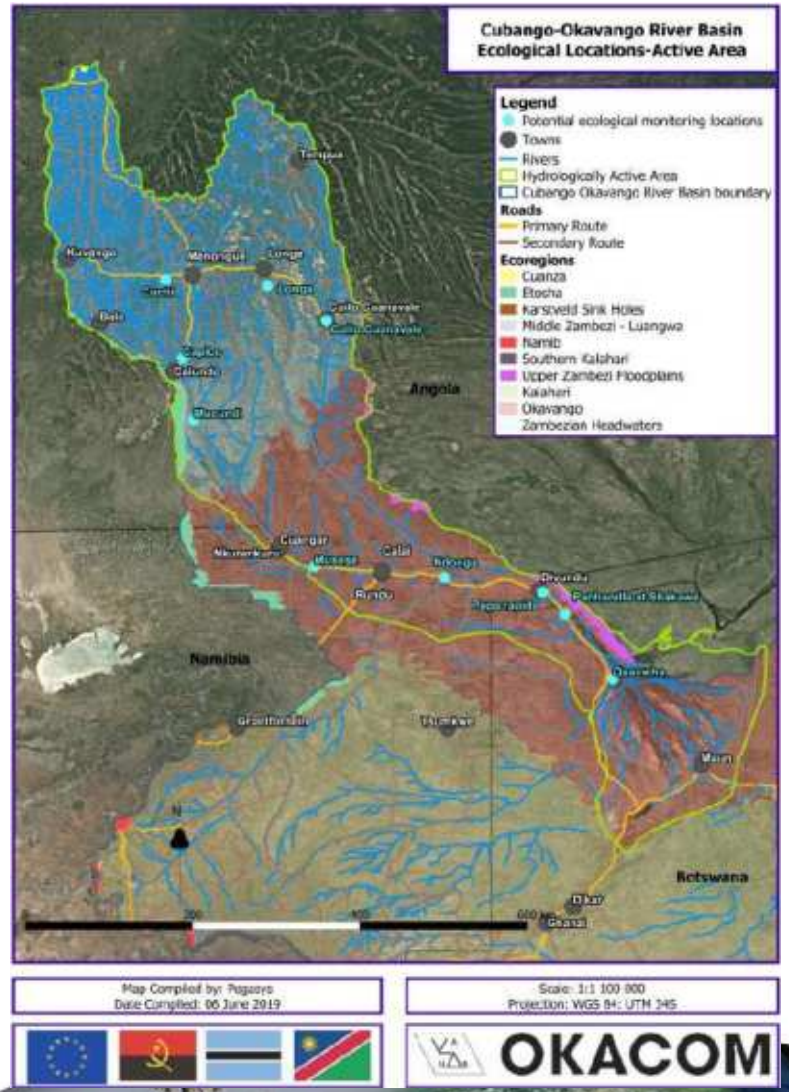
Ecological Monitoring



Ecological November 2021 survey

- Ecological sites assessed for the first time as part of the CORB ecological monitoring;
- 11 sites in total: 5 in Angola, 3 in Namibia and 3 in Botswana;
- Assessments included freshwater macroinvertebrates, diatoms, instream habitat;
- Accreditation of officials also conducted at Popa Resort in Namibia;
- State of the River report to be produced after the second assessment.
- Second ecological monitoring field survey conducted in May 2022;
- Same sites to be assessed - seasonal differences/comparisons;
- Review of Angolan regional sites (5 new sites identified by Angolan officials as part of their local monitoring);
- Further training/assistance as necessary to be provided for Member States while on-site.

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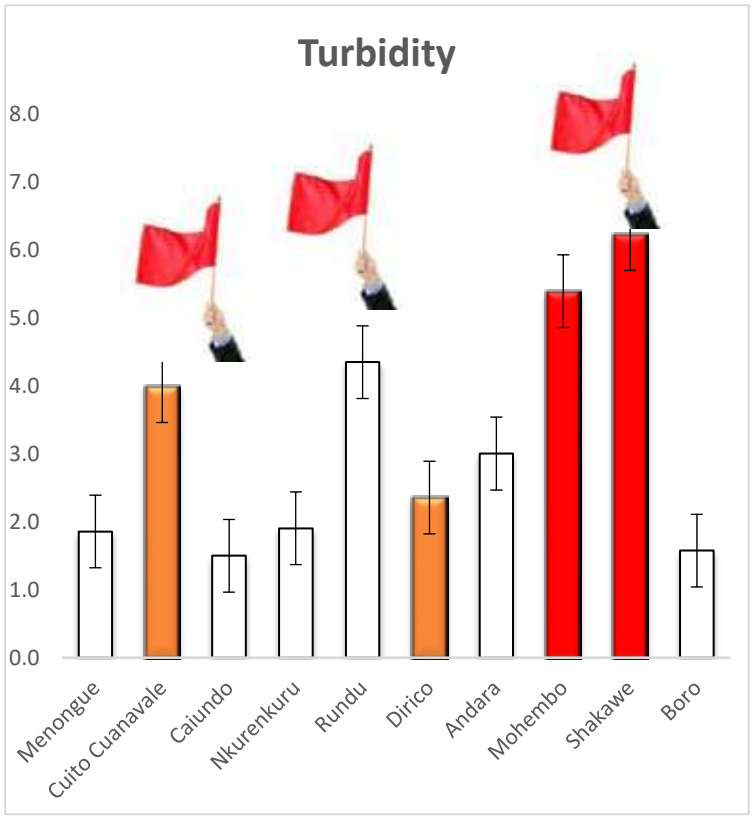
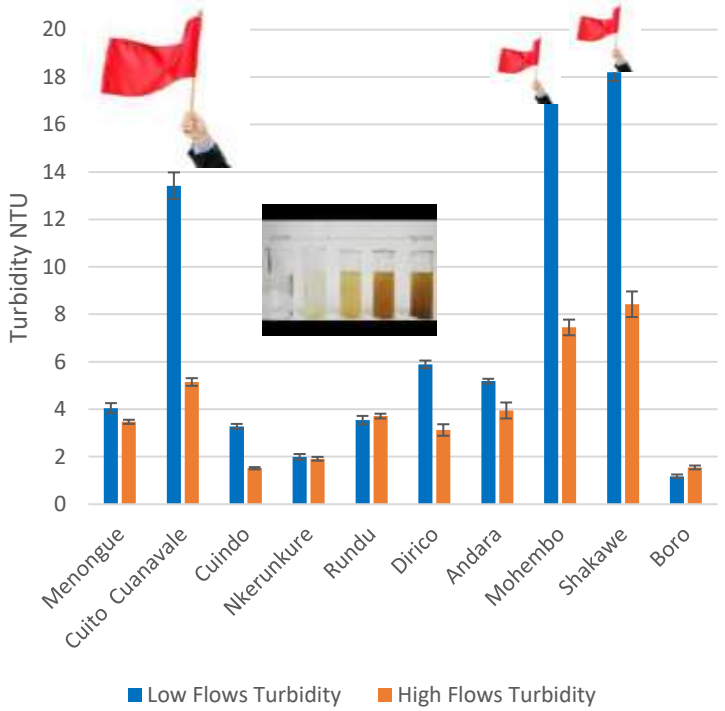
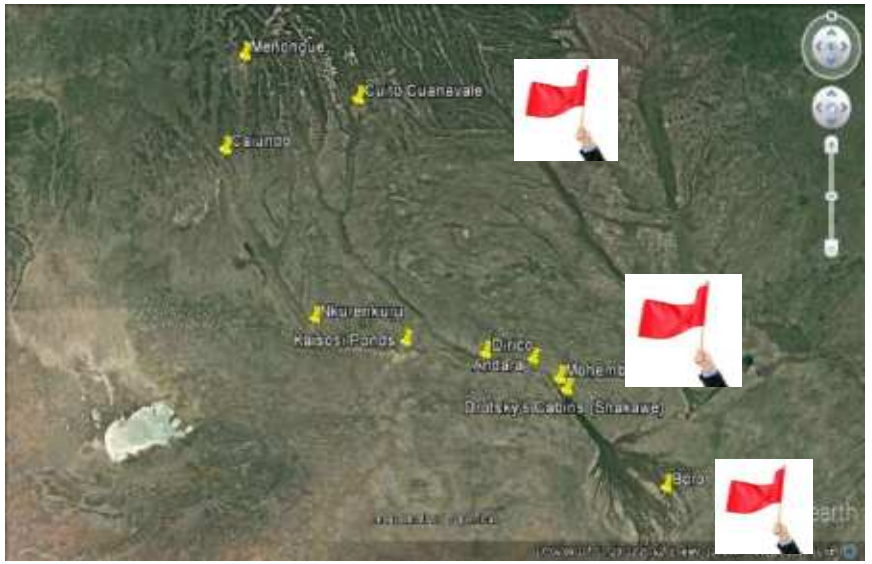
Turbidity







- Less than 25NTU for all the sights - desirable for most aquatic organisms
- Turbidity varies significantly both spatially and temporally
- Turbidity higher during the low flows and lower during high flows

Turbidity increases from upper part of the basin to lower part of the basin (panhandle) but decreases significantly in the delta outlet channel of Boro.

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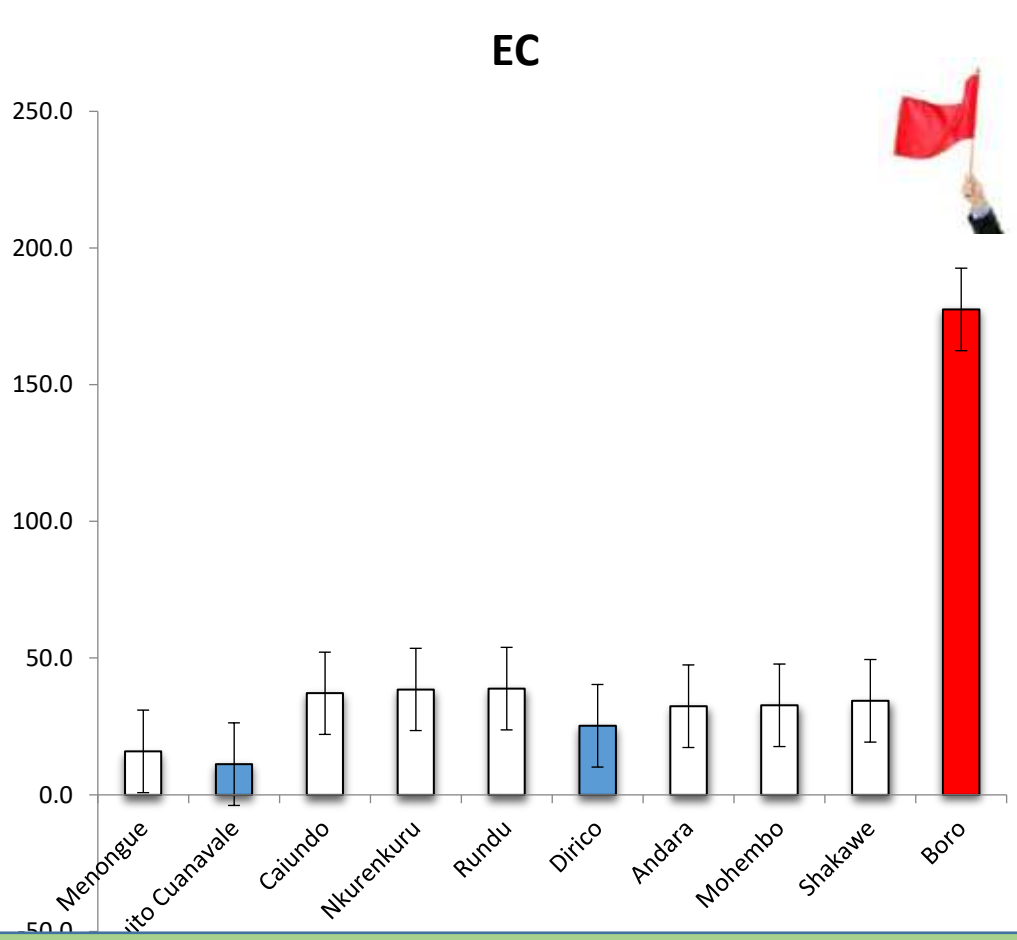
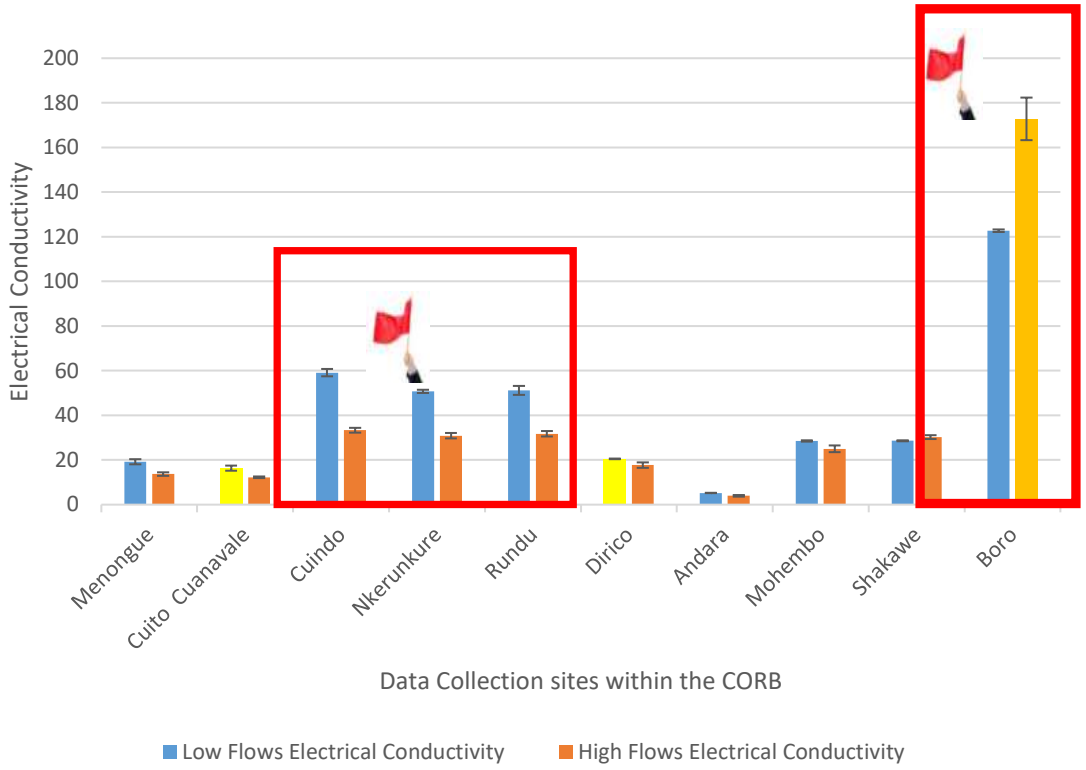
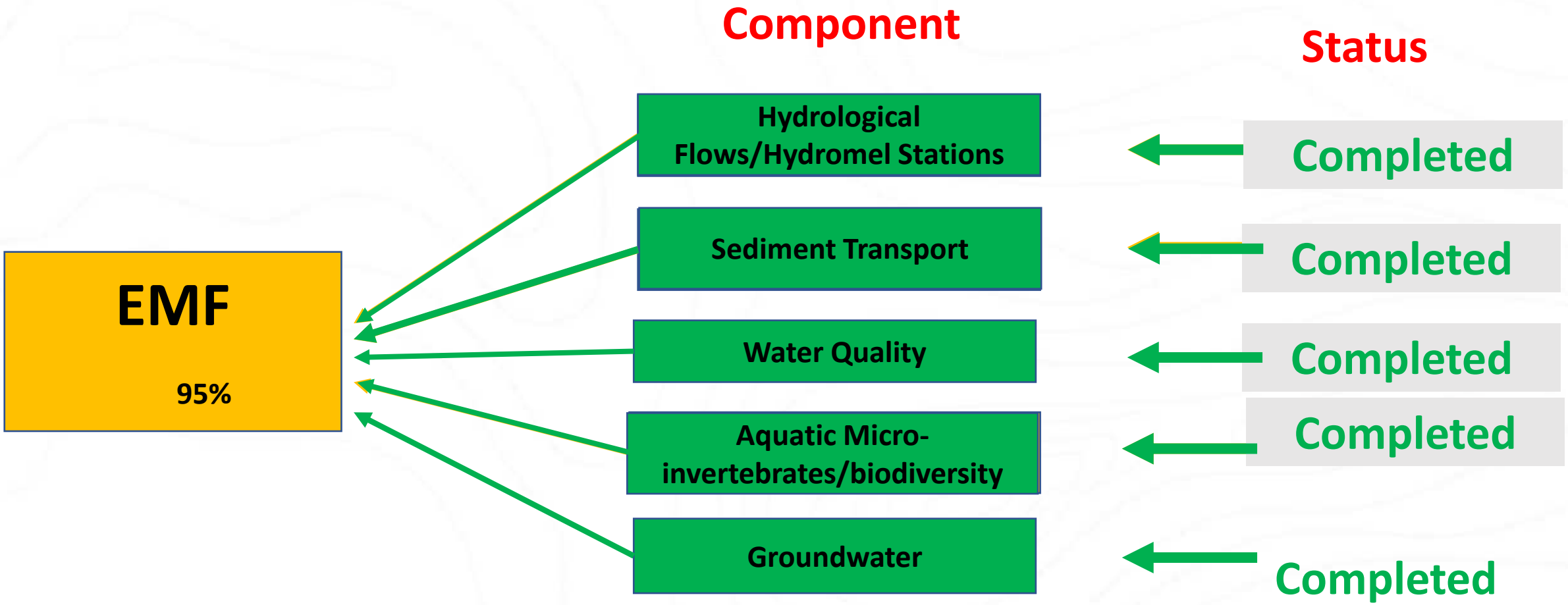
Electrical Conductivity





- Conductivity varies significantly, spatially and temporally (High during the low flows and lower during floods except at Boro
- Conductivity for most freshwater ecosystems ranges from **100 – 2000 (us/cm)**
- Conductivity is generally low in all sites except Boro
- General increase in conductivity from upper basin to the lower basin

Outcome 4. Basin's capacity to manage transboundary water resources based on the IWRM principles enhanced – Environmental Monitoring Framework



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Outcome 4. – IWRM Plan

CORB IWRM Plan

Consultations	Completed
EMF (95%)	Partially delayed
PES	Completed
SEA /Demand Forecasting/Socio-economic	Completed
Hydrological Flows/Hydro met Stations (70%)	Partially delayed
Sediment Transport	Completed
Water Quality/Water quality guidelines	Completed
Aquatic Micro-invertebrates/biodiversity	Completed
Groundwater	Completed

Data Sharing

- Data feeding into the OKACOM DSS
- Functional DSS been tested using data from Surveys)
- Data Sharing Protocol has been developed and approved
- Data sharing mechanisms still discussed

VISION

Economically prosperous, socially just and environmentally healthy development of the Cubango-Okavango River Basin

VISÃO

Desenvolvimento economicamente próspero, socialmente justo e ambientalmente saudável da bacia do Rio Cubango-Okavango

Thank You

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