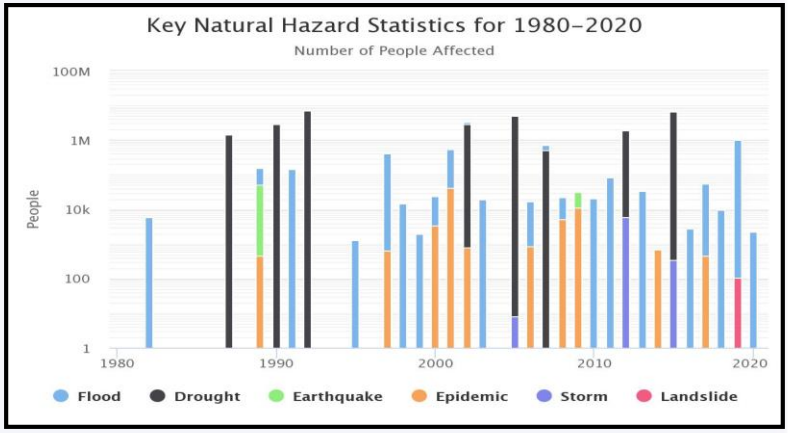
Integration of Satellite and Telemetry into Operational Community Based Flood Early Warning System for Disaster Preparedness and Risk Reduction – Case of Malawi.

Calvince Wara
Regional Hydromet Expert

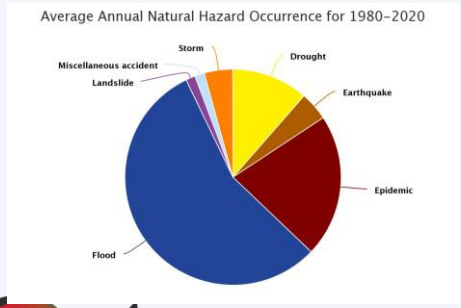
BACKGROUND

- In Sub-Saharan Africa, current development dynamics and demographic changes put more people and communities at risk from hydroclimatic disasters. Attributing to increasing rural poverty, rapid urbanization, growth of informal settlements, and catchment degradation.

- With a large population depending directly on agriculture, and settling in the floodplain, the impacts of localized disasters is significant on rural lives and livelihoods.

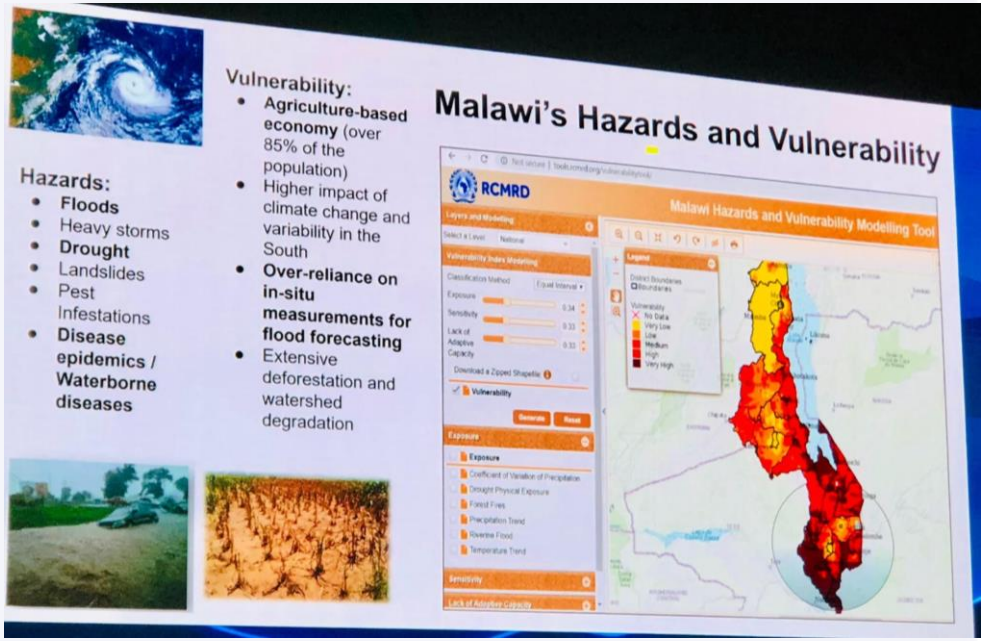


- Is there opportunities to involve the vulnerable communities?



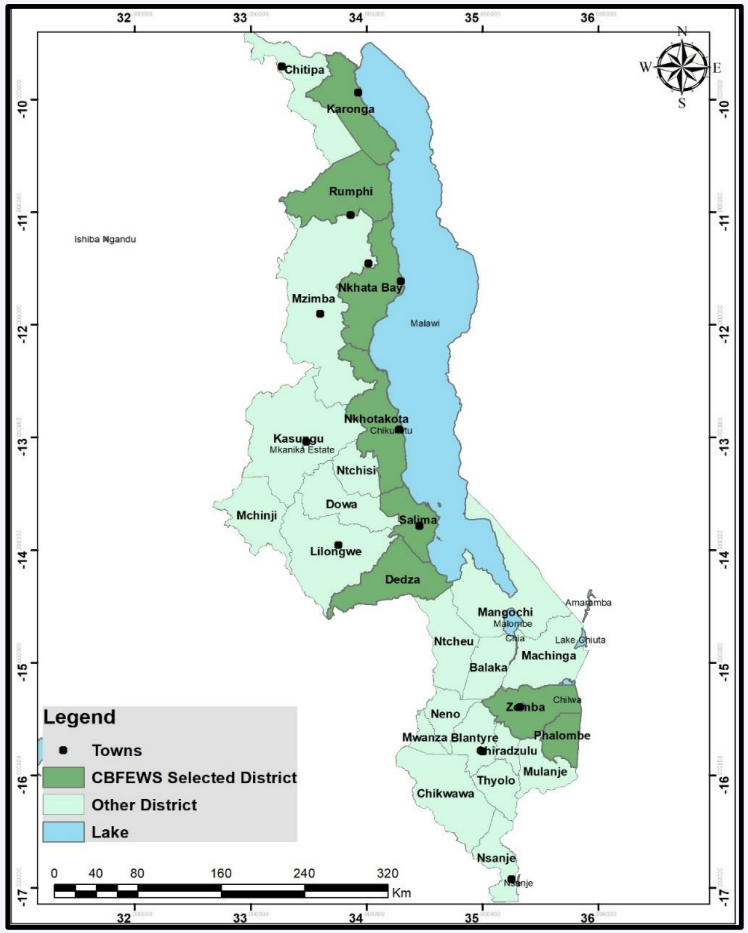
MALAWI

- In Malawi, hydroclimatic disasters (Flood & Drought) constitute more than 75% of all natural disasters.
- With the economy heavily dependent on rural agriculture, the hardest hit are rural communities who are least prepared and most vulnerable to the impacts of such disasters.
- Observed data indicates that floods are increasing in frequency & magnitude with increased destruction of lives, livelihood and physical infrastructure, hence reversing recent economic gains.



ESTABLISHMENT OF CBFEWS

- With financial support from the GCF through UNDP, RCMRD partnered with the ICIMOD and SEE of Nepal and collaborated with local agencies (DoDMA, DWR, DCCMS and MRCS) to establish an integrated flood forecasting system for the flood-prone districts.



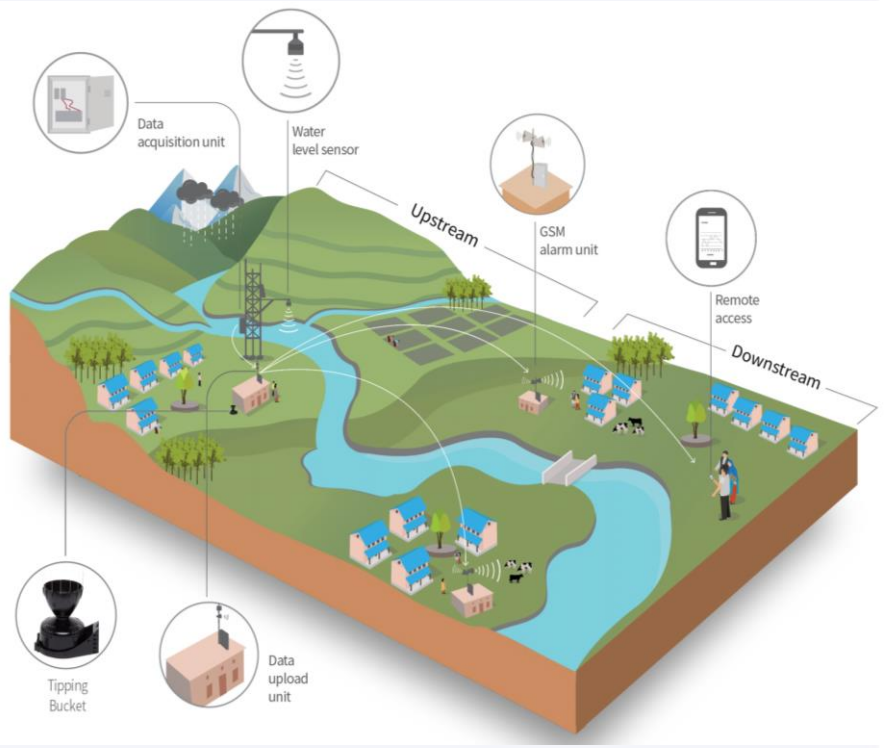
Main Objectives:

- To establish telemetric community-based flood early warning systems (CBFEWS) in 8 selected flood prone districts of:
  - **Karonga**, **Salima**, **Dedza**, **Nkhotakota**, **Nkhata Bay**, **Rumphi**, **Phalombe** and **Zomba.**
- Leverage the EOs and Satellite data to compliment telemetric CBFEWS for operational.
- Strengthening the technical capacity of the mandated government institutions in the use of the integrated system for flood early warning.

ESTABLISHMENT OF CBFEWS

- Community Caretakers upstream (telemetric sensor location) and downstream (Flood plain where Alarm is installed).
- Data Upload Unit and telemetric rain gauge (located within the Upstream Caretaker house),
- Manual River gauge for flood warning verification,
- Alarm/Loud Siren for Community Warning
- Mass SMS for warning dissemination
- Data visualization platform -DoDMA, DCCMS and DWR accessible by community and humanitarian organization.

TELEMETRY - COMPONENTS

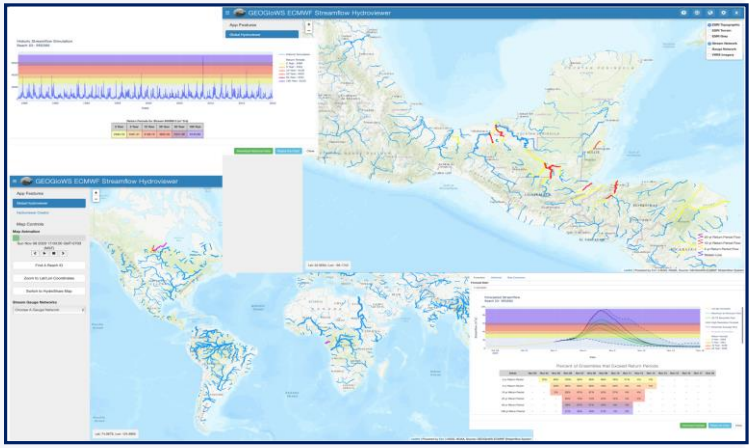


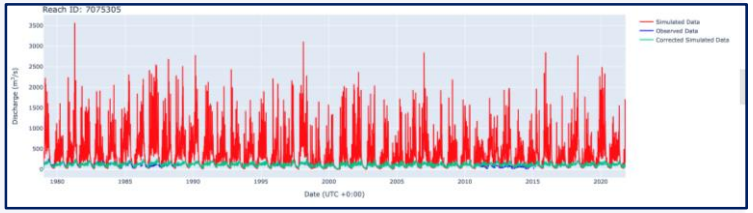
ESTABLISHMENT OF THE CBFEWS

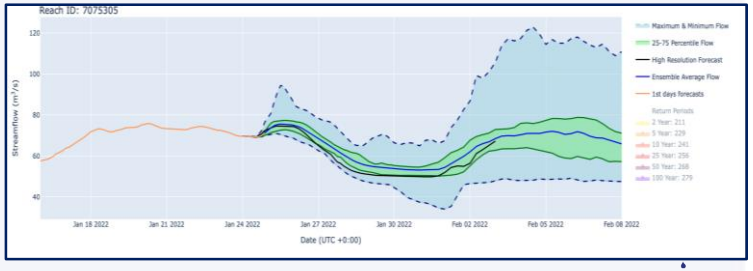
NILE BASIN INITIATIVE
INITIATIVE DU BASSIN DU NIL

GEOGloWS ECMWF Streamflow Service

- Combines modern cloud based computing technologies & cyber-infrastructure with hydrological and hdraulic science to deliver a web-based service for operational hydrological data infromation.
- Provides a 15-day ensemble and 10 day high res. streamflow forecast, and a deterministic historical simulation of river discharge data for over 40 years.
- Provides opportunity for bias correction using in-situ monitoring network







THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP

CIWA

german cooperation
DEUTSCHE ZUSAMMENARBEIT

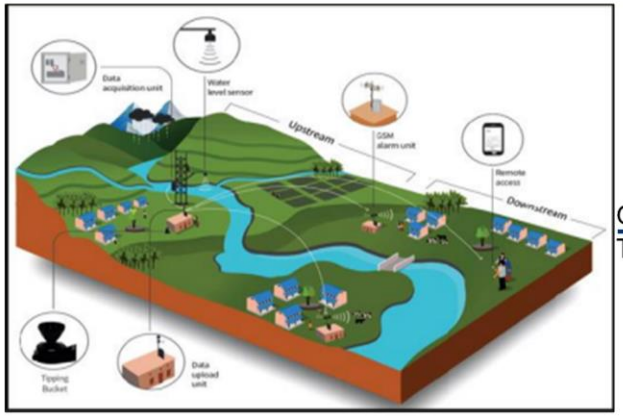
giz

2023 Nile Basin Development Forum, Uganda

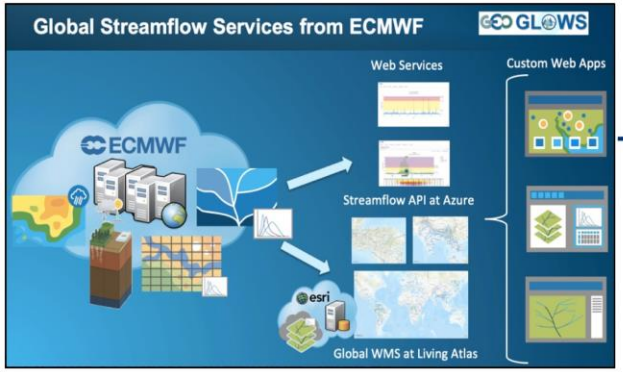
ESTABLISHMENT OF THE CBFEWS

NILE BASIN INITIATIVE
INITIATIVE DU BASSIN DU NIL

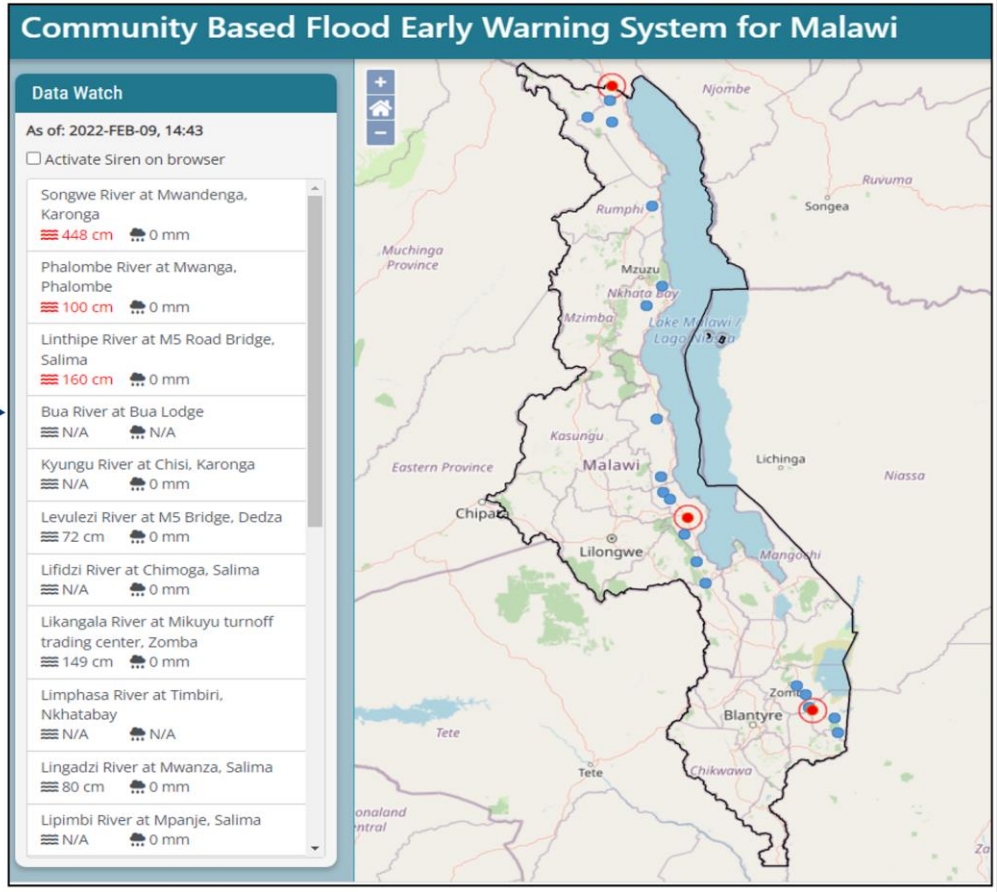
INTEGRATION of Satellite and Telmetry into CBFEWS



GSM Telemtry



REST API



THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP

CIWA

german cooperation
DEUTSCHE ZUSAMMENARBEIT

giz

2023 Nile Basin Development Forum, Uganda

ESTABLISHMENT OF THE CBFEWS

NILE BASIN INITIATIVE
INITIATIVE DU BASSIN DU NIL

Componnets of the integrated CBFEWS

(1.) Water level Sensor (DA)

Data Transmission

(2.) Server Data Upload (DU)

Alarm Triger

(3.) Alarm Unit (AU)

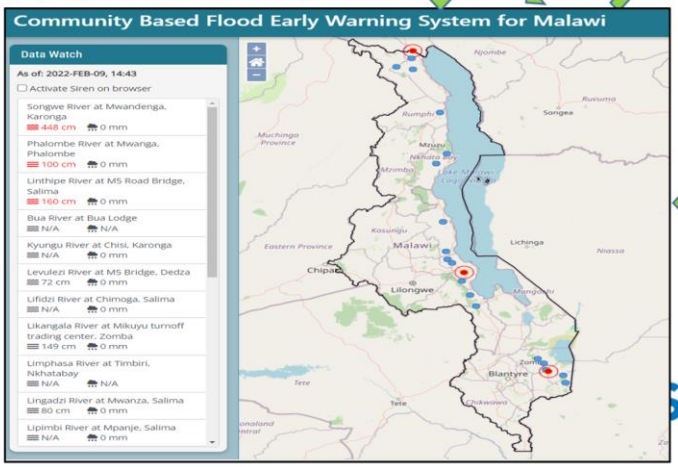
OC trigger

Alarm track

(4.) Manual River Staff Gauge

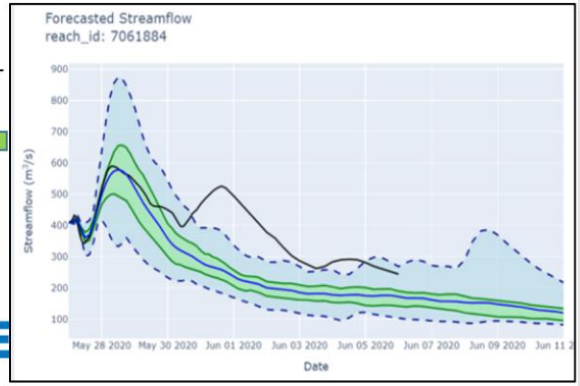
Warning & Alert levels calibration & validation

(6.) Operation CBFEWS platform



REST API

(5.) GEOGloWS Streamflow forecast data



THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP

CIWA

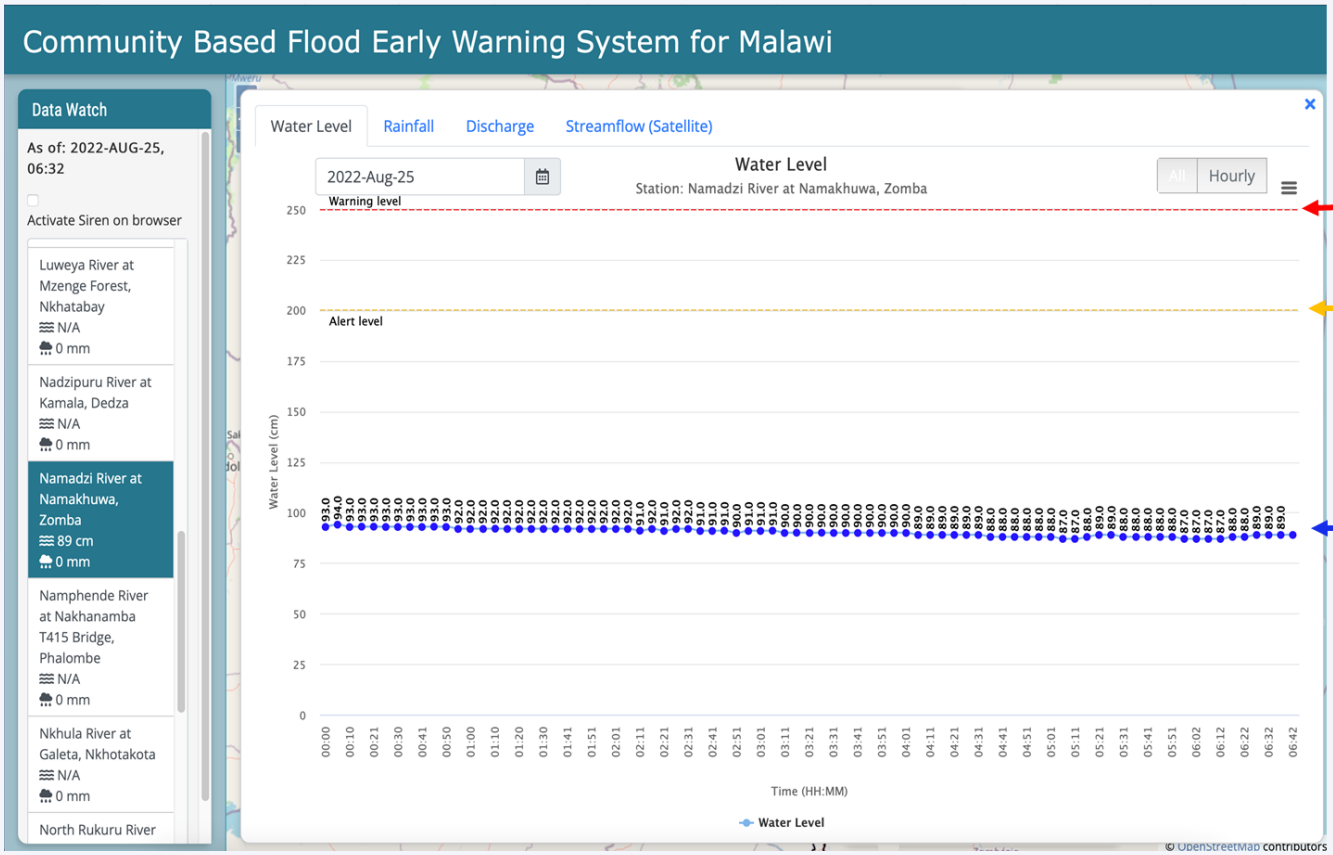
german cooperation
DEUTSCHE ZUSAMMENARBEIT

giz

2023 Nile Basin Development Forum, Uganda

ESTABLISHMENT OF THE CBFEWS

Flood Alert and Warning Information



Flood Warning Level

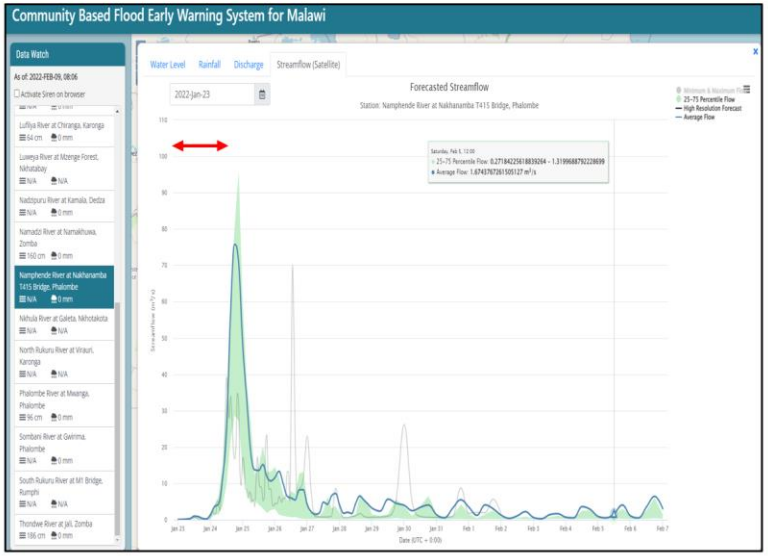
Flood Alert Level

Current Water Level

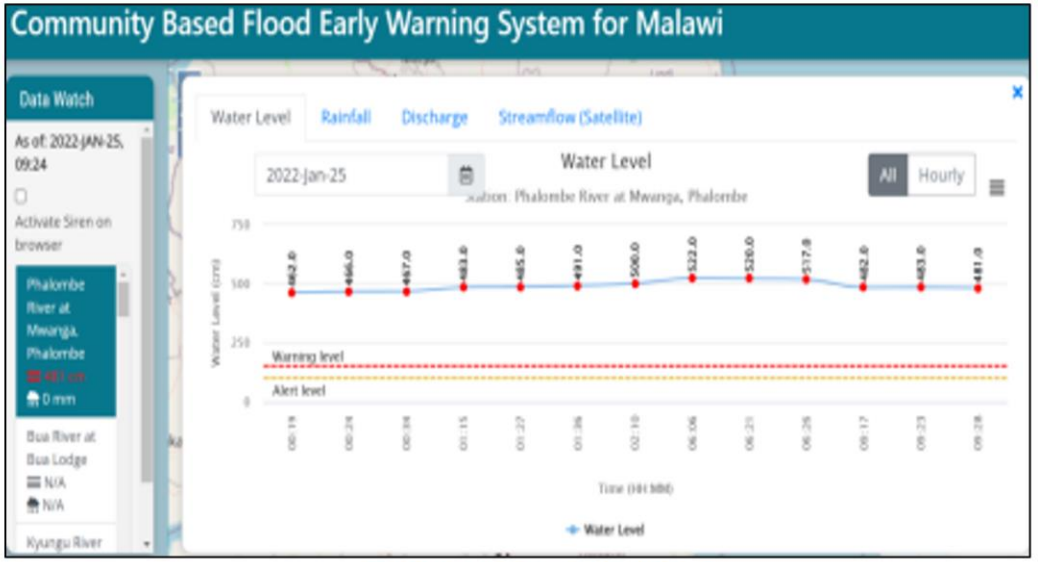
NILE BASIN INITIATIVE
INITIATIVE DU BASSIN DU NIL

Systems performance during Cyclone Ana in 22nd - 25th January 2022 –Phalombe River, Phalombe District, Southern Malawi.

GEOGloWS Streamflow forecast data picked the of Cyclone Ana flood wave on 20th January.



Telemetric measure river water level above the Warning & Alert Levels by the 25th January.



THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP

CIWA

german cooperation
DEUTSCHE ZUSAMMENARBEIT

giz

2023 Nile Basin Development Forum, Uganda

IMPACT & COMMUNTY PERCEPTION

NILE BASIN INITIATIVE
INITIATIVE DU BASSIN DU NIL

Post-Flood Assessment and Evaluation by Red Cross Society

THE NATION
TUESDAY, 24 MAY 2022

Floods warning gadgets save lives in Karonga

ANDREW MKONDA
MALAWI NEWS AGENCY

People around Songwe River in Traditional Authority Mwakaboko in Karonga District have said early warning gadgets saved their lives and livestock from floods this year.

Speaking on Saturday when Malawi Red Cross Society officials appreciated the impact of the gadgets in the area, Mwakaboko Village Civil Protection Committee chairperson Moffat Mwaseya said previously, people were caught unawares by floods, thereby losing lives.

He said: "But this year, no single life has been lost as people were able to escape to the upland on time following alerts from the gadgets.

"Without the gadgets, we would have lost many lives becau[illegible] River flooded beyond expectation."

PHOTOGRAPH: ANDREW MKONDA, MANA

Mwaseya (R) explains how the warning system works

One of the flood survivors, Dickson Ngonya, whose house collapsed during the disaster, said his family fled to safety after hearing an alarm showing that the river had flooded.

He said: "We were fast asleep when the alarm rang. We quickly woke up and left the house surrounded by water.

"No sooner had we left, than the house collapsed."

Malawi Red Cross Society disaster preparedness and mitigation specialist Cecilia Banda said it was interesting to learn that community members were following warnings using modern equipment.

She said: "We are impressed with how people are using the gadgets. It shows that Modernised Climate Information and Early Warning System Project we are implementing is bearing fruits."

Communi[illegible]ased early warning system gadgets were installed in four rivers in the district with financial support from UNDP. The rivers are Kyungu, North Rukuru, Lufilya and Songwe.

Karonga is one of the disaster-prone districts in the country and this year, over 6 000 households were affected by floods in the district. ■

"The system saved our lives and livestock from flood this year. Previous years people were caught unaware by floods thereby losing lives. But this year no single life has been lost as people were able to escape to the uplands on time following alerts from the gadget." Community Chairman – Karango District

THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP

CIWA

german cooperation
DEUTSCHE ZUSAMMENARBEIT

giz

2023 7th Nile Basin Development Forum, Uganda

- The integrated system supports the government's efforts of expansion of **the use of Modernized Climate Information and Early Warning systems (M-CLIMES) in Malawi** to enhance community preparedness and resilience.
- **GEOGloWS –**increased the warning lead time from hours to days for **Anticipatory Actions** and complements the telemetric water level sensors during the downtime period. This capability enhances community preparedness and leads to early action that significantly reduces their risk to flood disaster.
- The system was featured in the recently concluded **27th United Nations Climate Change Conference or Conference of the Parties of the UNFCCC, (COP27)** in Egypt.
- Post Disasters assessment by DoDMA indicate a financial savings in 2022 (Cyclone Ana) and 2023 (Cyclone Fredy) of about of about **40 and 12 million usd respectively,** in disaster response this year, **90% of the saving is attributed to the established CBFEWS system.**
- The Government of Malawi through DoDMA have secured funding from the **World Bank to Upscale the system into 10 Southern districts frequently impacted by Cyclone induced flooding - covering 40 rivers**.
- Streamline the warning information to community level understanding.


NILE BASIN INITIATIVE
INITIATIVE DU BASSIN DU NIL
THANK
YOU!