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INITIATIVE DU BASSIN DU NIL

Nile Basin Initiative (NBI)
Eastern Nile Technical Regional Office (ENTRO)

Hydromet Needs and Opportunities - the Nile Context

Azeb Mersha
East Africa Drought Monitoring and Forecasting Workshop
Addis Ababa, Ethiopia

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Outline

1. Overview of the Nile
2. History of NBI – ENTRO
3. Features of Eastern Nile basin
4. Hydromet needs and opportunities
5. Ongoing activities on Flood and Drought forecast

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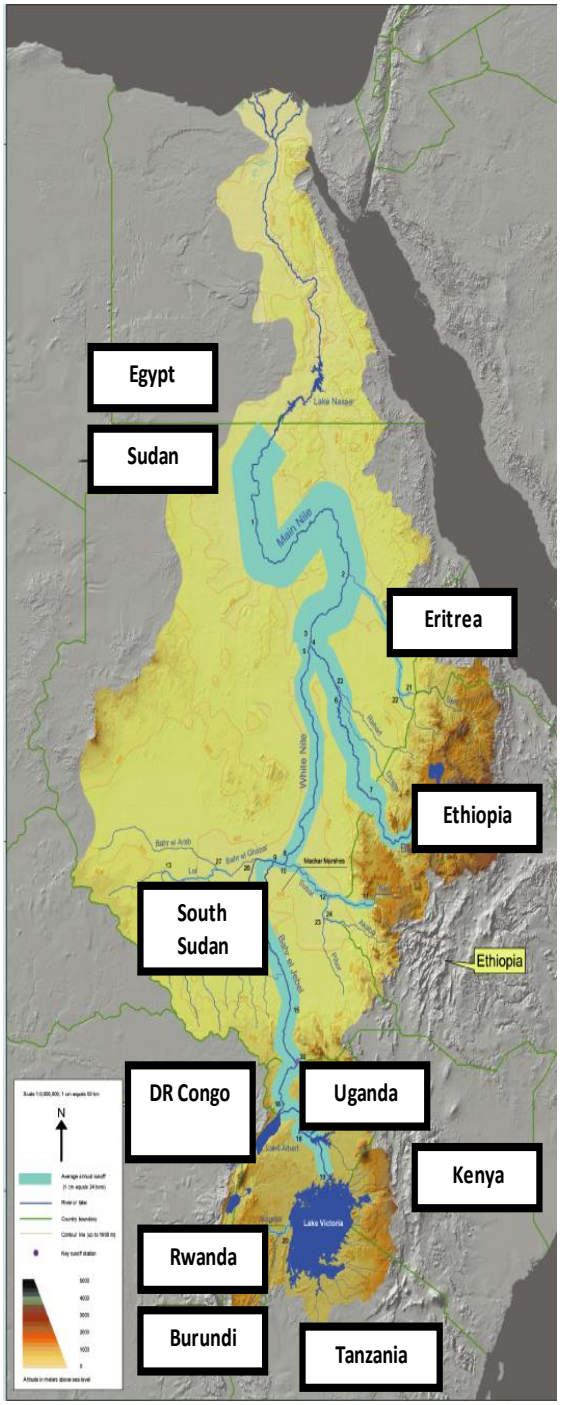
The Nile Basin

- Africa's largest river basin by area
- Area: 3.25 Million Km2 (10% Africa)
- Length: 6,695 Km (The longest in the world)
- Main Tributaries: **White Nile & Blue Nile**
- Population: 232 Million (within NB)
- Mean annual discharge 84 BCM
- Huge Water Loss in the System



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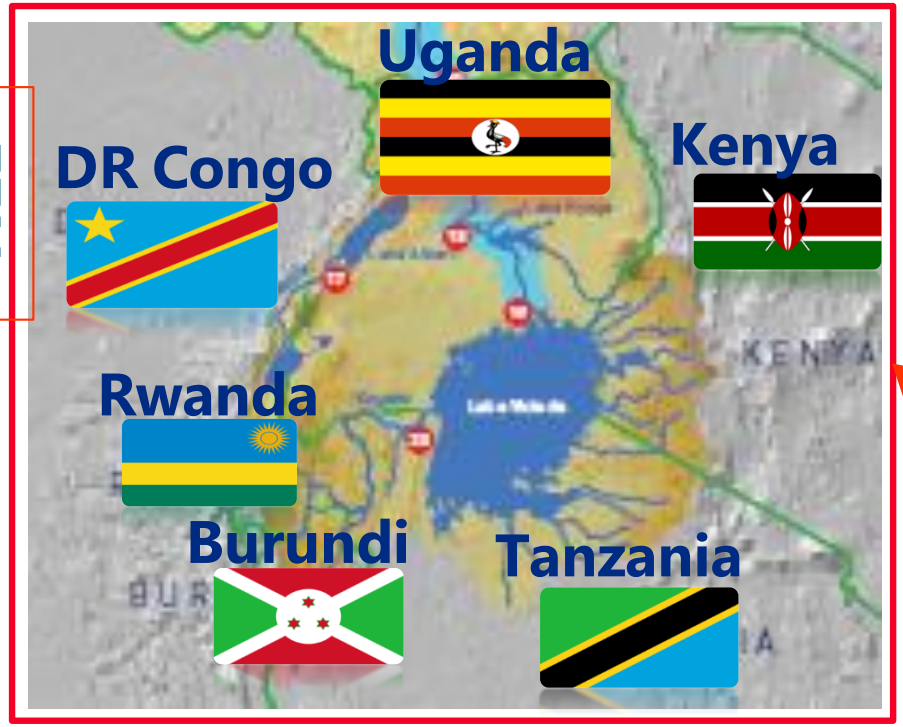
The Nile Basin

Eastern Nile

- The Nile Basin is shared by 11 countries
- All except Eritrea are members of the Nile Basin Initiative (NBI)



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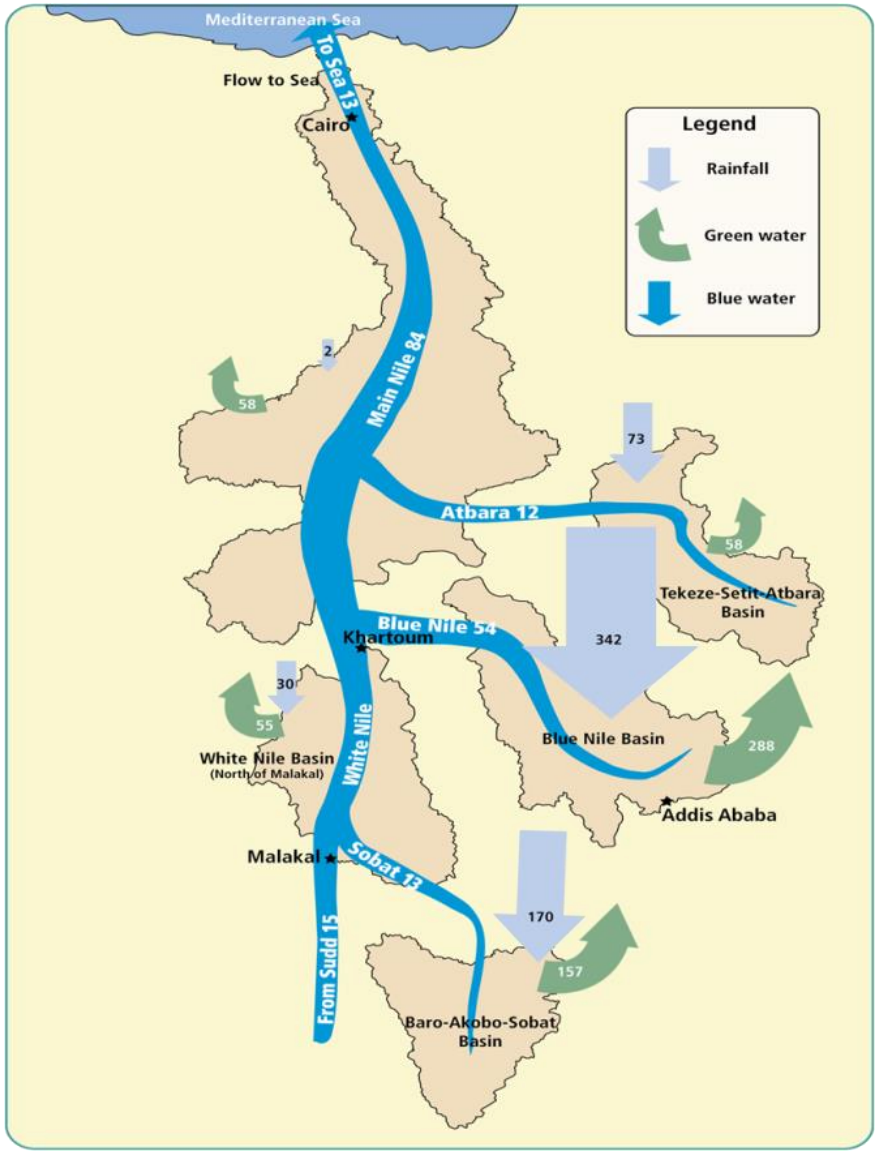
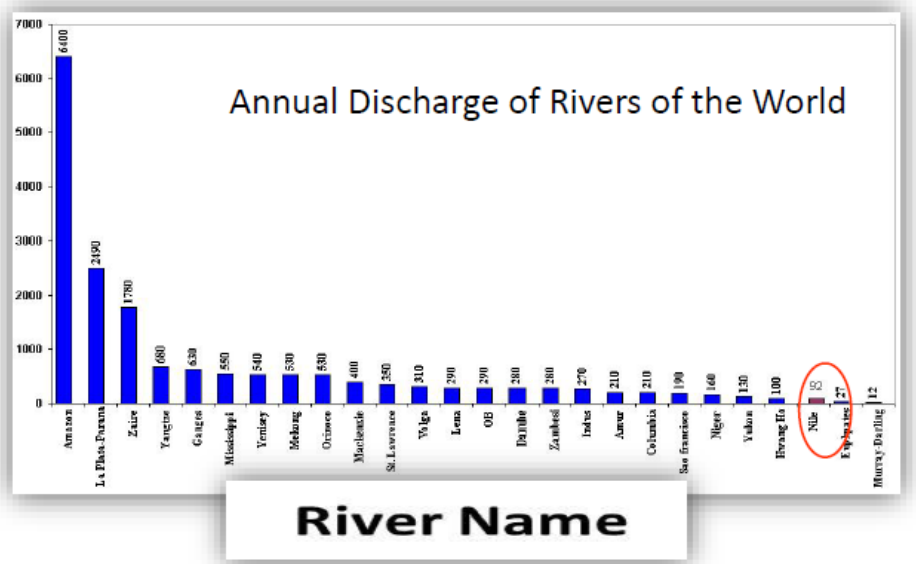
Nile Basin…
a water scarce region



(Long-term) annual flow at High Aswan Dam 84 BCM

- *Ethiopian highlands (86 %)*
- *Nile Equatorial Lakes region (14 %)*



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The Need for a Regional Organizations

Cooperation on the Nile (Pre – NBI)

1. Hydromet Survey:

- In 1963-1964 the equatorial floods lead to the hydro-met data sharing agreement that was signed in 1967 by Egypt, Sudan, Uganda and Rwanda, Zaire , Central African Republic

2. TECCONILE: Technical Cooperation for the Promotion and Environmental Protection of the Nile Basin

- Started in 1993 by Egypt, Sudan,, Uganda and Tanzania, Zaire
- Ethiopia, Kenya, Eritrea as observer

The Need for a Regional Organizations

3. Nile Basin Initiative(NBI):

- Though not inclusive these two activities promoted interaction and shared understanding of basin issues among experts and recommended an all inclusive cooperation mechanism to address common challenges.
- Following this recommendation the NBI was established in 1999.

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Nile Basin Initiative(NBI)

The Foregoing provide the rationale for Nile Basin Cooperation which took two parallel tracks of a Strategic Action Program which were hoped to complement each other!

→The Cooperation Track (NBI) – via

→ Shared Vision Program

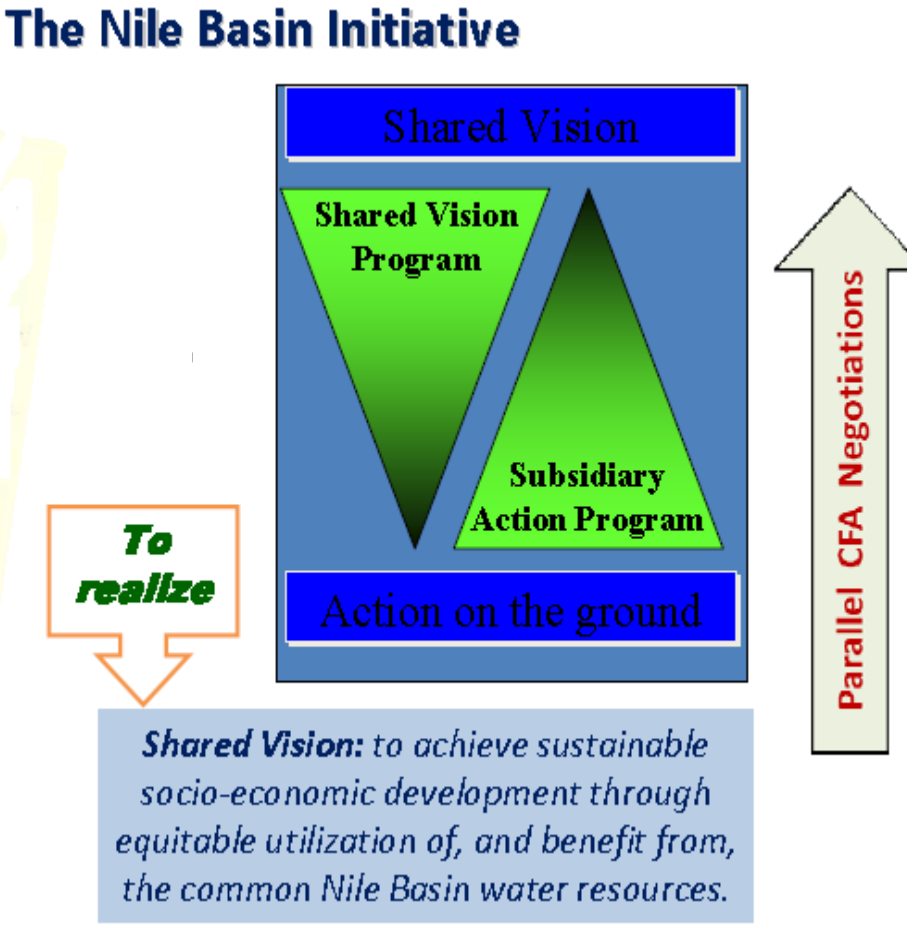
→ Subsidiary Action Programs

→The Negotiation Track (CFA) – Negotiation to build a New Legal Regime

ENTRO and ENSAP

After the establishment of the NBI

- The basin wide Shared Vision Program (SVP) was launched to build **trust, capacity, knowledge base and analytical tools**.
- The Subsidiary Action Program (SAP) was launched to undertake **concrete actions on the ground at sub-basin levels** of the Eastern Nile (ENSAP) and Nile Equatorial lakes (NELSAP).
- **The Eastern Nile Technical Regional Office (ENTRO) was established in 2001 to implement the ENSAP.**



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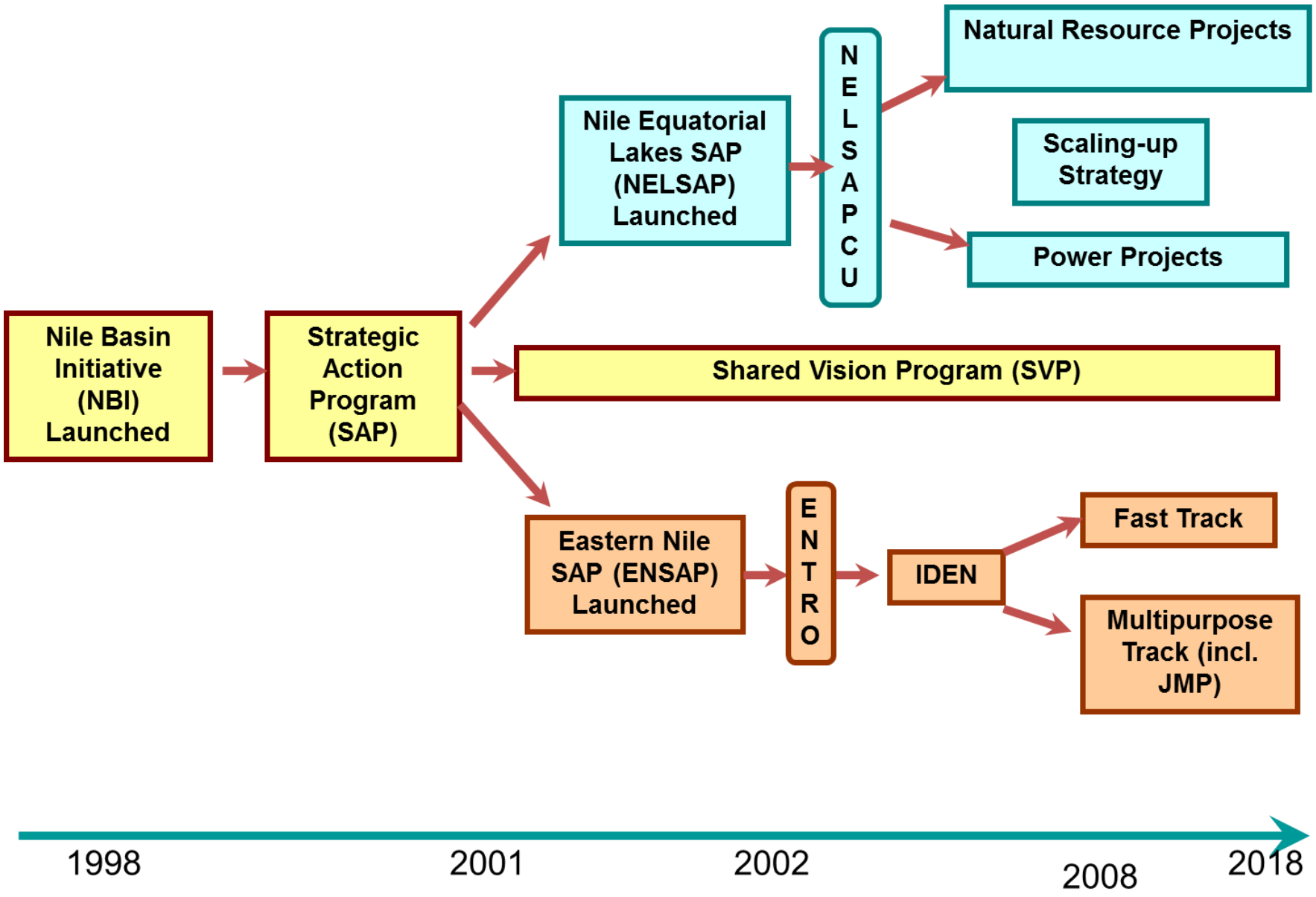
NBI – Evolving Programs



ENTRO

- ENTRO (Eastern Nile Technical Regional Office) is one of the **three** Centers of the Nile Basin Initiative, (NBI) established by Eastern Nile **Countries(Egypt, Ethiopia, South Sudan and Sudan**).
- ENTRO is a **technical** arm of ENSAP whose overall objective is the cooperative development and management of the water resources of the Eastern Nile sub-basin in a sustainable and equitable manner.

ENTRO Mandate

ENTRO provides permanent platform for:

- **Facilitating cooperation**
  - Confidence Building.
  - Development Communication.
- **WRM & Planning**
  - Information and Knowledge Development and dissemination.
- **Water Resources Development.**
  - Identification and Preparation of Transboundary Investment Projects.
- **Institution Building**
  - EN Institutions and Professionals Capacity Building.
  - ENTRO capacity strengthening.

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Eastern Nile Basin

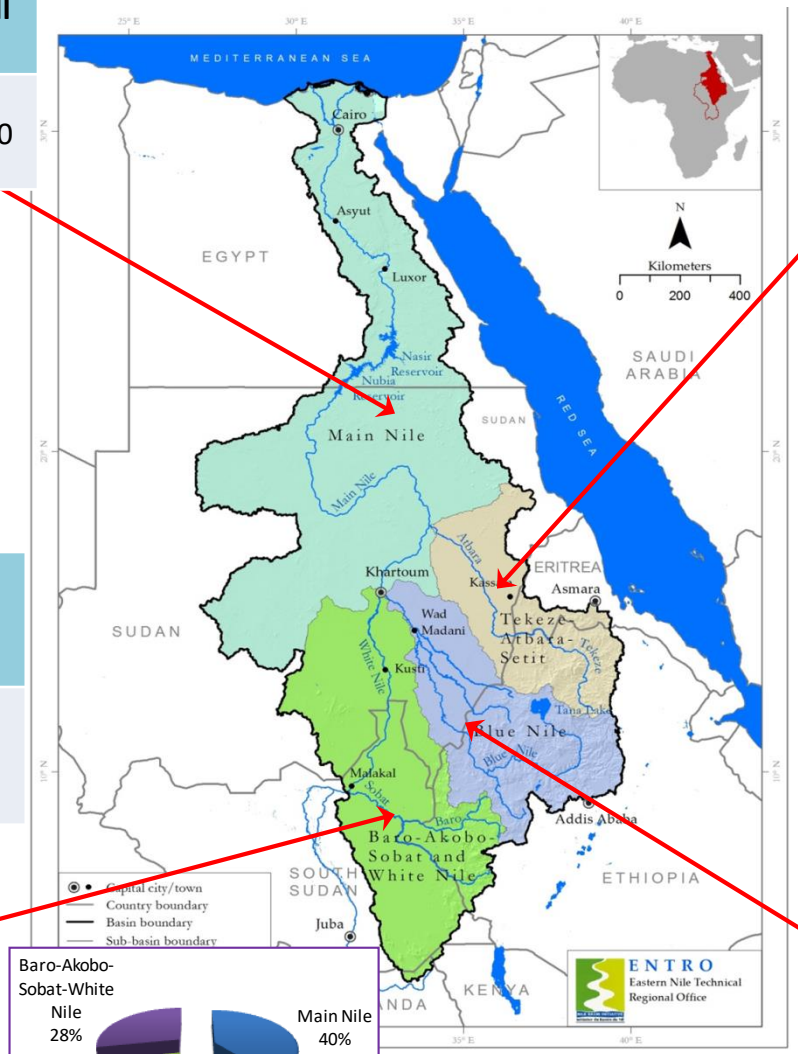
Eastern Nile Sub-basins

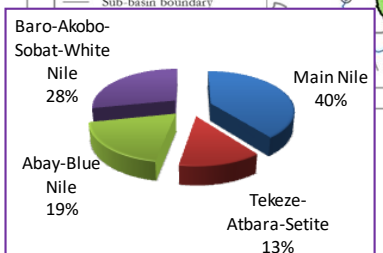
Sub-basin	Area (km²)	Flow (BCM)	Annual rainfall (mm)
Main Nile	656,398	84	0 – 200

- Very low rainfall
- The Aswan High Dam and Lake Nasser
- Extensive irrigation systems
- The Nile delta

Sub-basin	Area (km²)	Flow (BCM)	Annual rainfall (mm)
Baro-Akobo-Sobat	205,775	13	500 – 1750

- Important wetland areas
- Complex ethnic and tribal context
- Little water infrastructure





Sub-basin	Area (km²)	Flow (BCM)	Annual rainfall (mm)
Tekeze-Setit-Atbara	227,128	12	200 – 1500

- Water availability is highly variable
- Little water infrastructure (except for new Tekeze hydropower dam and largely silted Kashm-el-Girba dam)
- Sediment flows are high
- Potential for small and medium-scale projects

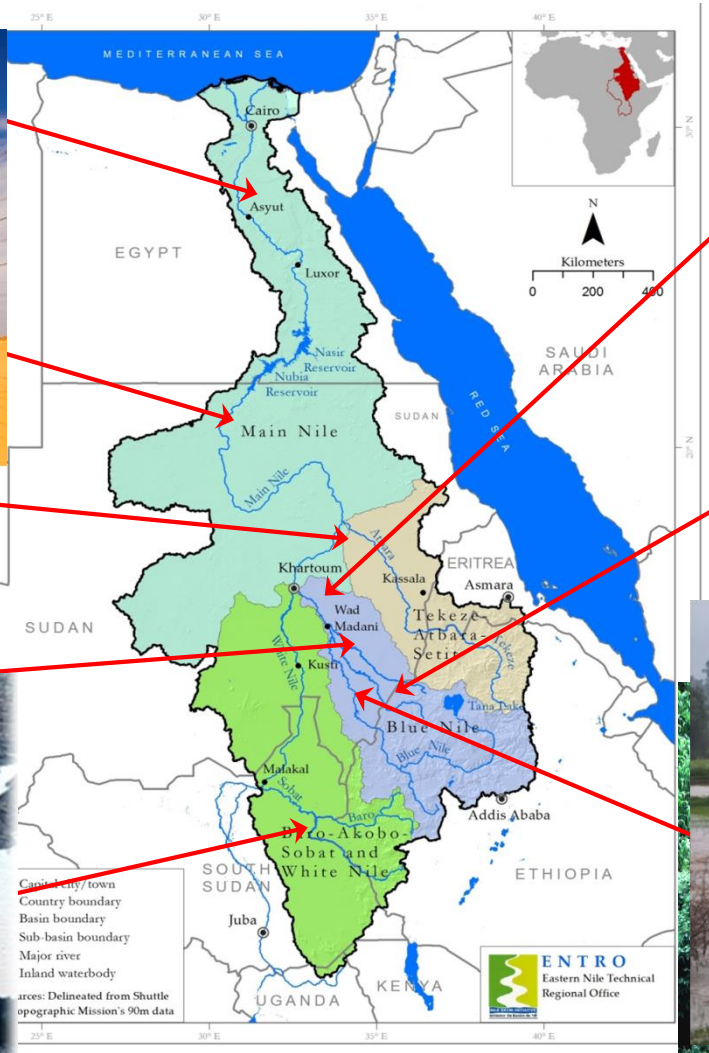
Sub-basin	Area (km²)	Flow (BCM)	Annual rainfall (mm)
Blue Nile	311,548	54	500 – 1800

- Contributes majority of the water to Eastern Nile system
- Sediment flows are high
- Hydrologic variability is high
- Gezira Irrigation
- Significant potential for economic development. Dam potential (GERD recently initiated)

Challenges & Opportunities of Eastern Nile Basin

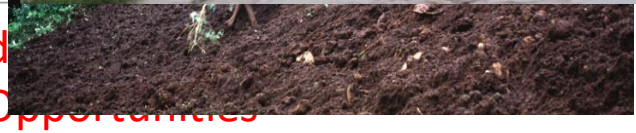
Agriculture/ Irrigation

Regional



Flood Management

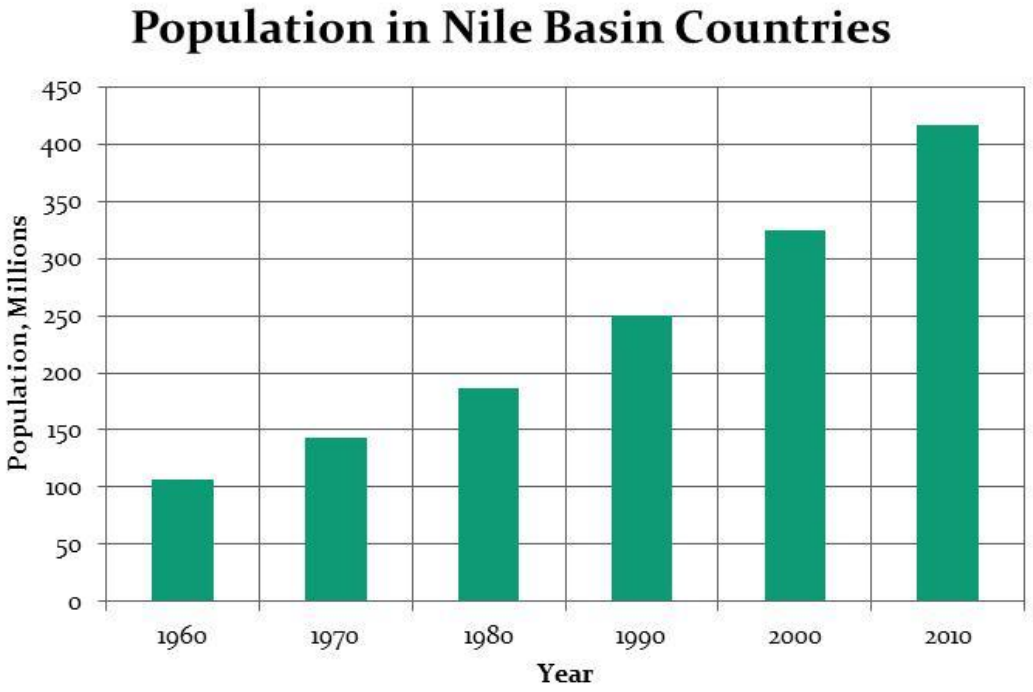
Land Degradation Reversal/Watershed Management

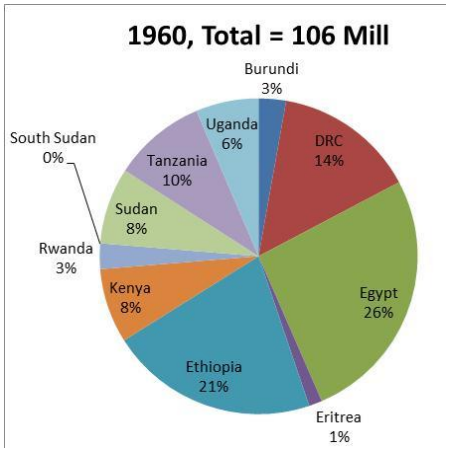


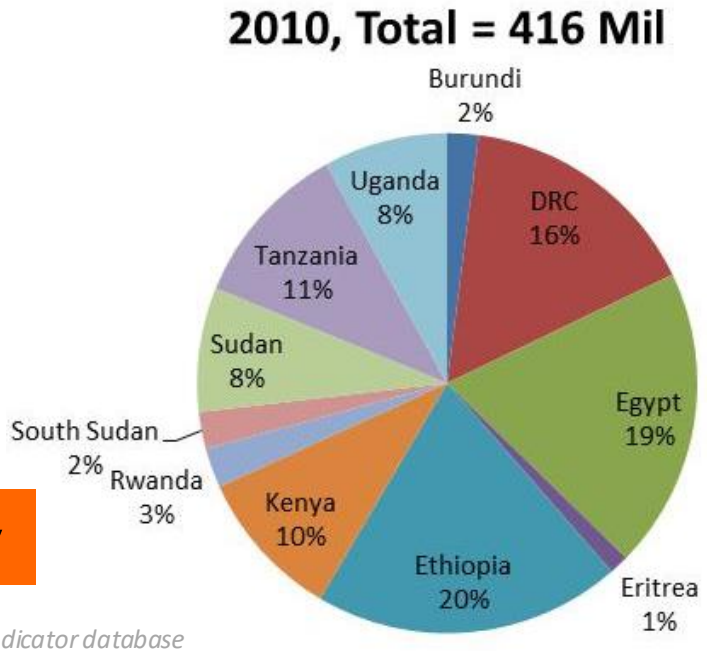
ning, Preparation, Facilitation, and

nge Adaptation/Carbon Finance Opportunities

Rapid increase in population…







Population of basin countries increased 4 fold between 1960 and 2010

Shrinking per capita water availability

Source: World Bank; World Development Indicator database

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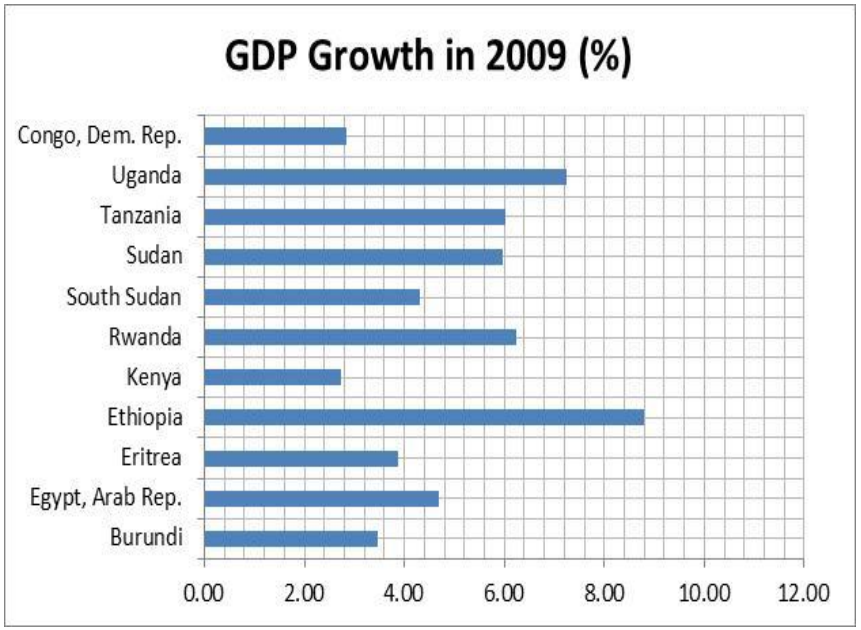
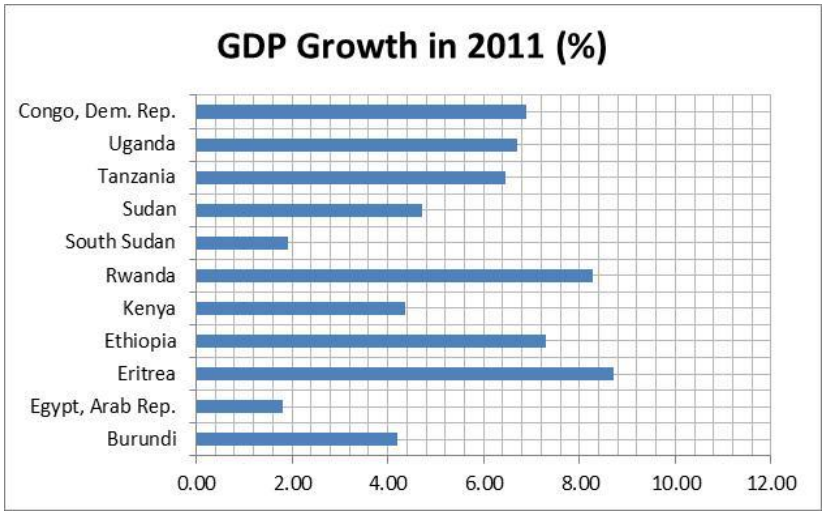
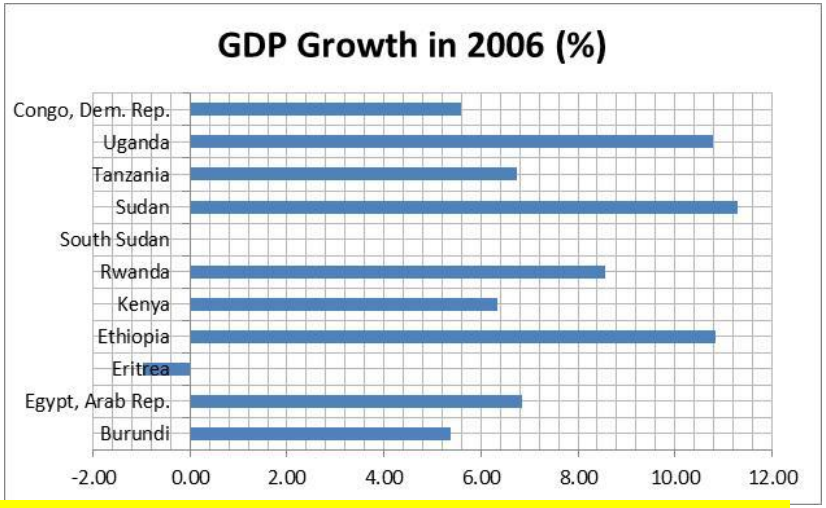
Demand for Water Growing.....

Increasing energy demand





Increasing food demand



Increasing water demand

More competition for water to meet demands

Source: World Bank, World Development Indicator database

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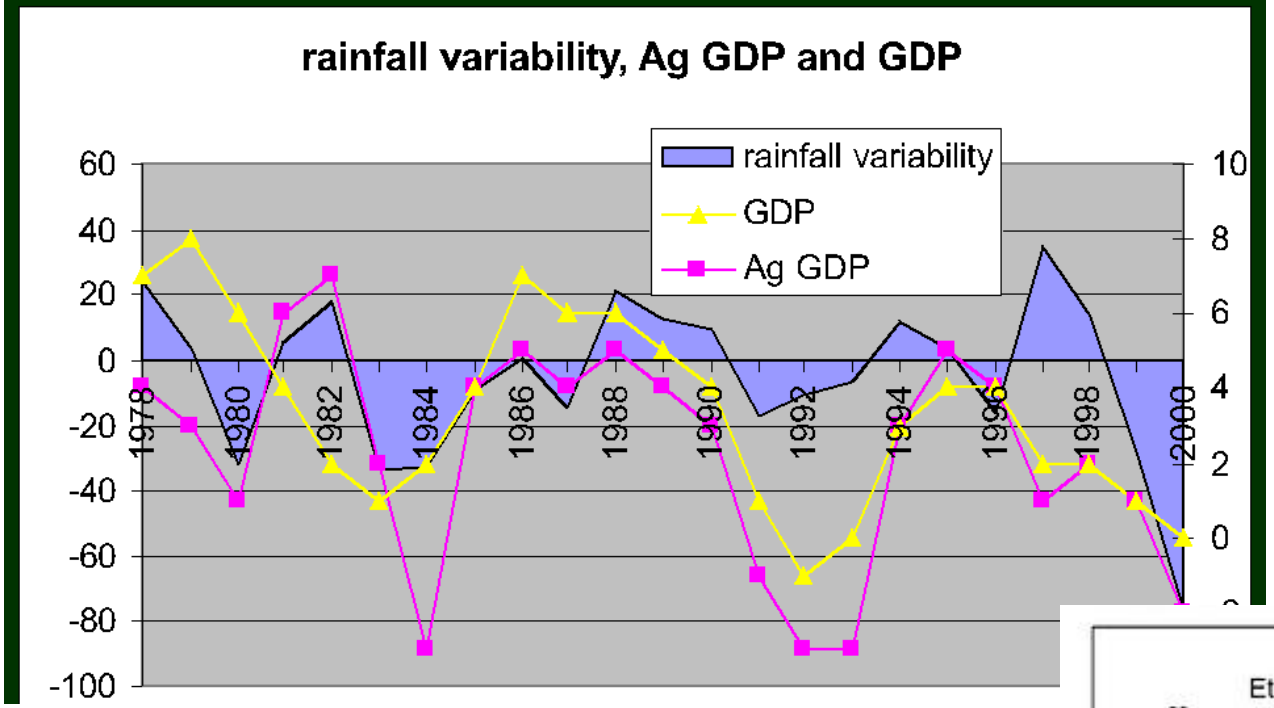
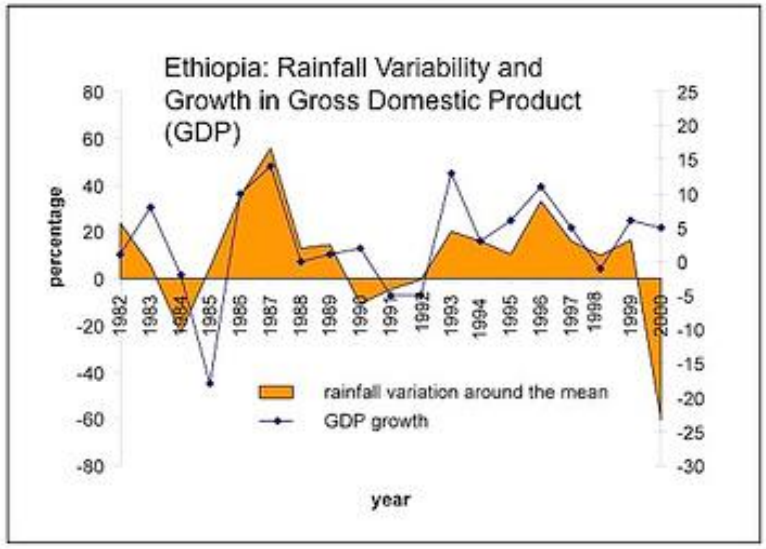
the threat of climate change….

Kenya: variability and growth



Upstream economies:

- *Agriculture is backbone of economy*
- *hostage to climatic variability?*



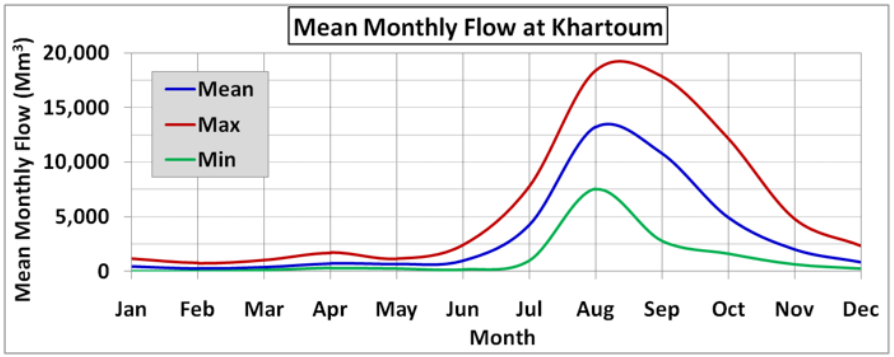
Hydromet need and Opportunities

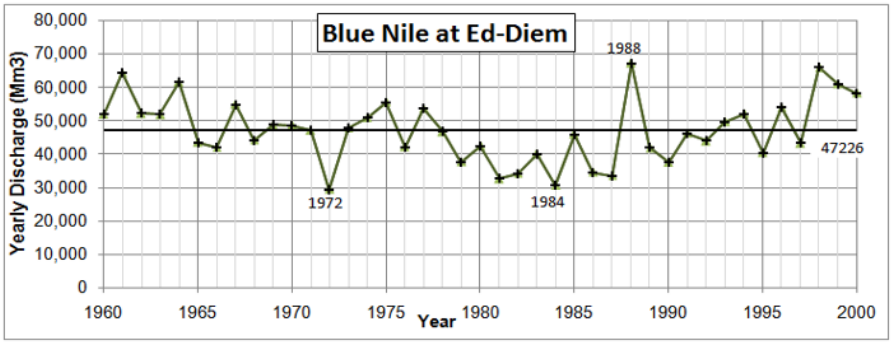
Hyromet Needs – Basin monitoring

River basin monitoring is essential for knowledge based water resources management and development; The current system of Nile Basin monitoring is far from adequate.

→ *there is an incomplete understanding and knowledge of bio-physical conditions of many hydrologically significant parts of the Nile Basin*

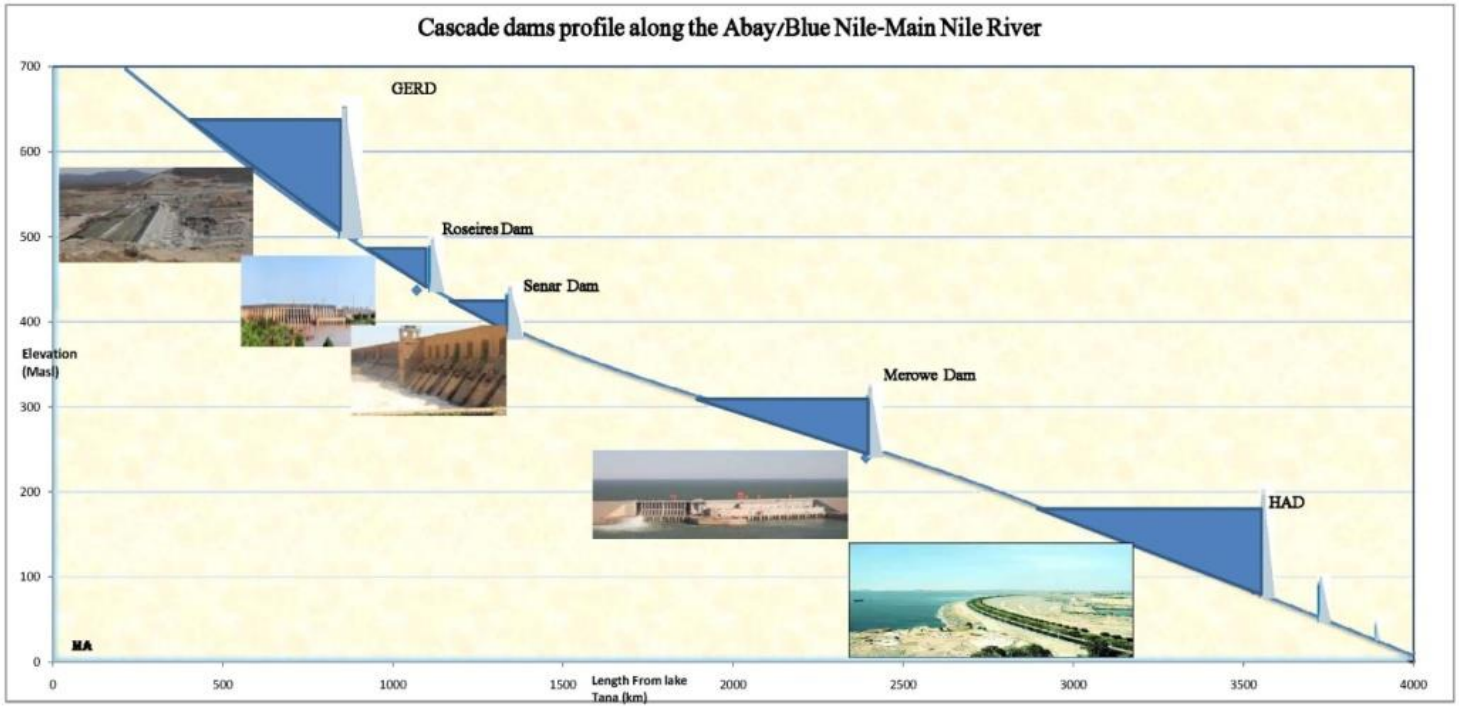
Complex Hydrology





Hyromet Needs – Key Infrastructures

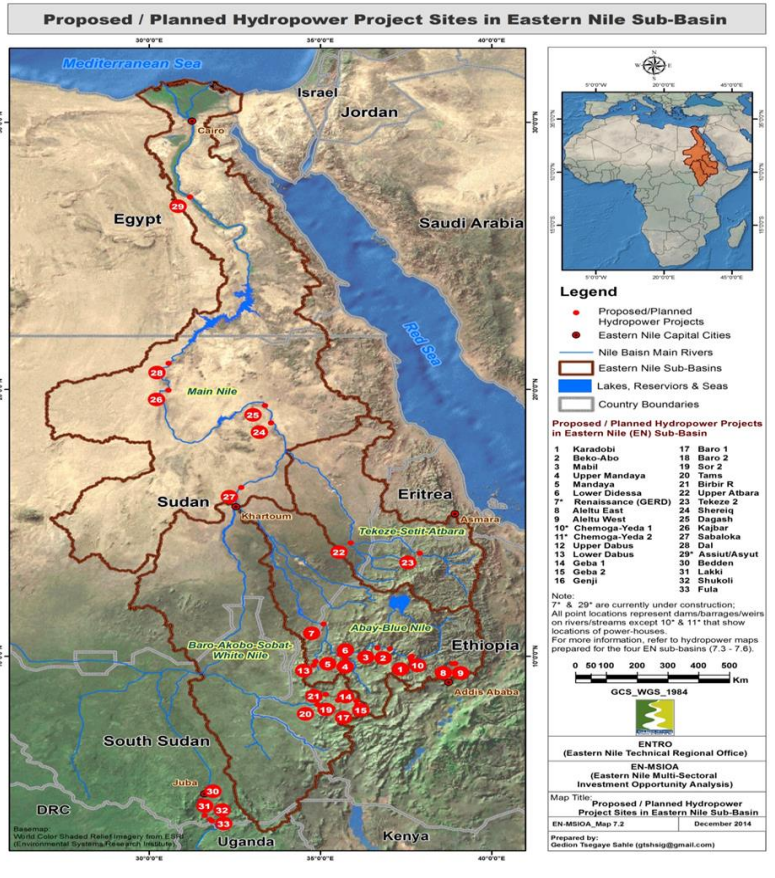
- To meet growing demands of water for food, energy and consumption, the Nile Basin will continue to witness transformational levels of water resources development.
  - → *Monitoring the change and forecasting the possible impact of the future*
  - → *Sediment monitoring concerning downstream impacts of dam operation and impacts of watershed interventions upstream*



Hyromet Needs – Key Infrastructures

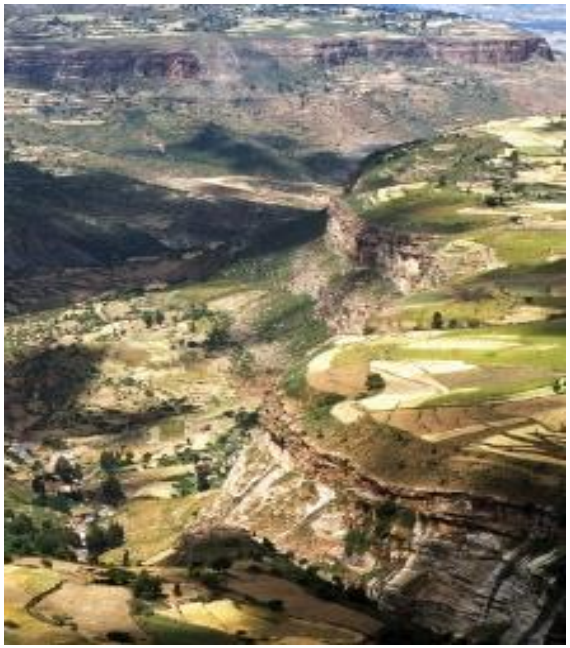
- >30 dams, barrages or weirs - proposed/planned currently
- >150 million people leave D/S of dams

→*Monitoring the safety of the dam*



Hyromet Needs – Environmental and Social

- Watershed degradation, Soil loss, siltation & sedimentation of infrastructure, declining farm productivity → persistent poverty
- Habitat and Biodiversity loss



→ *Monitoring the state of the basin is vital for sustaining the water resource base and managing environmental and social impacts*

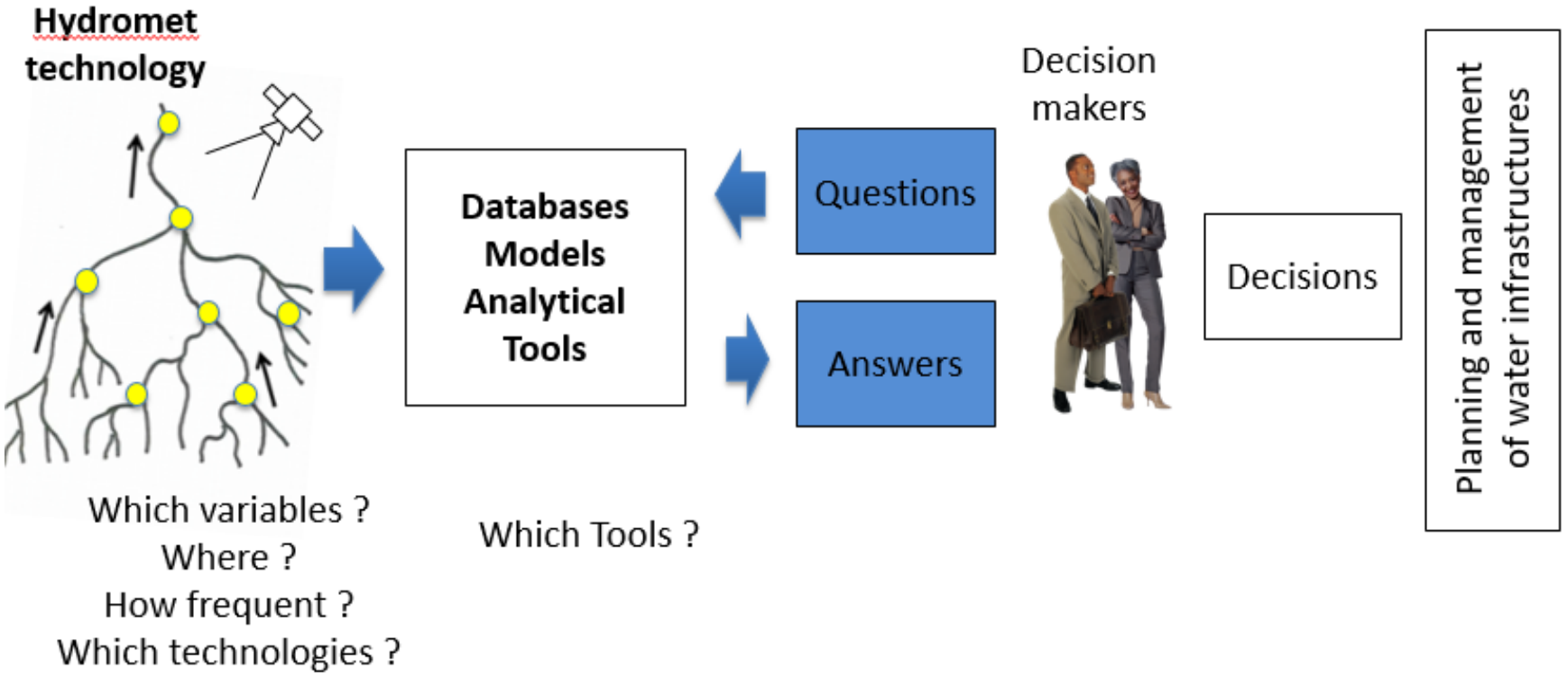
→ *Socio-economic data concerning downstream impacts of water infrastructurefor realizing the gains from such development projects*

Hyromet Needs – Flood and Drought

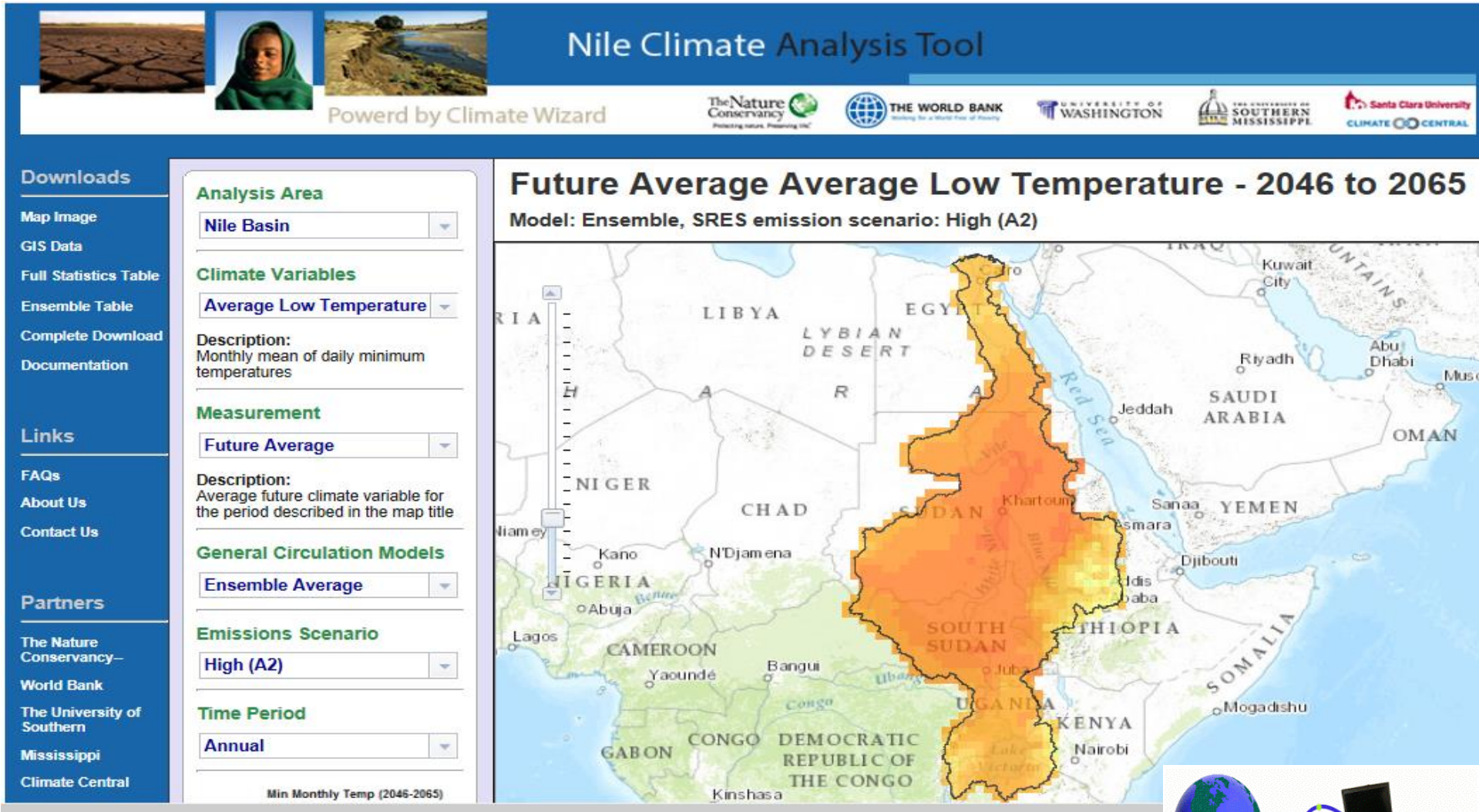
- **1998 in Sudan:** caused a direct flood damage of about US$ 24.3 million
- **2003 in Sudan:** More than 250,000 families affected
- **2006 in Ethiopia:** 600 people dead, more than 35,000 people homeless & 115,000 livelihood affected
- **2013 in South Sudan and Ethiopia:** causes losses of many life and damage of properties
- **2014 in Sudan:** 257,000 people in ten states have been affected

Hyromet Needs – Support Decision Making

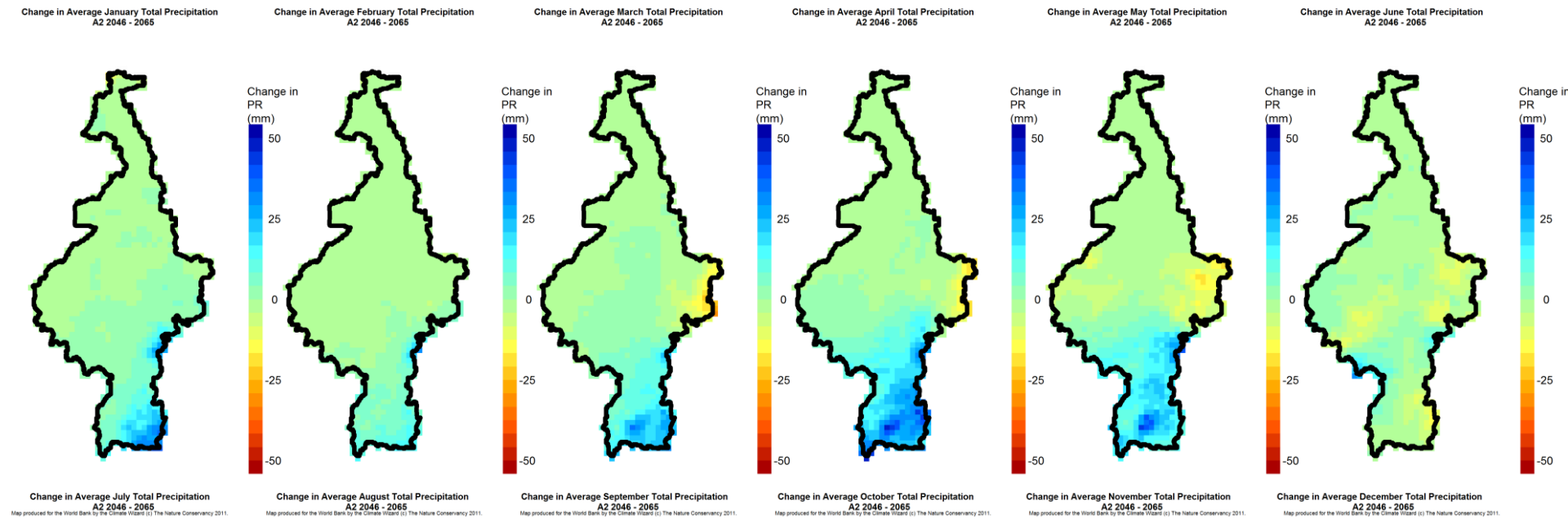
Support for decision-makers by providing access to reliable and timely available information on the hydrologic, meteorological, and socioeconomic conditions for **optimal development and operation of water infrastructures**

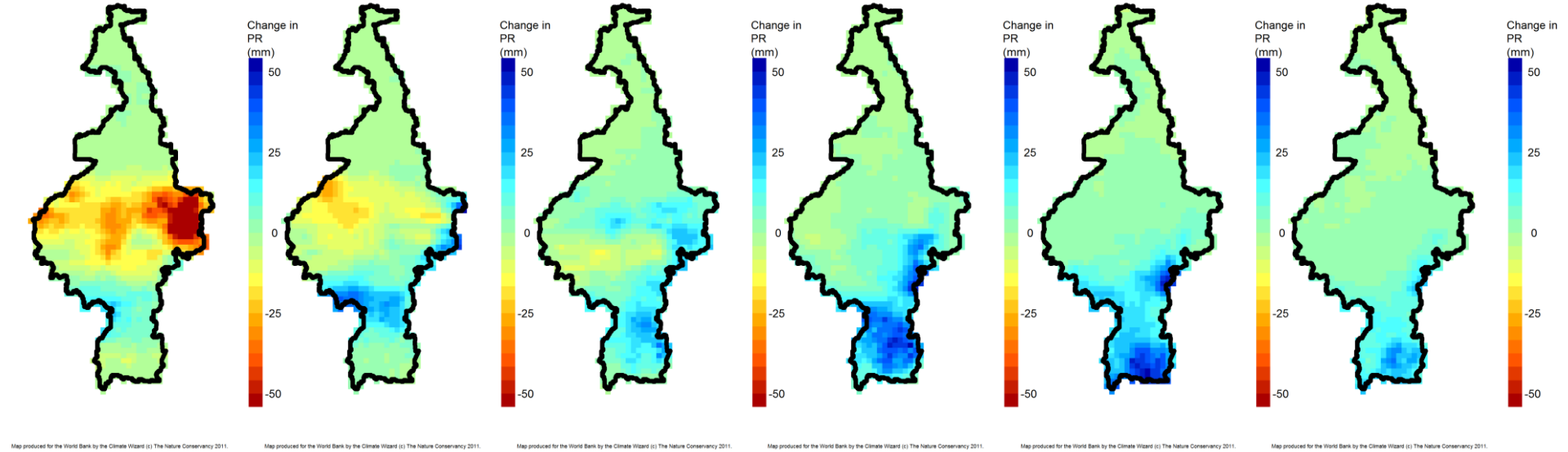


Nile Climate Change Tool



What changes and where?





Efforts Addressing - Hydromet needs

- Gaps in availability of data required for water resources planning and management have already been identified for quite sometime
- A number of project-specific efforts made by NBI(NELSAP, ENSAP) to strengthen member country hydromet systems
- In 2008 (SVP Mid-term review), the Nile-TAC instructed Nile-SEC to prepare a Nile river basin monitoring strategy
- The strategy was developed and subsequently approved by Nile-COM in 2012; the strategy was the first attempt to look into the hydromet questions holistically and provide strategic direction (rather-than piece meal)
- Funding was made available by WB to prepare detailed design and implementation plan; which were completed in May 2015. Now NBI is on the implementation stage

Opportunity

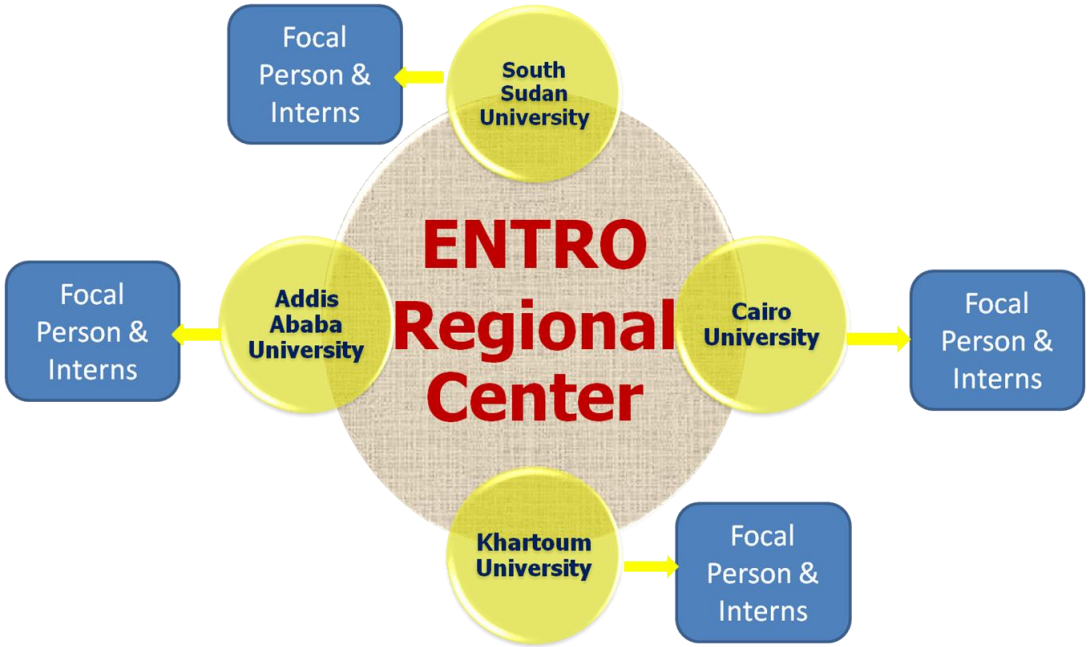
- Regional Hydro-met and forecasting system

Improve accessibility to real time data, knowledge, tools, and partnerships

Enhance trans-boundary cooperation

Knowledge Product - Internship

- Improved access and use of global products by identify who can use what - customize appropriate products.
  - Facilitating access to data and knowledge products using modern dissemination
  - Research on Hydromet
  - Filling data gaps
  - Knowledge support to Nile Countries in planning, preparing and managing of investments



Hyromet for Basin Cooperation

A regional Hydromet system provides the data and information required to support cooperative development and management of the water resources.

→ A basin that is shared by 11 countries can be cooperatively developed and managed its resource ***only if riparian states have a common understanding on the resource base, its state and the threats it faces***

Ongoing Flood and Drought activities

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EN – Flood Forecast and Early Warning

Conversations
A regular column of Nile-Flow, ENTRO's Newsletter, the column
series of engaging interviews with ENTRO staff shedding light
respective projects and activities.

Eastern Nile Seasonal
Flood Monitoring Program

Nile Climate
Analysis Tool

Downloads
EN Flood Maps
Discussion Forum
Survey

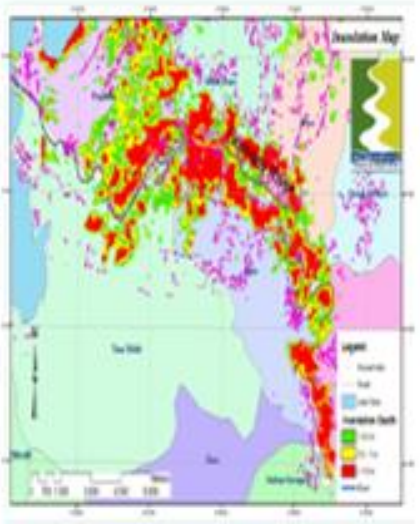
Eastern Seasonal Flood Monitoring Program

EN Seasonal Flood Forecast

The Eastern Nile is one of the places in the world with recurrent flooding. Populate areas in the region are significantly affected by flash and riverine flooding in most of the years. The most flood affected areas in Ethiopia for instance, are the Dembiya and Fogera floodplains around Lake Tana (upper Blue Nile) and the Gambella area in south west of the country. The Blue and Main Nile River reaches in Sudan are also frequently affected along with the downstream Nile Delta region in Egypt.

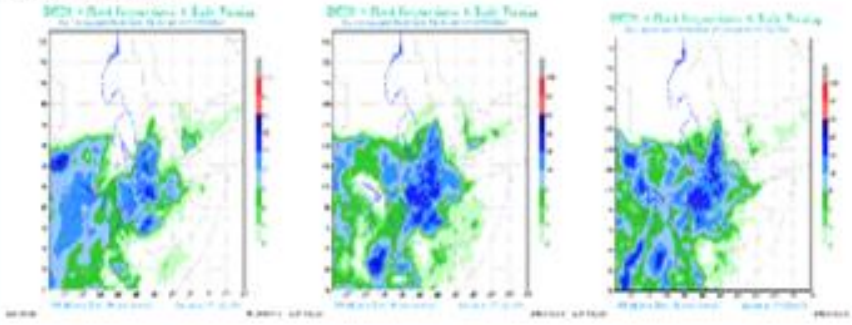
The Eastern Nile Technical Regional Office (ENTRO) works to mitigate this human suffering through various means. One of its fast track projects – the Flood Preparedness and Early Warning project (FPEW) was launched in 2007 and has been providing assistance to national, regional and local authorities through early warnings and capacity building for preparedness.

The main objective of this FPEW project is to enhance regional collaboration and improves national capacity in mitigation, forecasting, early warning, emergency preparedness, and response to floods in the EN basin. The early warning information include: expected flood extents and inundation levels, information used for safe and efficient reservoir operation in the whole region.



Daily Accumulated Percipitation :
Three Days rainfall forecast generated over the EN catchments (regions) using Eta model is displayed as of 24 hours accumulated precipitation. The next 3 consecutive days spatial rainfall distribution imagery data observations and the accumulated rainfall estimates across EN river systems are presented.

Click here to download

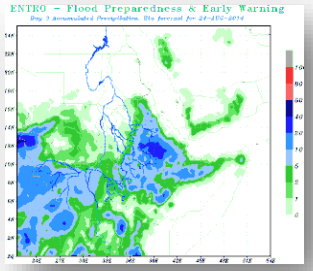


Reducing the risk of flood devastation for 2.2 million people in the region

Current - EN Flood Forecast and Early Warning

Rainfall Forecast- Eastern Nile Basin

- Produce Daily and Weekly rainfall Forecast for Eastern Nile basin



Lake Tana Flood Plain - Ethiopia

- Produce Daily and Weekly Forecast Report for Lake Tana Floodplains (WRF weather forecast model, combined flood forecasting models)

Main/Blue Nile - Sudan

- Produce Daily and Weekly Forecast Report for Blue and Main Nile System in Sudan (Sudan FEWS)

BAS in Gambela / Ethiopia and South Sudan

- Produce Daily and weekly forecast report for Baro-Akobo and Sobat floodplains

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FFEW & Seasonal Forecast

Eastern Nile Seasonal Forecasting/Flood Forecasting and Early Warning

- To Enhance and expand the FFEW system
- To expand the FFEW system other flood prone areas in EN basin
- To support the EN countries by issuing seasonal forecast and its application in reservoir operation and irrigation water use

Enhanced Flood Forecast System

- Upgrading the existing
- Replicate flood forecast system
- Address Flash flood
- Web base early warning system
- Stakeholder mapping

Seasonal River Flow Forecast

- Seasonal river flow Forecast
- Drought Forecast
- Tools developed using river flow forecast for
  - Operation of dams
  - Irrigation water use

Capacity Building

- Capacity building training Flood forum
- Workshops
- Infrastructure

Collaboration with sub-basin Authority/NMA

Working with NileSec

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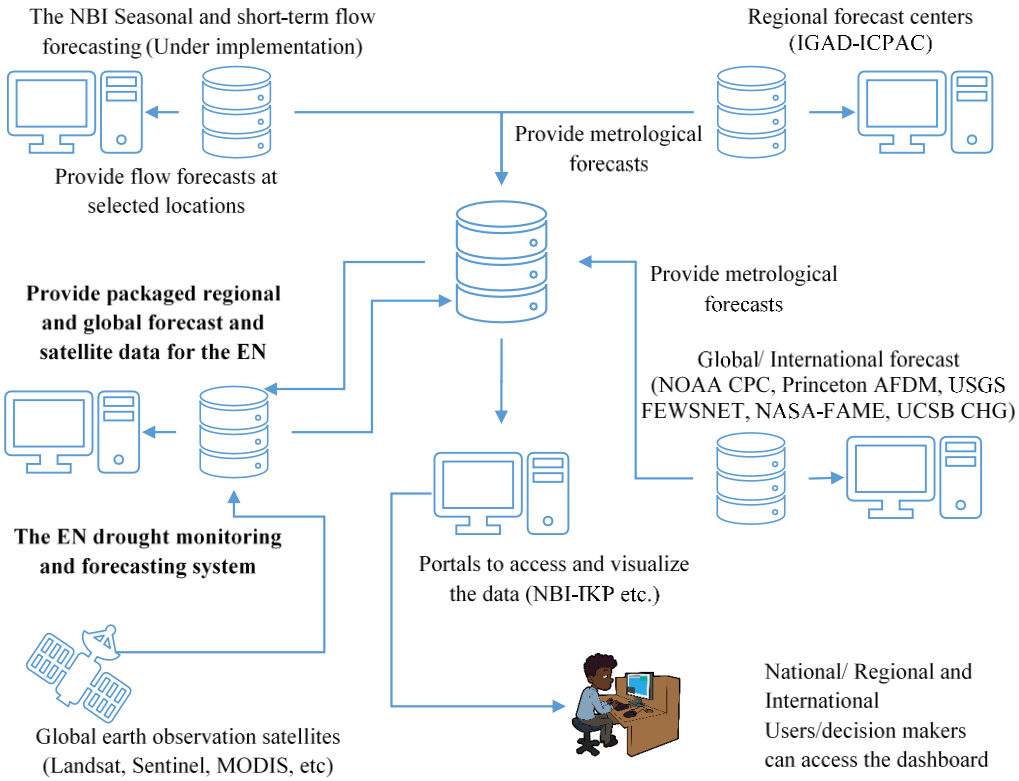
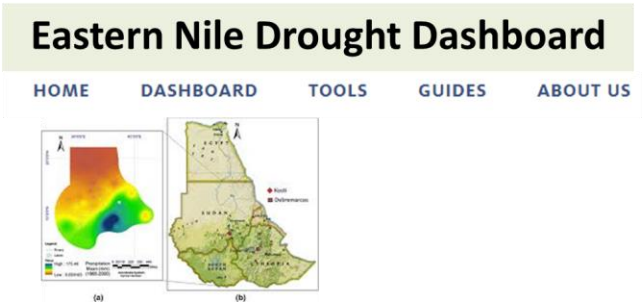
Establish a Drought Perdition and Early Warning System for Eastern Nile basin (DPEW)





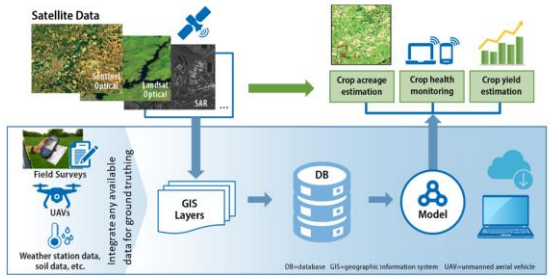


Figure 2 Framework for estimating crop acreage, health and yield using to freely available satellite data to

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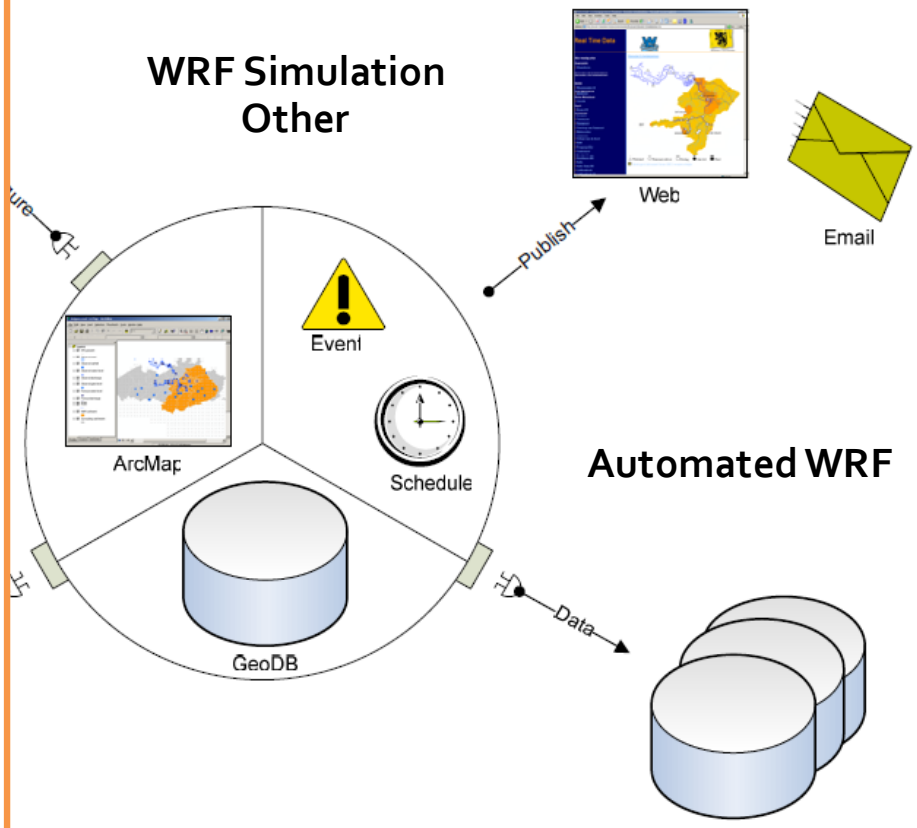
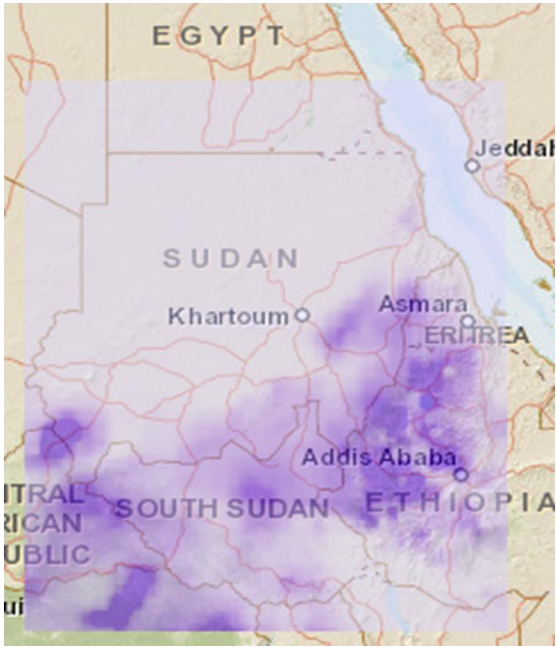
Rainfall Forecast

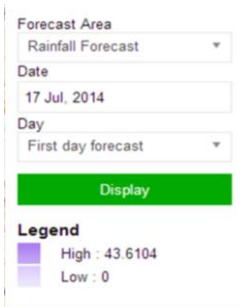
Global Forecast input



IKP - Web Interface

Eastern Nile Rainfall Forecast





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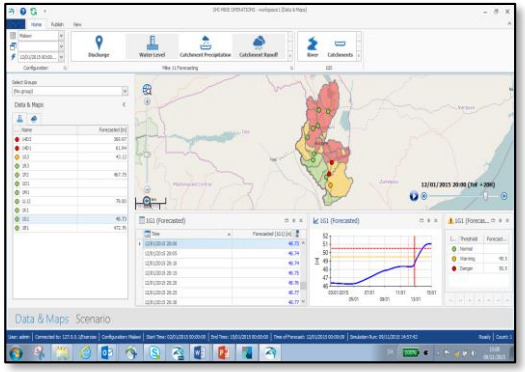
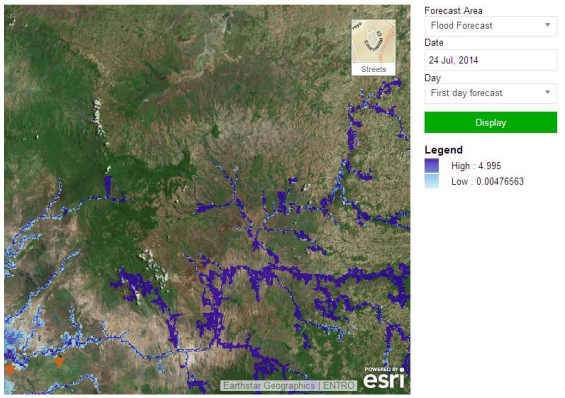
Flood Forecasting System

Flood Forecasting System



IKP - Web Interface



WRF/other Input

MODEL

MIKE BY DHI

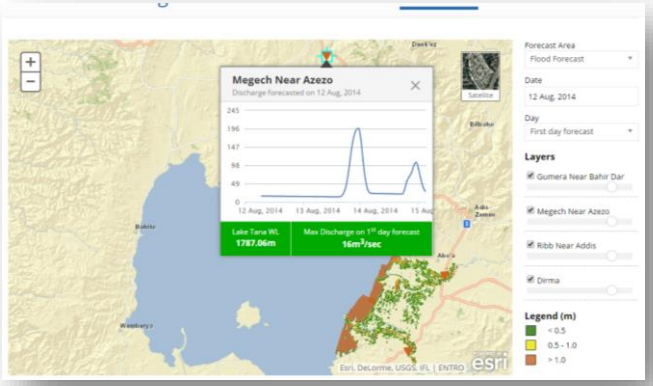
Flood Forecasting Tools

Flood Admin

Download

Database

Other Visualization



Meteorological Forecast → Flood Forecast → Early Warning

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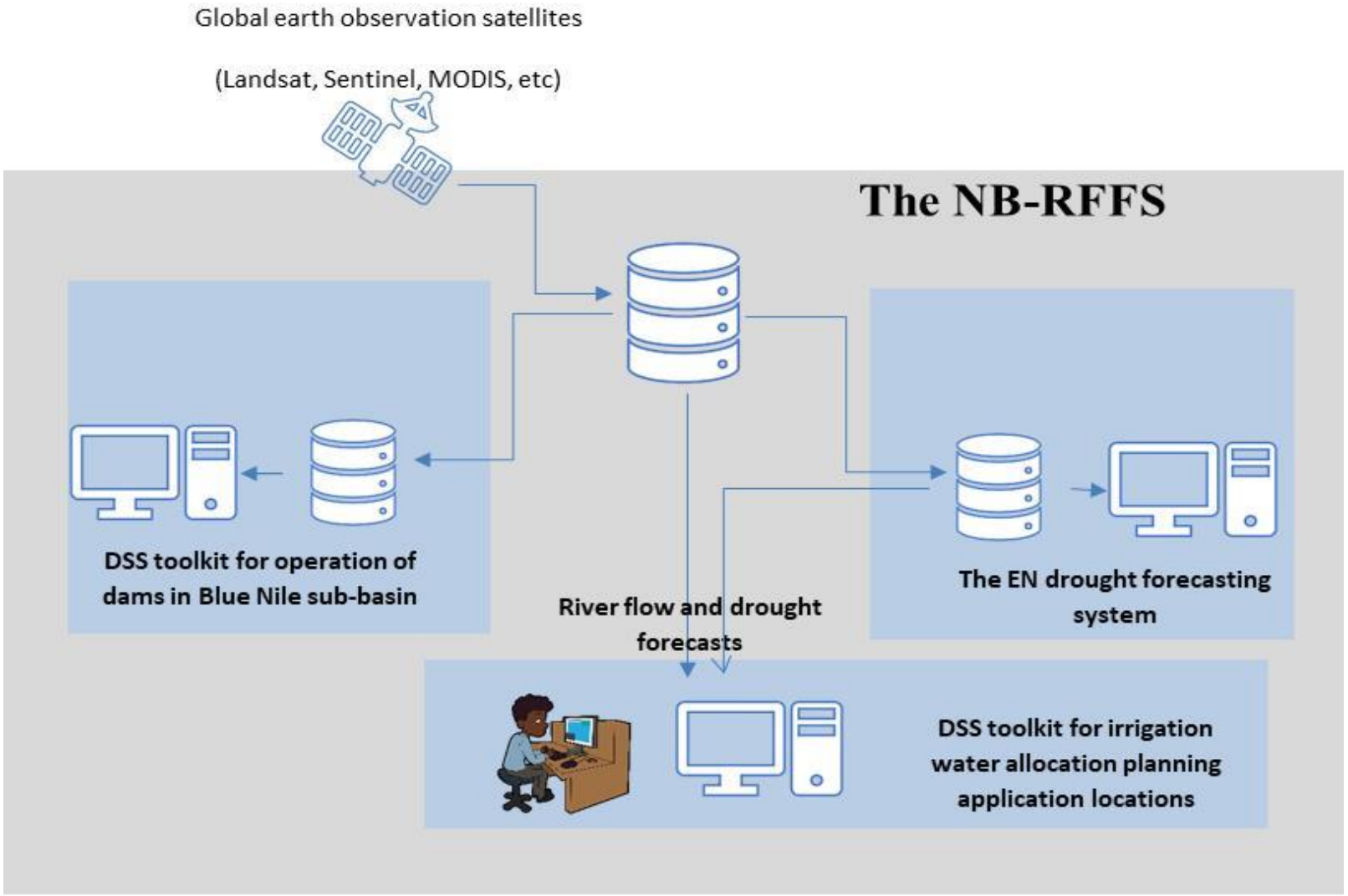
Seasonal River Flow Forecasting



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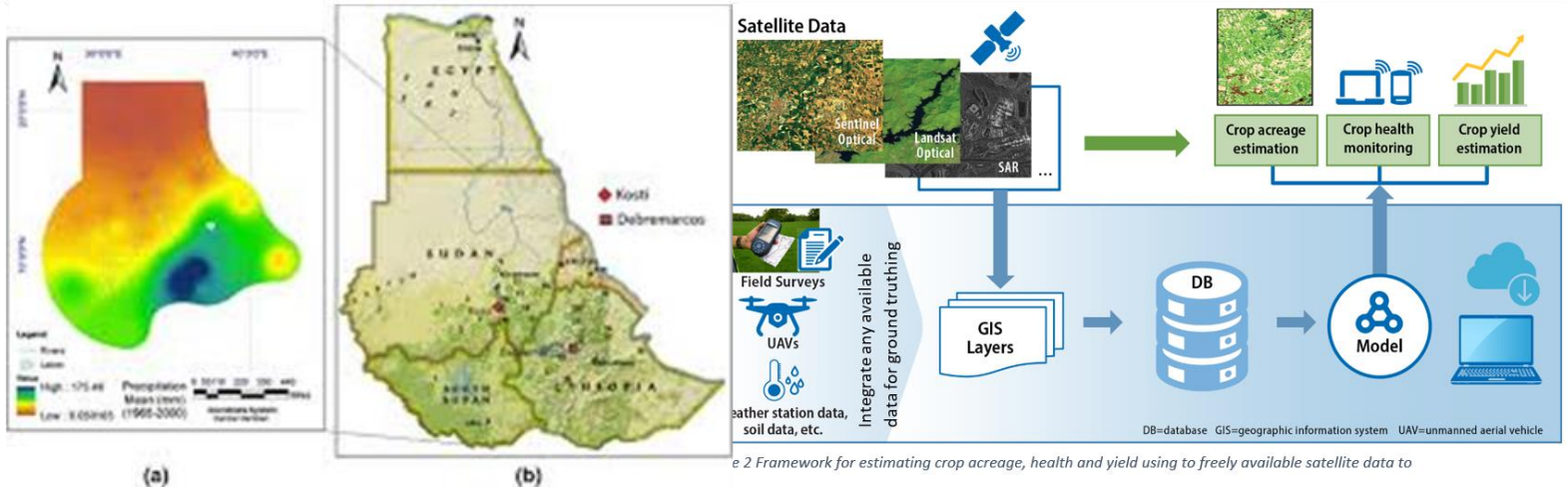
Drought Forecast

Eastern Nile Drought Dashboard

HOME DASHBOARD TOOLS GUIDES ABOUT US



e 2 Framework for estimating crop acreage, health and yield using to freely available satellite data to

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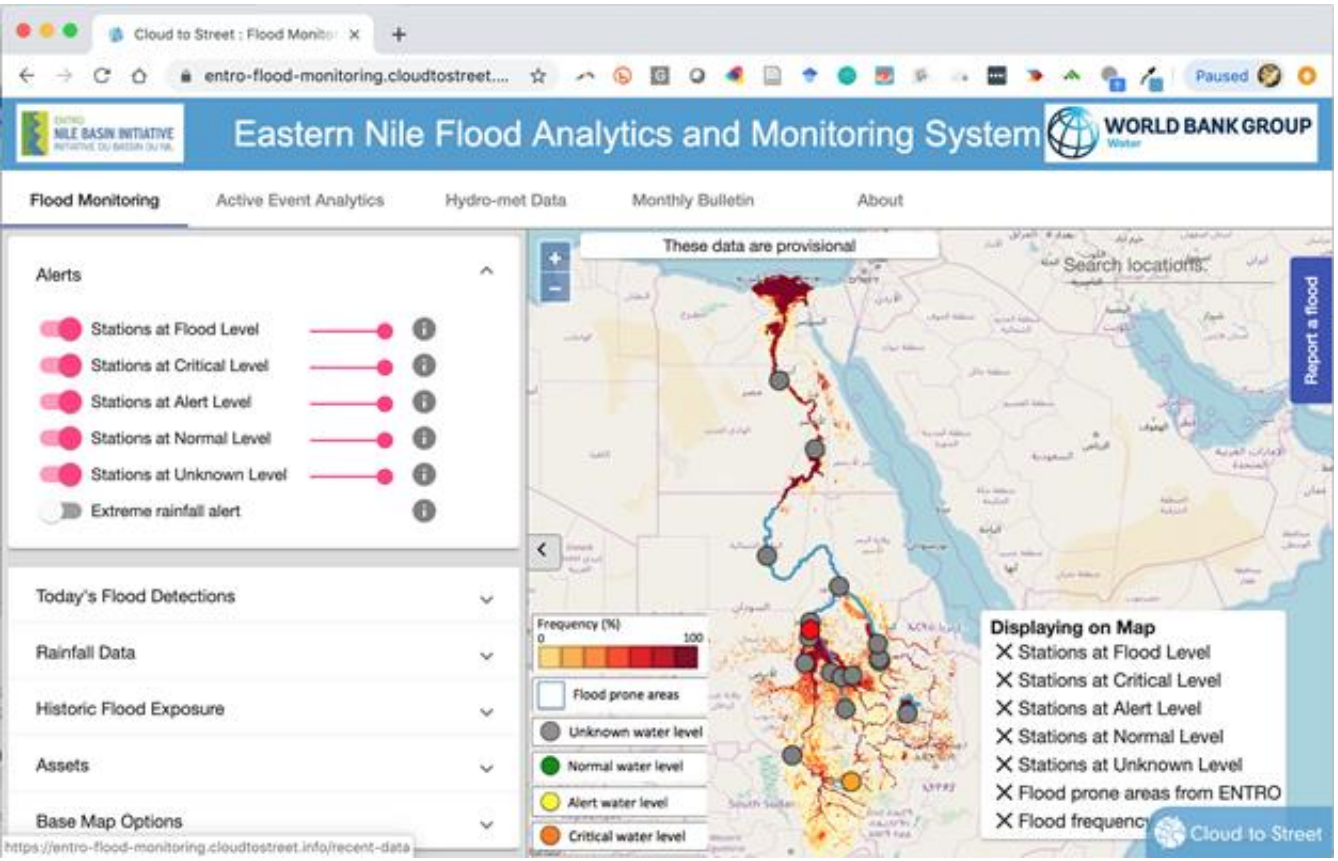
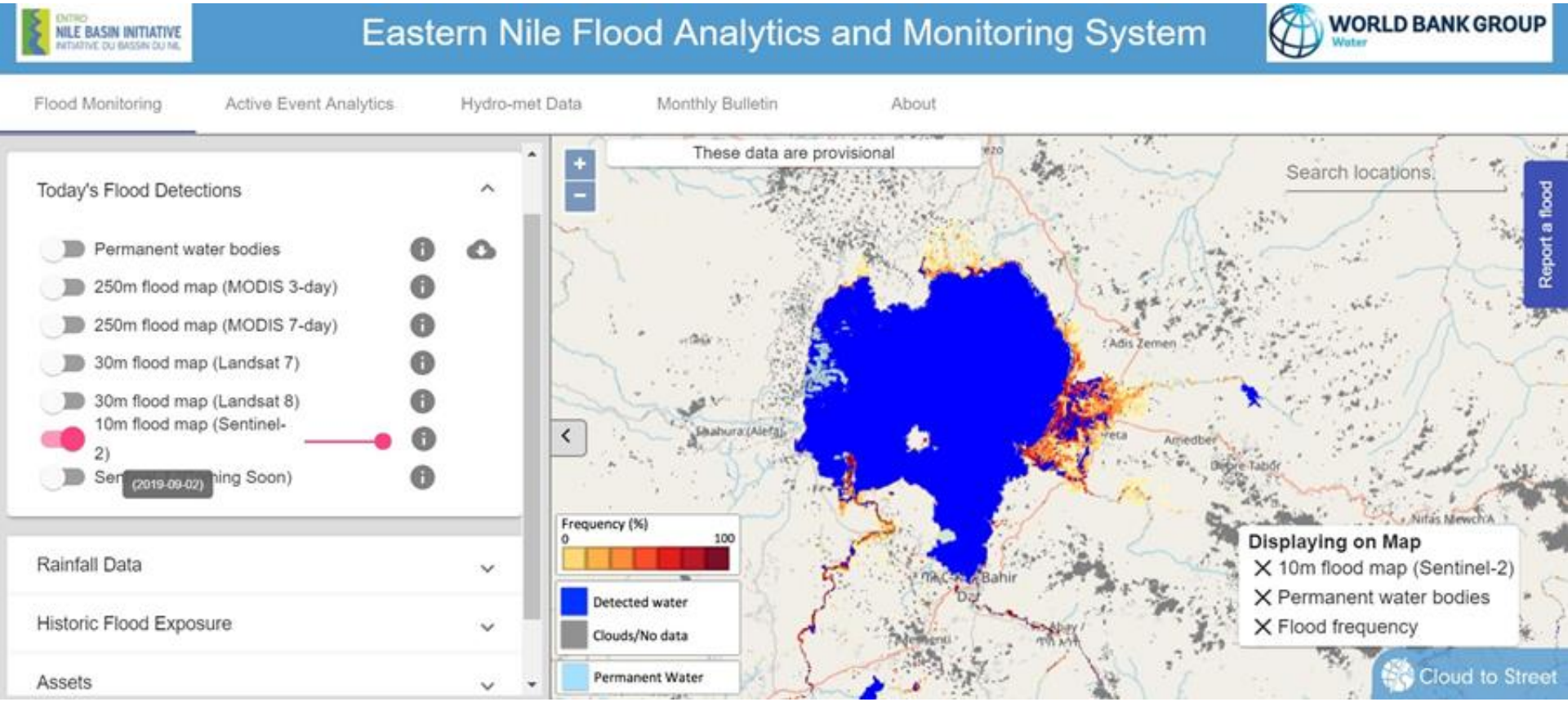
Cloud to Street data and services



- Watershed wide flood frequency and hotspot maps
- Library of historic flood events
- Flood forecast accuracy assessment
- Daily flood alerts and mapping

entro-flood-monitoring.cloudtostreet.info

Eastern Nile Flood Dashboard



- Assess the accuracy of the current ENTRO forecast model
- Help improve provide daily verification of the maps in the bulletin
- Early alerts for flooding to enable faster response and more targeted recovery
- Identify frequently flooded areas and assets like farms, communities and roads at high risk of flooding

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Integrated Knowledge Portal

Rainfall Forecast: Short term and Long term

Flood and Flow Forecast: Short term and Long term

River Flow Forecast: Seasonal river flow forecast

Drought Monitoring and Forecast: Satellite base drought monitoring

Capacity Building: Training ; Training material and user guide

Thank You