



## **Water Resources Management in Abay River Basin**



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April 19, 2018  
Addis Ababa**

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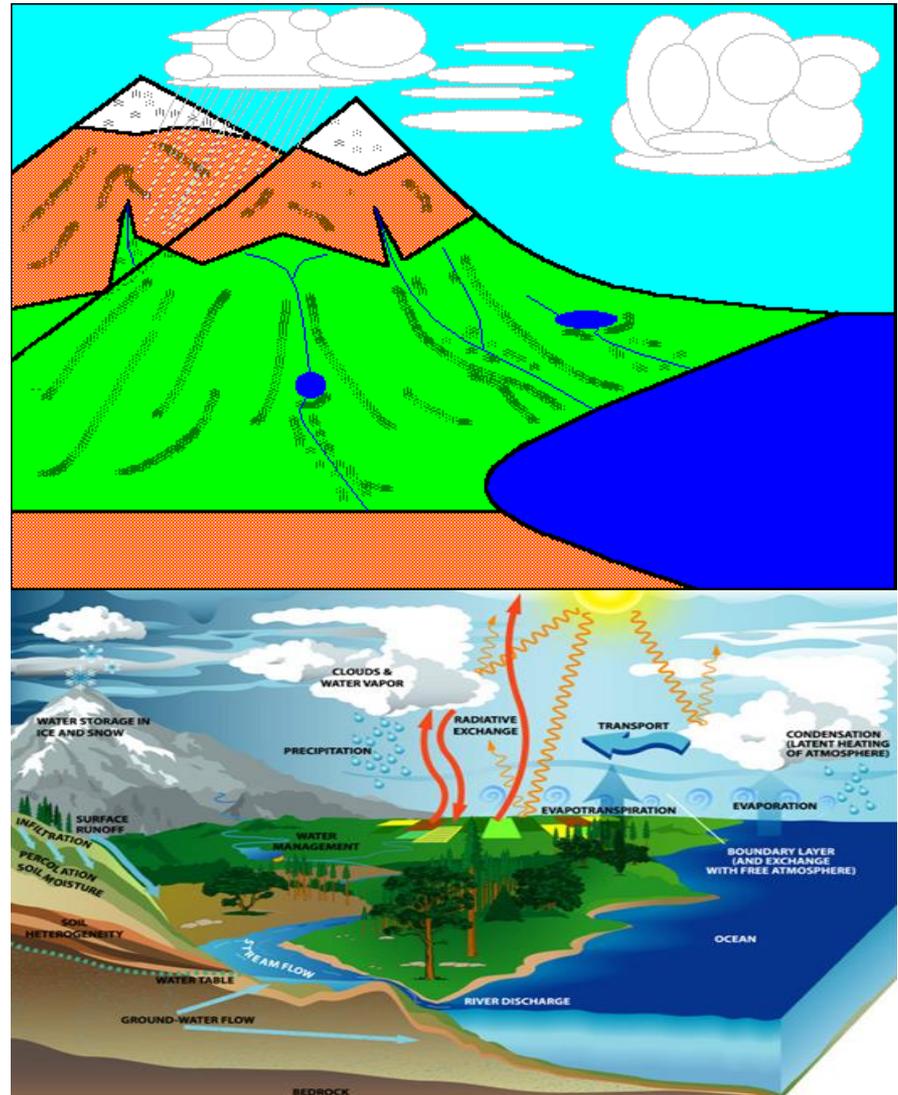
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# 1. Introduction

## ❖ Water Resources

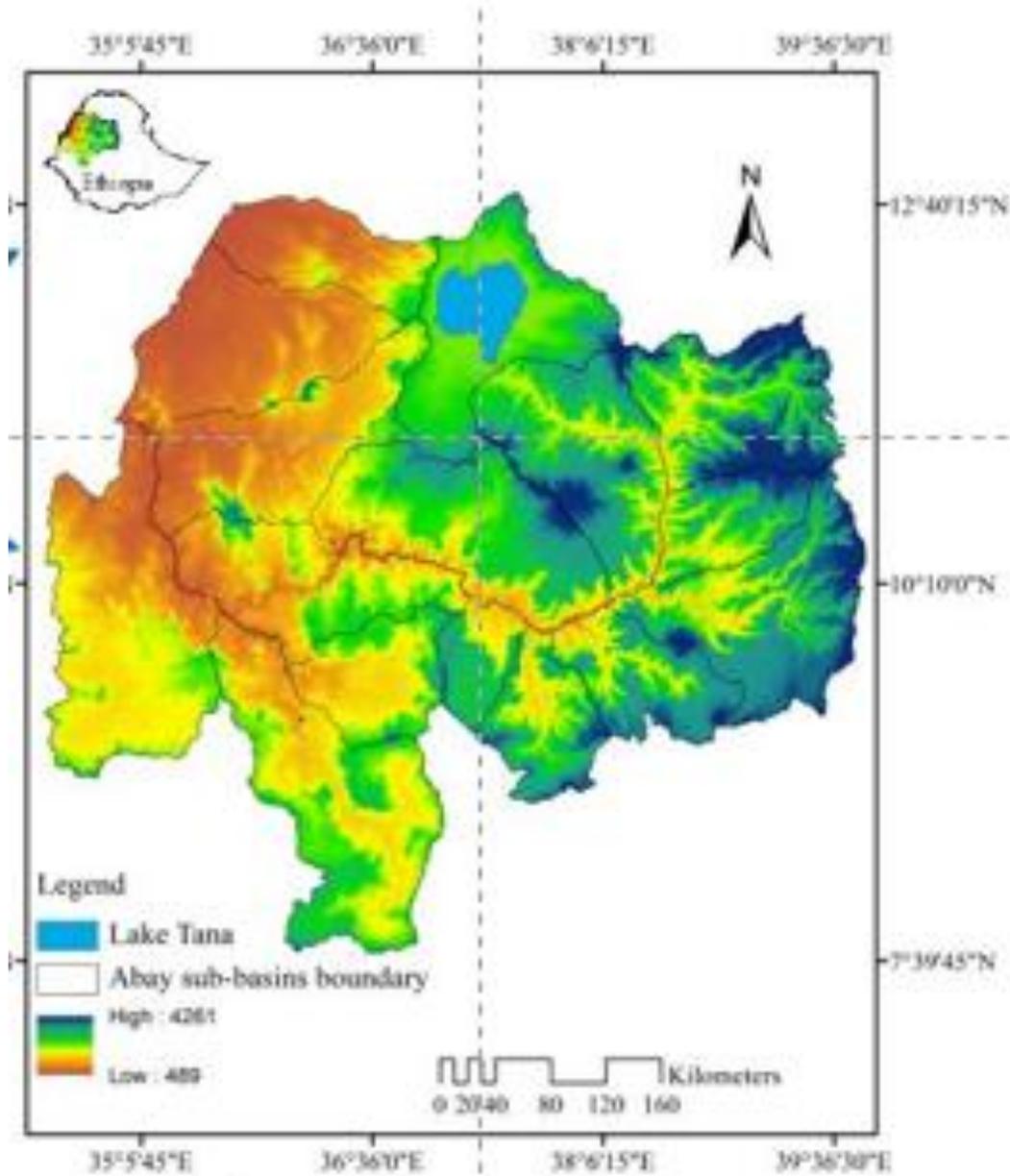
- Crucial natural resources
- Scarce, limited and finite
- Has Social, Economic, and Environmental Value
- Unevenly distributed through time and space.
- Quantity and quality threatened by different factors
- The continuous monitoring of hydrological and meteorological variables is a prerequisite for informed water resources management.



## INTRODUCTION(Contd)

- Integrated water resources management is a systematic process for the sustainable development, allocation and monitoring of water resource use in the context of social, economic and environmental objectives.
- IWRM strives for effective and reliable delivery of water services by coordinating and balancing the various water-using sectors – this is an important part of sustainable water management.
- A central goal of IWRM at the river basin level is to achieve water security for all purposes, as well as manage risks while responding to, and mitigating disasters.

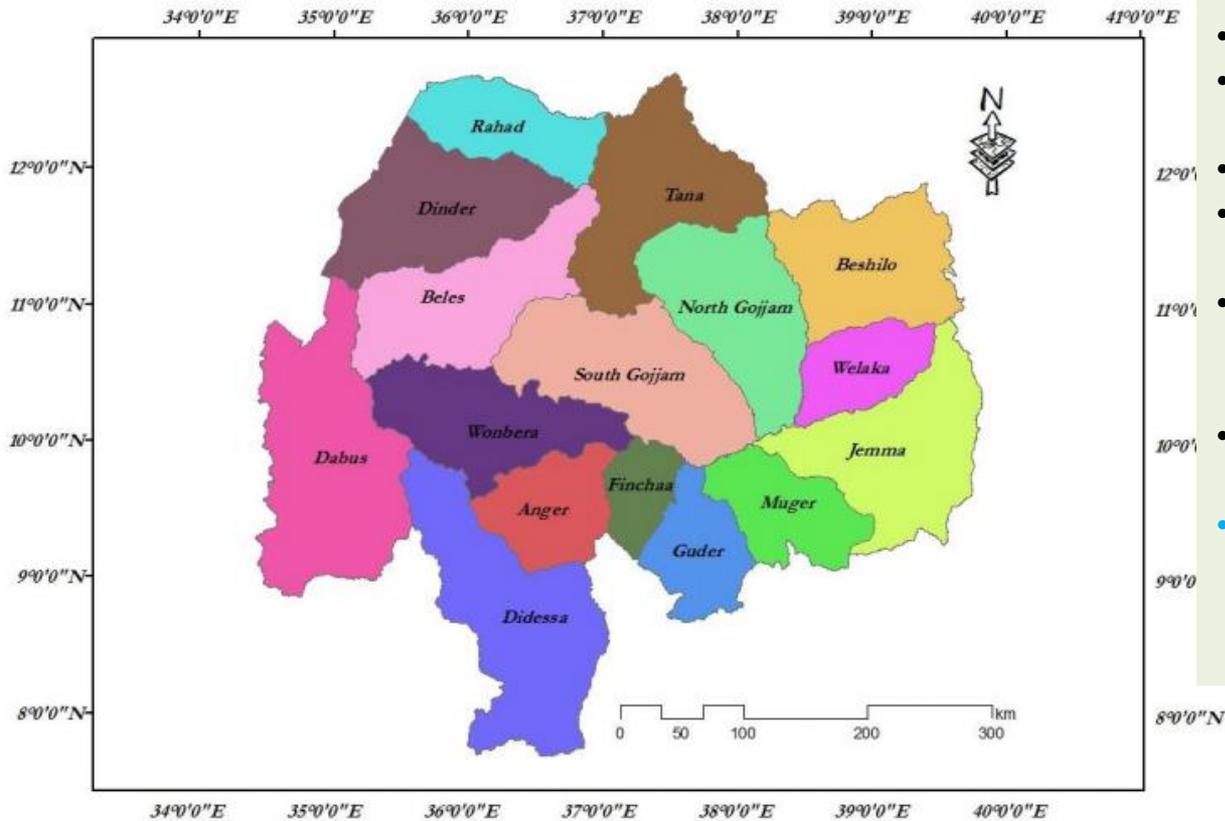
# Overview of Abbay basin



**Abay Basin**  
is the most important Basin in  
Ethiopia,

- Area 199,812 km<sup>2</sup>
- 45% of the countries surface water.
- Contributes > 62% of flow to the Nile.
- 28% of the population,
- 20% of the landmass,

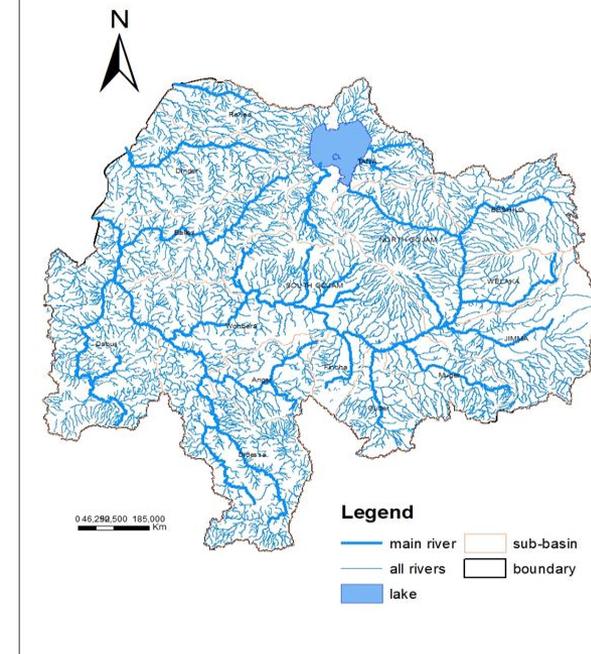
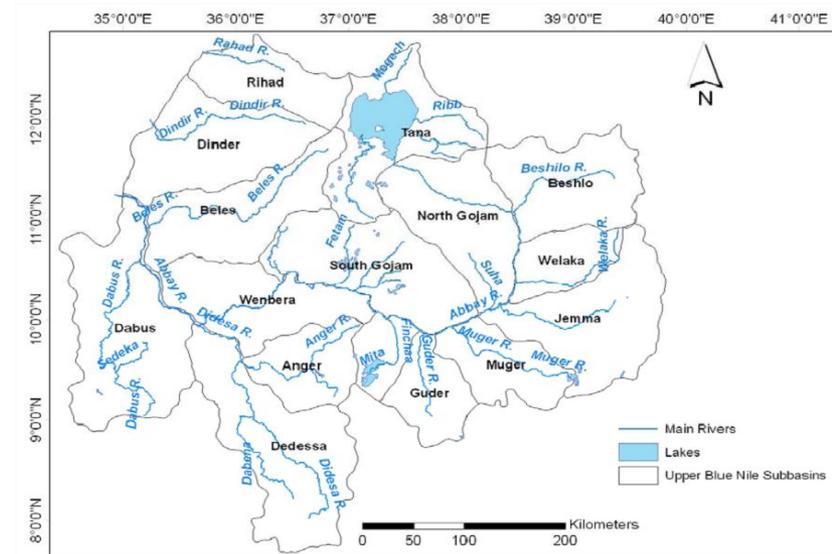
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- 3 Regions
- 16 sub basins.
- 40 % of the nations agricultural product.
- 38% of the hydropower .
- Irrigation potential of the country.
- Irrigation potential of the basin is about 2.5 millions ha of large and medium- scale, 526,000 ha was found economically feasible
- 39% of Livestock resource

## Surface Water Resources

- ✓ Largest section of the Nile Basin in terms of volume of discharge
- ✓ Second largest in terms of area in Ethiopia and is the largest tributary of the Nile
- ✓ Has annual average runoff of 49 BCM
- ✓ Dinder, Galegu and Rahad rivers have a combined annual run-off of about 5.5 BCM.
- ✓ A total of 54.5 BCM annual flow,



# Other Resource potential

1 Fishery

3 Tourism

28 fish spp described in Lake Tana  
nearly 70% the fish spp are endemic

## LAKE TANA



Estimated at 18,200 tons  
Lake Tana – 15,000 tons  
Finchaa Reservoir - 750 tons  
new reservoirs - 450 tons;  
rivers – 2,000 tons

Blue Heart of Ethiopia

Shape

Thoracic position

contains very important  
world wide resource  
scientific, Economic,  
tourism, Historic and  
Religious

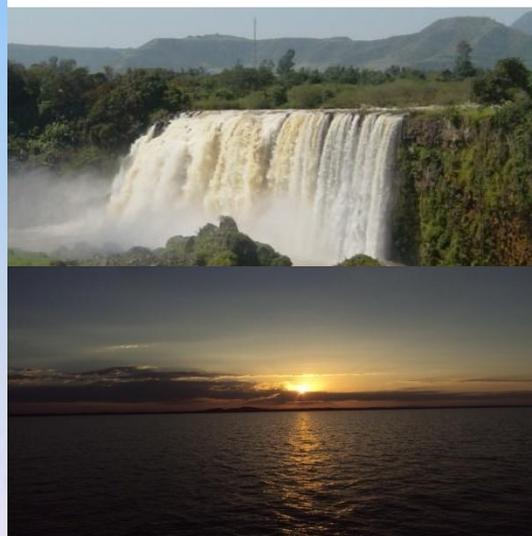


Figure:17 Fish species expected to compose the fish community of the Grand Ethiopian Renaissance



*Labenbarbus intermedius*



*Labenbarbus nedgia*



*Labenbarbus scissibarbis*



*Labenbarbus nil*

Source: (Taddele et al., 2015)



Transport and Navigation

# Abay River Basin Authority

- Was established by proclamation No.534/2007 E.C having the mission To contribute ;
- For overall sustainable development in the basin by ensuring
  - ✓ Integrated,
  - ✓ Participatory,
  - ✓ Equitable and
  - ✓ Sustainable water resource management,
- By Creating favorable conditions for the better protection & conservation of the ecosystem,
- And through knowledge building & being the center of excellence, data and information.
- To implement IWRM



# A Platform for IWRM and Participatory consensus building of ARBA)

## I. REGIONAL DEVELOPMENT plans:

**Amhara**  
Regional State

**Oromia**  
Regional State

**Benishangul-Gumuz**  
Regional State



## II. Water resources DEVELOPMENT SECTORS

1. **Hydropower** sector development plan
2. **Irrigation** sector development plan
3. **Water supply** development plan
4. **Other sectors:**
  - **Fisheries** sector
  - **Navigation** sector
  - **Tourism** sector



## ABBAY BASIN AUTHORITY:

A platform for integration and participatory consensus building to promote IWRM

- **Coordination of planning**
- **Regulation and permits**
- **Knowledge building**
- **Information exchange**
- **Capacity building**



## III. Water and environment PROTECTION SECTORS:

1. **Watershed** management plans
2. **Pollution control** and sanitation programme
3. **Flood and drought** management plans
4. **Biodiversity** conservation plans



## IV. Other STAKEHOLDER INTERESTS:

1. **Main water users**
  - Sugar estates
  - EEPKO
  - NGO's
  - Flower industry
  - Water utility companies
  - Mining industries
  - etc.
2. **Others**
  - National NGO's
  - International
  - Donors
  - NBI
  - etc.

# Major activities in relation to WRM in the basin

## I. Design and Development of Basin Information System(BIS)

Every river basin Authority shall develop and use management oriented basin information system, in order to guide and support the basin water resources strategic planning and water management functions

### Importance of Basin Information System

- It is indispensable for effective water management;
- More and more reliable information will be critical in future;
- It is needed to address escalating challenges in:
  - ✍ Increased water needs for growth, development and equity;
  - ✍ Complexities and uncertainty brought about by climate change;
  - ✍ Competing needs of different water users and aquatic ecosystems; and
- Good information on water depends on effective monitoring systems, good data management, secure archiving and highly accessible dissemination systems.

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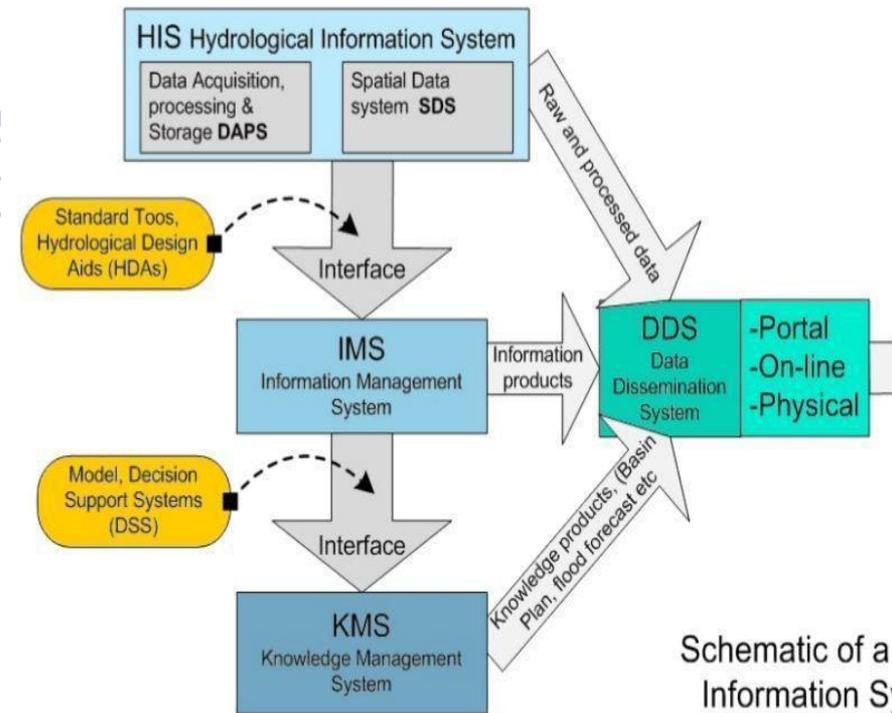
A key element of the BIS :

- Hydrological Information System (HIS)
- Integrate a Spatial Data System (SDS),
- Information Management System (IMS)
- Knowledge Management System (KMS)
- Data Dissemination System (DDS).

.Meteorological network.

. Groundwater monitoring

. Water Quality monitoring



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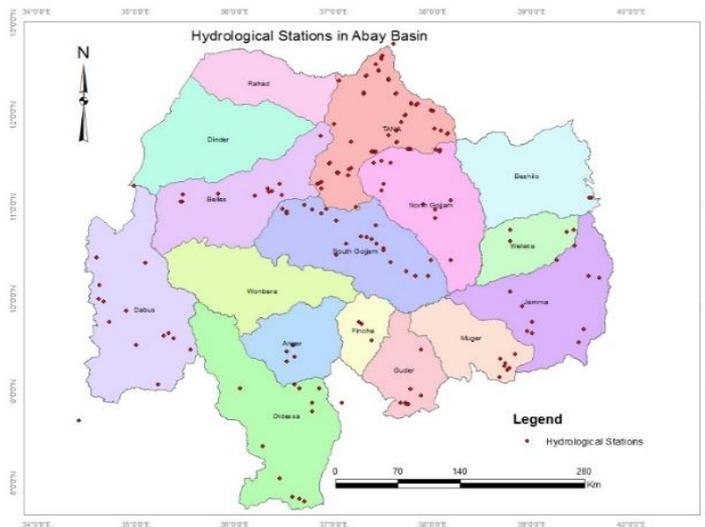
❖ **Expected output/key indicators**

- the quantity and quality of water resources of the basin;
- the aquatic ecosystem of the basin;
- the level of the water demand within the basin;
- the existing and planned major water infrastructures;
- the main interventions or projects that may have impact on the water resources;
- the existing water uses;
- stakeholders of the basin

# Design and Development of Basin Information system

## 185 Hydrological Stations

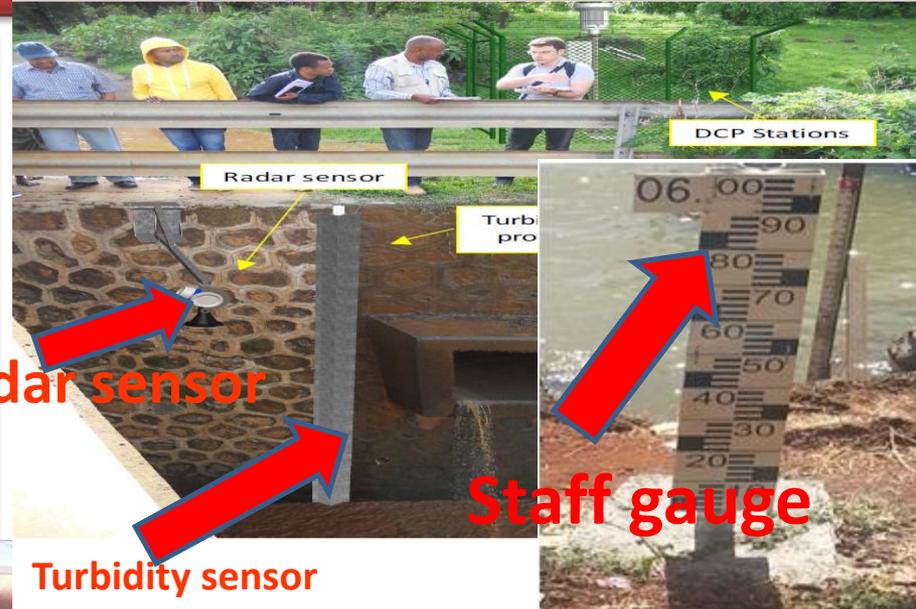
- 142 Manual flow measuring staff gauge
- 43 Telemetric stations  
(Tana and Beles Sub basins)
- Real time hydrological monitoring



# 1.1. Telemetric monitoring System

## 43 Telemetric monitoring System

- > Radar sensor for River water level meas.
- > Pressure transducer for WLM
- > Turbidity sensor for sediment & others
- > Data collection platform(DCP)
- > Current meter to msure velocity
- > Sediment sampler to measure sediment
- > Staff gauge for manual river water level meas.
- > Rain gauges for FEWS
- > Bank operating cable for sediment and velocity measurement



Radar sensor

Staff gauge

Turbidity sensor



Data Logger for Radar, turbidity & rain gauge sensor



Bank Operating cable

Name	Unit	Value
Level	m	-2.67
Level (delta)	m	0.00
Rain intensity	mm/h	0.0
Rain (delta)	mm/h	0.0
Critical STS	sts	0
Turbidity	NTU	8.1

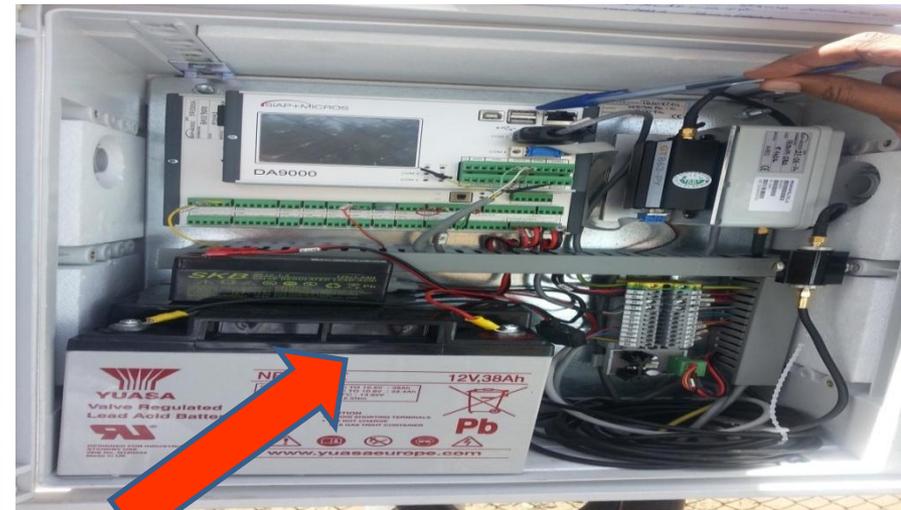


# 1.2 Flood Early Warning network

- 19 flood early warning stations with
  - Data collection platform(DCP)
  - Multichannel rain gauge for FEWS

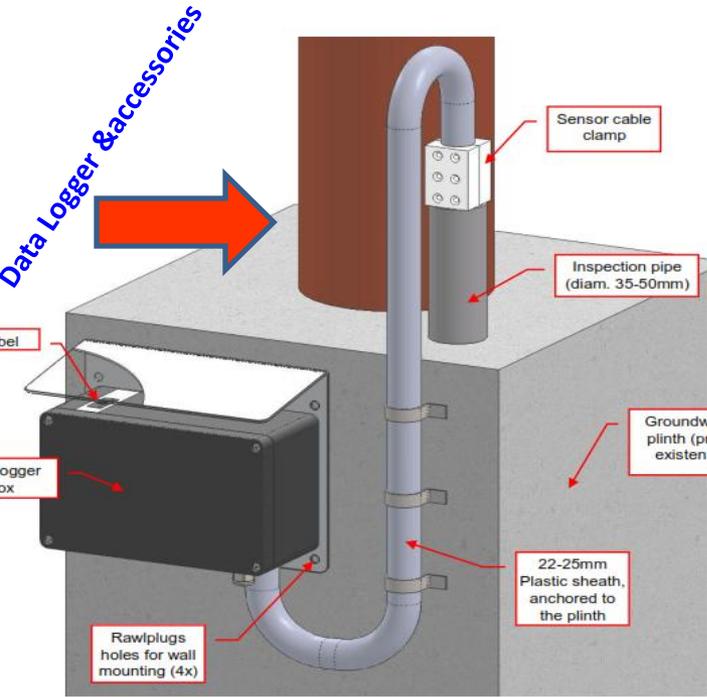


*Auto Rain gauge*



*Data logger with Battery & Accesseraries*

# 1.3. Ground Water monitoring network



20 strategic deep and shallow wells are designed for monitoring (4 installed)

- Pressure transducer for GWLM
- Data collection Platform
- Deep meter

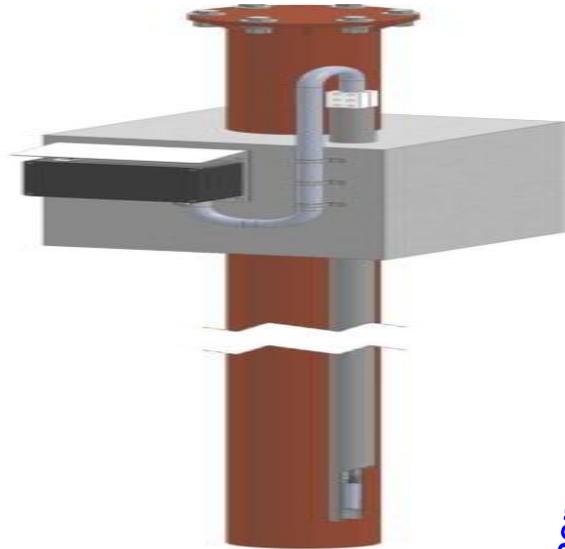


Groundwater Basin

Boreholes for monitoring GWL



Groundwater potential demand. Identify an industry has begin to rely upon existing water resources, it is critical to understand



Deep meter to measure WL



# 1.4. Design & Development of Meteorological monitoring

## Satellite Network

- ❖ 33 meteorological stations
  - Class I=7 installed
  - Class III=4 installed
  - Class IV=22 installed

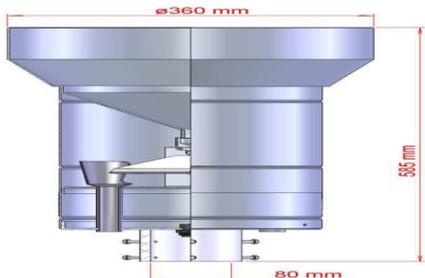
Forecast/ Dissemination/ Decision Support Center/ Operational Control Room/ Water Center

Automatic Collection & Real-time Transmission  
(e.g. GSM/GPRS, Terrestrial Radio, Satellite Radio, Meteorburst, broadband, etc. or combination possibly with local data logger storage backup)

## Terrestrial Radio

## Mobile Network

## Internet



Raingauge



Wind speed&dir



Hum&Temp



Global solar rad.meter



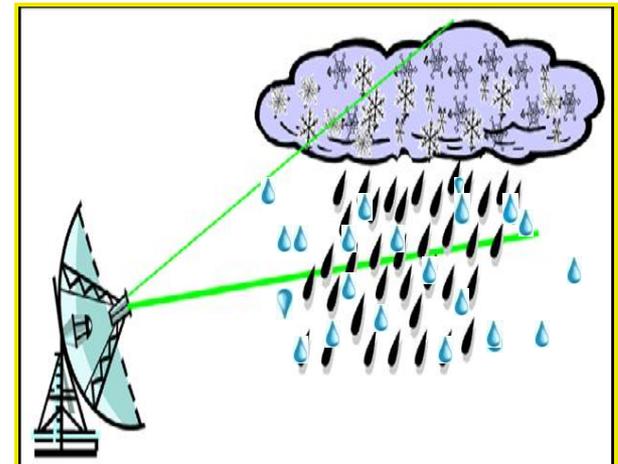
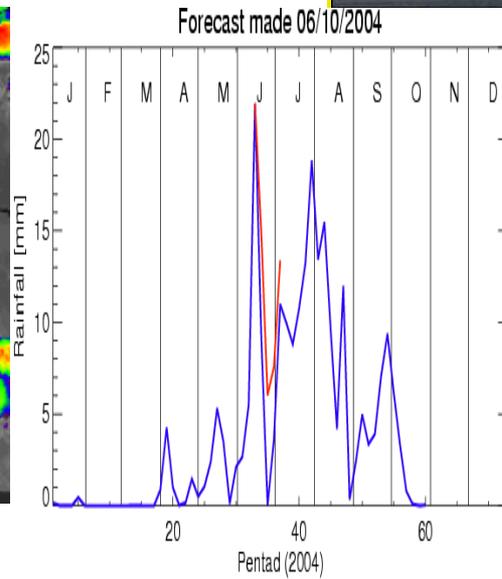
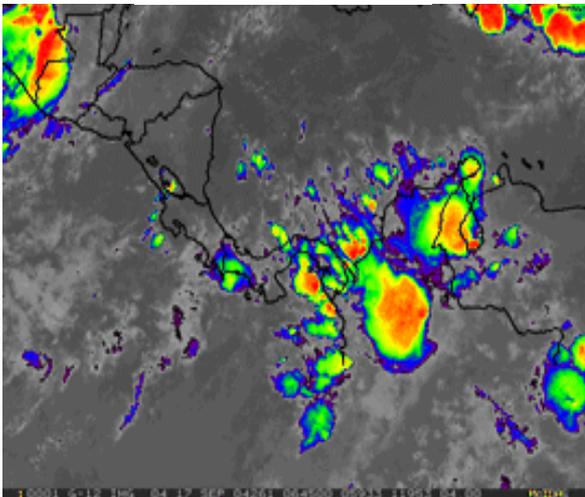
Evaporation pan



Data logger

# Weather Radar Established

- To estimate the amount of rainfall and rainfall rate directly over lake Tana and near by sub-Basins
- To obtain cloud information within the proposed radar field of view.
- To provide flood early warnings based on the prevalent precipitation conditions. **Real time weather information**





## Available socio economic data

- All 16 sub basins socio economic data collected, analyzed and computerized
  - ✓ Population
  - ✓ Land use land cover
  - ✓ Water resources potential
  - ✓ Livestock potential
  - ✓ Water supply services coverage
  - ✓ Water use data
  - ✓ Water users
  - ✓ Irrigation potential
  - ✓ Hydropower potential ..etc
- Situation assessment of wetlands in the basin
- Pollutant sources (Industries) in the basin
- Identification of potential sources for water pollutions
- Flood and drought prone areas
- Land slide areas
- GIS based maps
- Wildfire areas..etc