Water Resource Management

Theme3: Hydropower and Water Management Practices and Challenges

Taming Water in Ethiopia - An Interdisciplinary Approach to Human Security in a Water-Dependent Emerging Region

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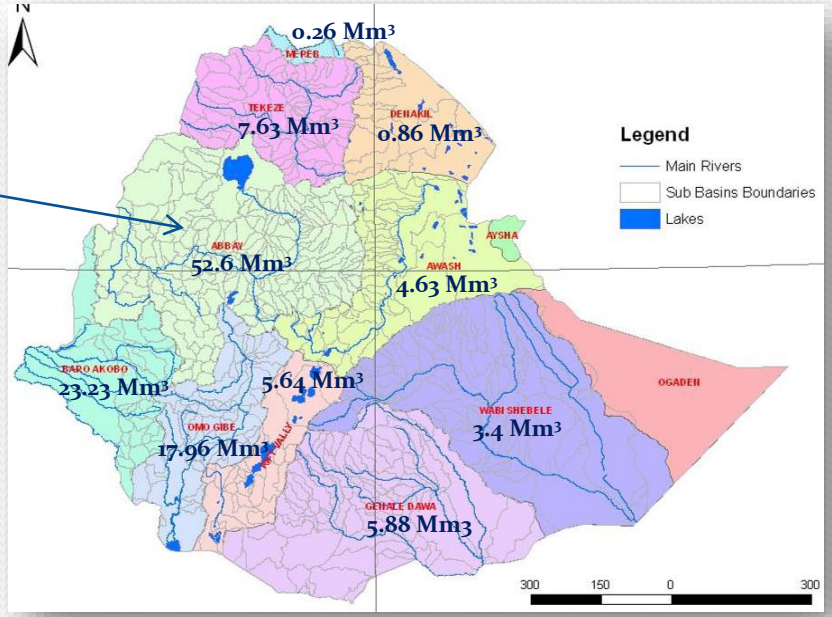
Introduction



- Ethiopia, total surface area of about 1.13 million km^2
- Estimated population is about 90 million (2011)
- Geographically diversified with high and rugged mountains, flat topped plateau, deep gorges, river valleys and plains

Water Resources Development

- Domestic water supply
- Irrigation and drainage
- Hydropower

Water Resources Management

- **Hydrological Information system**
- **Ground Water Investigation**
- **Hydropower Preparation**
- **Basin Management**
- **Watershed Management**
- **Water permit systems**
- Capacity building (Institutional, human)

Challenges

- The temporal and spatial variability of water resources impact on Availability of sufficient quantity and quality of water, reliable access to and use of water for health, agriculture, livelihoods, production (Water , Food and Energy Security)
- Watershed degradation and Sedimentation
- The frequency of extreme events
- The mountainous and rugged nature of the country
- The growing population
- Capacity challenges categorized as institutional, human and technology challenges
- High fund requirement

Weather and climate impacts

evidence across many sectors and scales

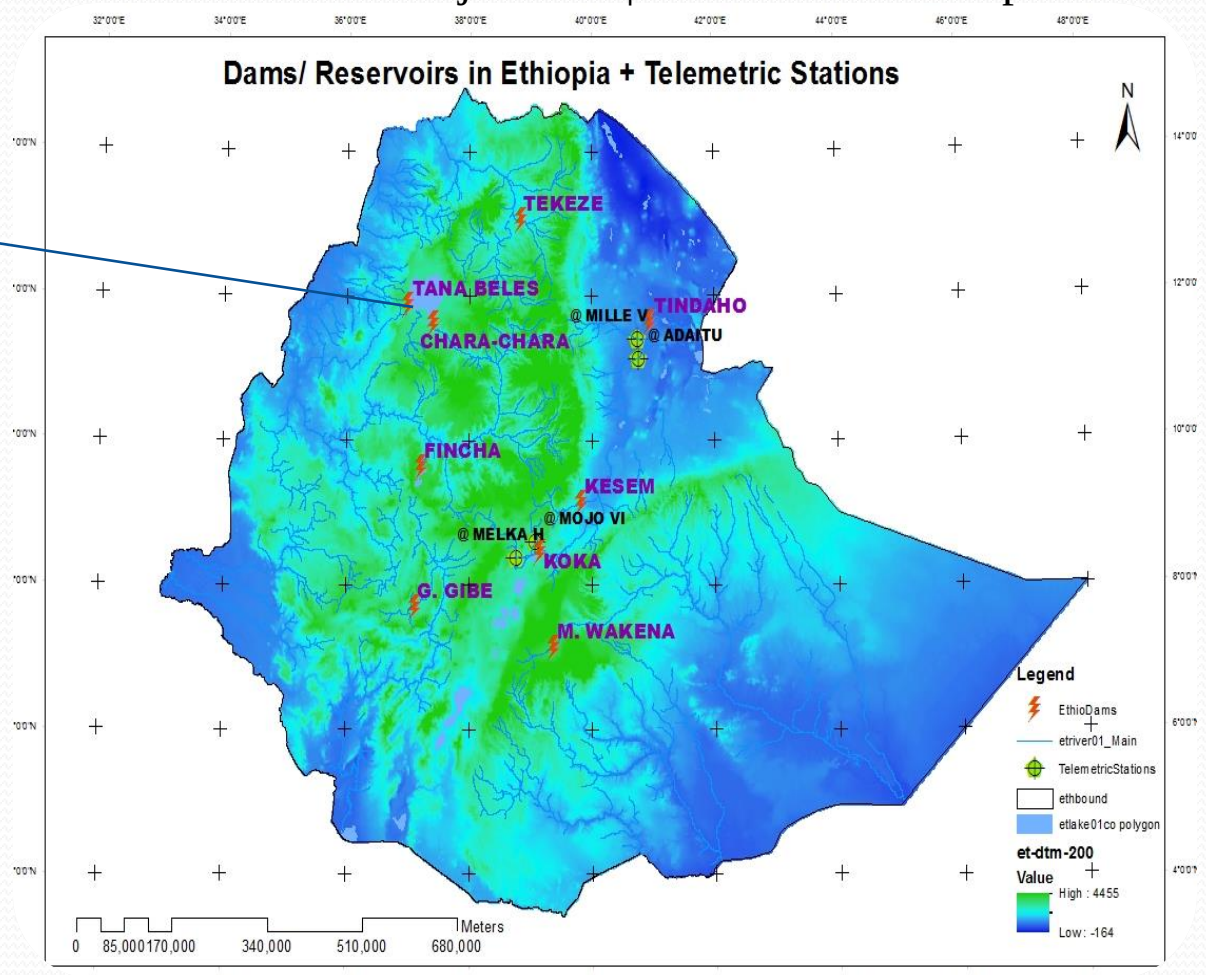
Policies, strategy and legal framework and Governance

- The Ethiopian Water Resources Management Policy that was formulated in 1999 has major provisions that are in line with the principles of integrated water resources management
- The policy framework pillars are Integrated Water Resources Management, Domestic Water Supply and Sanitation, Irrigation and Drainage and Hydropower Development
- Ethiopia Water Sector Strategy was formulated in 2002
- Ethiopian Water Resources Management Proclamation provides a legal basis for water resources administration

- The ministry of water and Energy - over all WRM
- At basin level, River Basin Authorities – ensuring IWRM basin l
- At regional level water resource bureaus development of water resources for (mainly) domestic water supply and sanitation and irrigation.
- Water Supply and Sanitation Authorities or Boards - providing potable water to urban centers and providing wastewater services
- EEPCO- Ethiopia Electric Power Authority – Dam management for hydropower
- Academics, training and Universities, Schools, Training Centers, Research Institutes, Research Directorate under the MOWE ; Linkage between research activities and operational water resource management

Hydropower and Water Management Practices

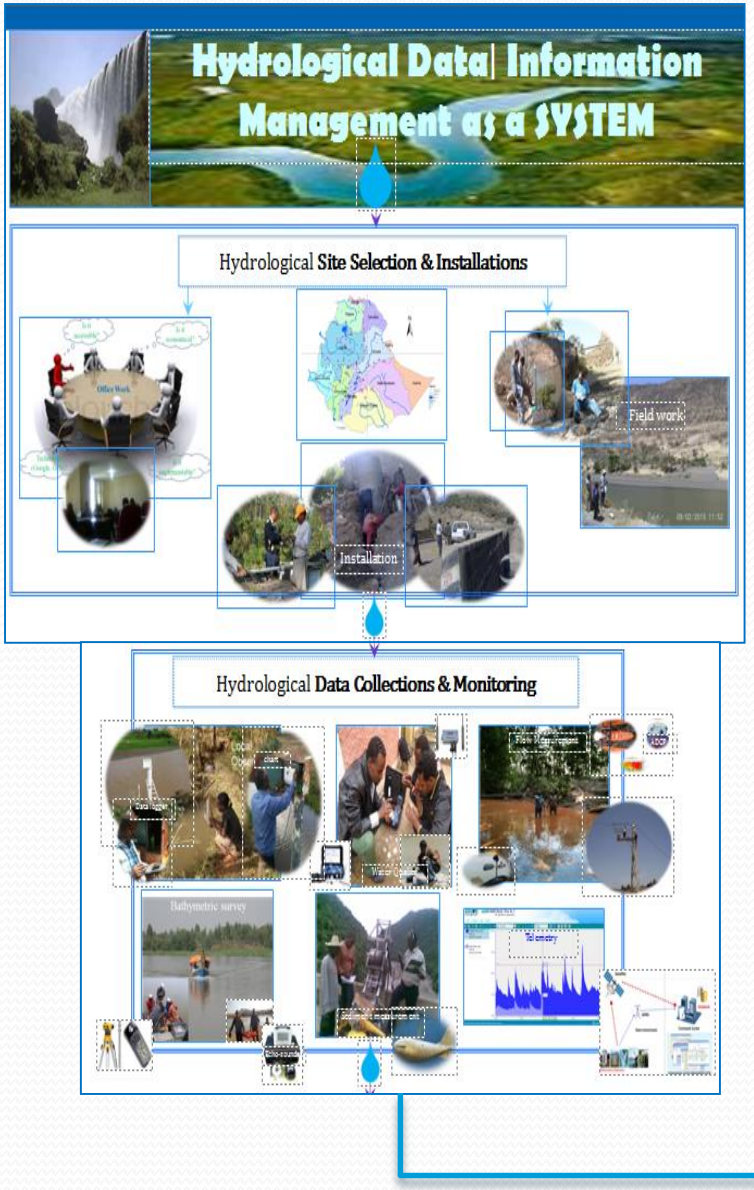
❑Major dams| reservoirs in Ethiopia



Involvement of different stakeholders

- MoWIE with Basin Authorities – data and information generation (historical, real and near real time and predicted)
- EEPCO- hydropower Water Demand
- NMA – sources of meteorological data rainfall, temperature etc (seasonal, historical, forecasted)
- DRMSFF – (before, During and after disaster) working on early warning
- Regional water Buearo – as means of data| information dissemination and feedbacks
- Universities| Research Institutes – capacity building in flood forecasting and monitoring infrastructure (university - industry linkage), etc
- Relevant stakeholders and Communities – main data and information users

Real and near real time data collection, forecasted data and information generation



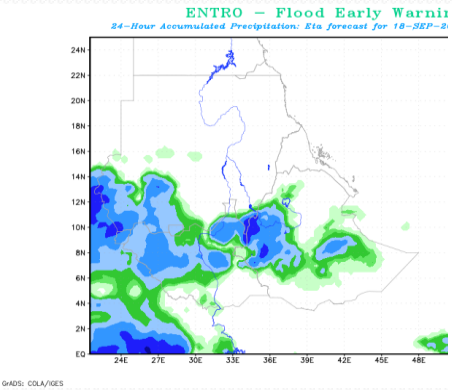
Data Collection, Manual

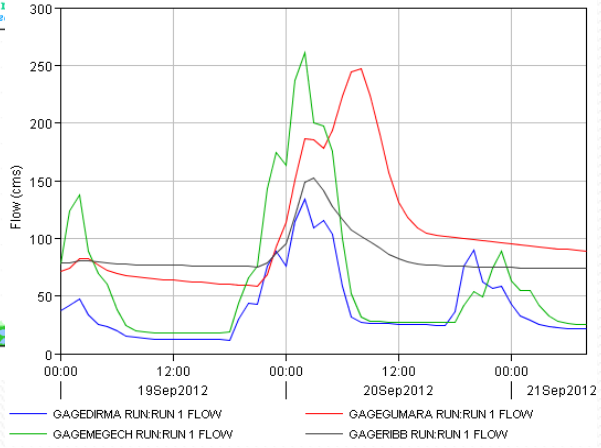
Communication and dissemination,
high frequency radio,
mobile and direct lines

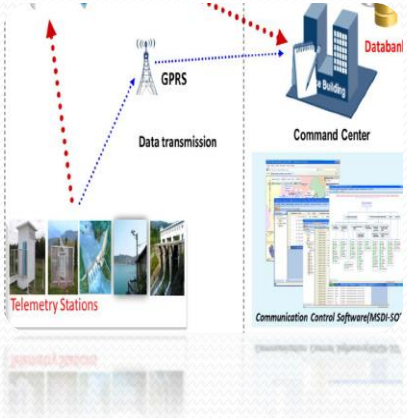
Data Collection,
automatic methods

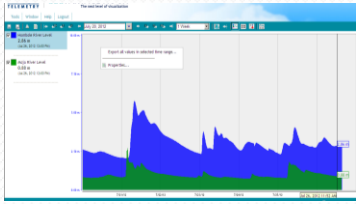
Communication and dissemination,
using high frequency radio, telemetry using GPRS, LAN-WAN communication systems (office) , Internet , mobile and direct lines

Predicted data
Meteorological
and hydrological









Reservoir Water management and Operation

- Predicting of reservoir water levels on seasonal bases

  Computed using a Mass Balance method using MS Excel

  A selected analogues years, suggested by NMA

A general water balance equation:

$P = Q + E + \triangle S$

Where: P is precipitation, Q is runoff, E is evapo-transpiration and $\triangle S$ is change in storage in a system

Input data used:

historical and seasonal climate data -Rainfall

historical and real time hydrological data, Inflow to the reservoirs reservoir levels and storage capacities,

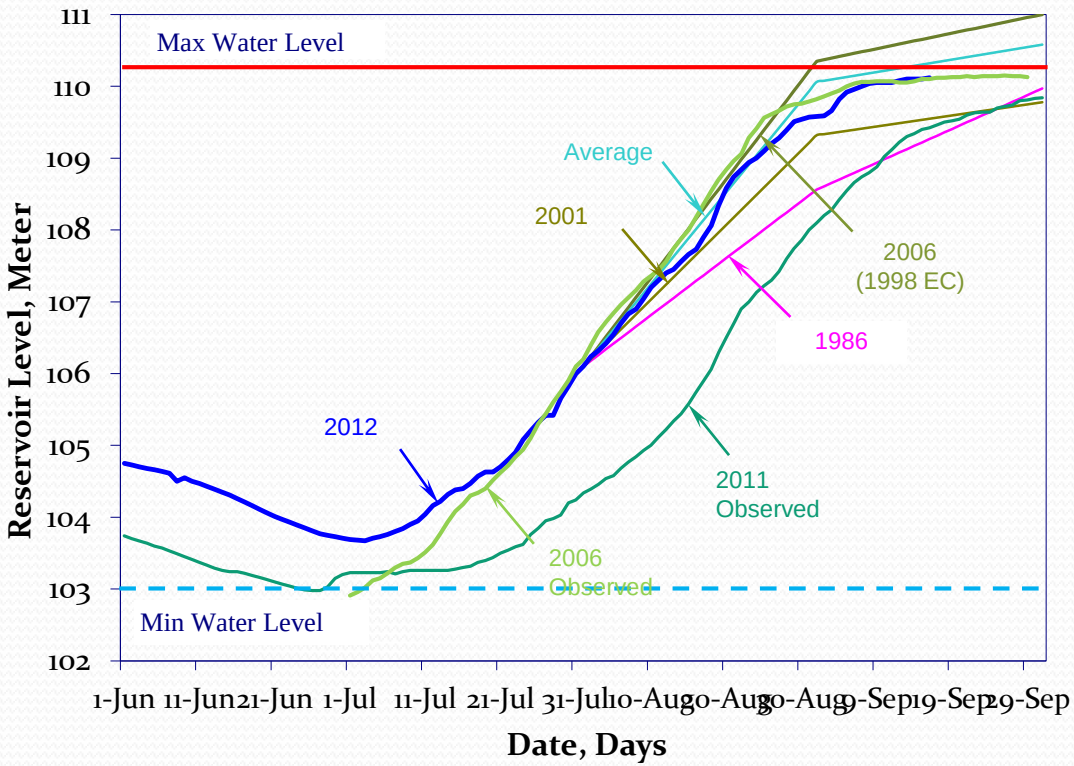
Outflows or releases from the reservoirs demand is considered

Loses: evaporation and seepage

Predicted outputs and applications

Reservoir predicted levels for Kiremt Season

Based on analogous Year 1986, 2001, 2006 and Average Year



Based on seasons of the year (Kiremt, Bega and Belg), the predicted reservoirs levels produced and compared with observed levels

the predicted reservoir level is then being used for:

- Storing and reserving enough amount of water for hydropower production and irrigation demands in dry season
- Flood control during rainy seasons in addition to hydropower generation

Major Issues to be considered

- Technological improvement for data monitoring and dissemination
- Improvement of Decision support system (forecast, tradeoff demands, information generation and dissemination)
- High technical linkage among stakeholders esp forecast of hydrology and meteorology
- Human Capacity building
- Need to strengthen the integration of institutions for water management

Conclusion

- Wtaer resource mangement is a key issue for development purposes that considers integrated approach
- Proper reservoir management needs: improved hydro meteorological network for data and information, strengthened forecasting capacity, proper communication system and appropriate information generation for decision
- Institutional and human capacity strengthening is a priority for WRM
- The integration of different stakeholders is a key to be considered

THANK YOU