

# Ethiopia's Water Security and the State of Water Resource Management

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# Outline

- 1. Water resources of Ethiopia**
- 2. Water security – definition, implication & Cases**
- 3. Water resources management institutions genesis**
- 4. Challenges and opportunities in water resource  
Management – findings of the bottle neck analysis**
- 5. Conclusion and implications**

# 1. Water Resources of Ethiopia

**Water, Land, and Labor** – are resources Ethiopia has

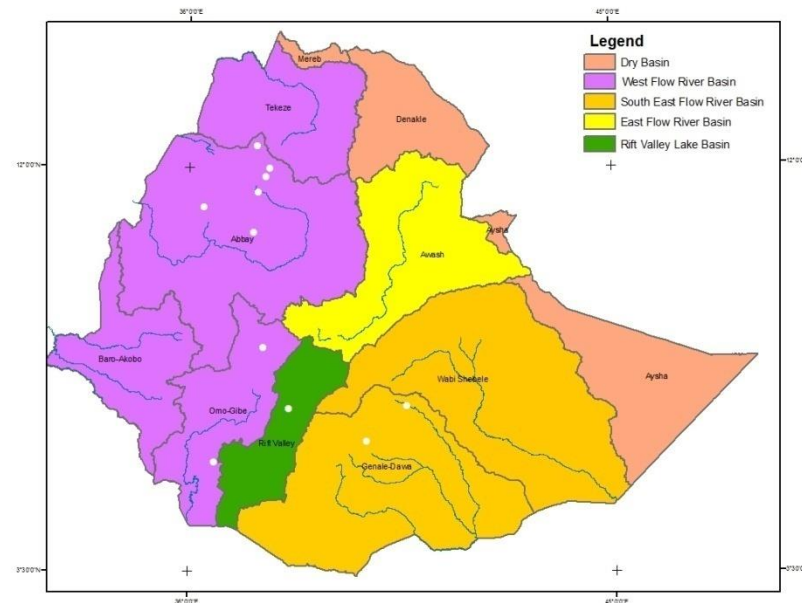
- Is Ethiopia water rich country?
- 12 major river basins with total annual runoff about 122 bn m<sup>3</sup>
- Groundwater potential: 2.6, 26, 40 billion m<sup>3</sup>

(Figures are very uncertain)

Ethiopia is the water tower of (east and north) Africa. Anything wrong in that statement?

The Dome shaped physiographical features of Ethiopia.

No river from neighboring countries enter Ethiopia



# Water scarcity

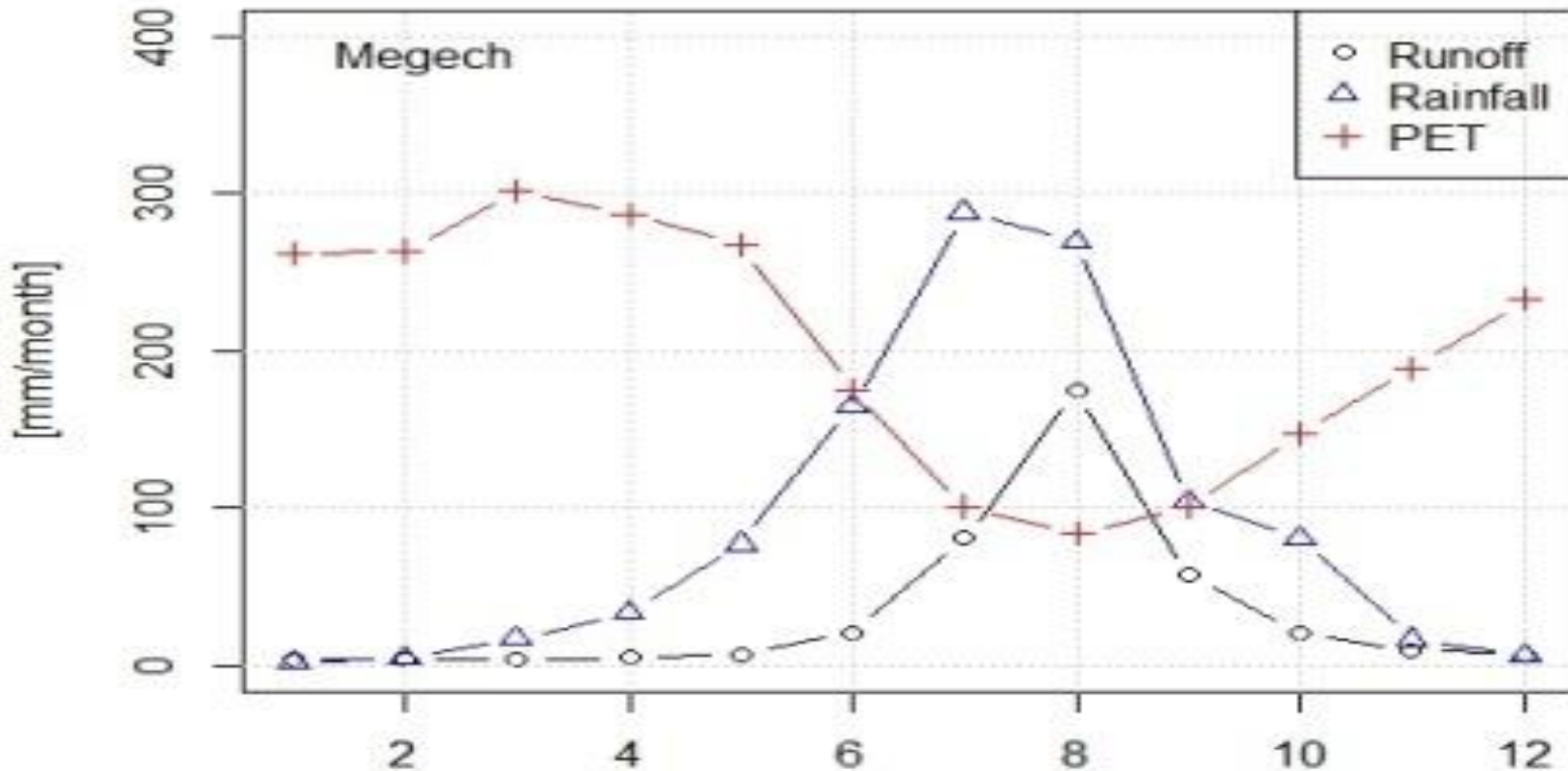
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- **Physical water scarcity** – Water resources development is approaching or has exceeded sustainable limits. More than 75% of the rivers are withdrawn for rivers
- **Economic water scarcity** – (Human, institutional, and financial capital limit access to water even though water in nature is available locally to meet human demands water resources are abundant relative to water use, with less than 25% of water from rivers withdrawn for human purposes but malnutrition exists.

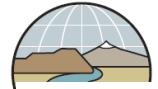
**Ethiopia is grappling with economic water scarcity? How?**

# The fundamental challenges:

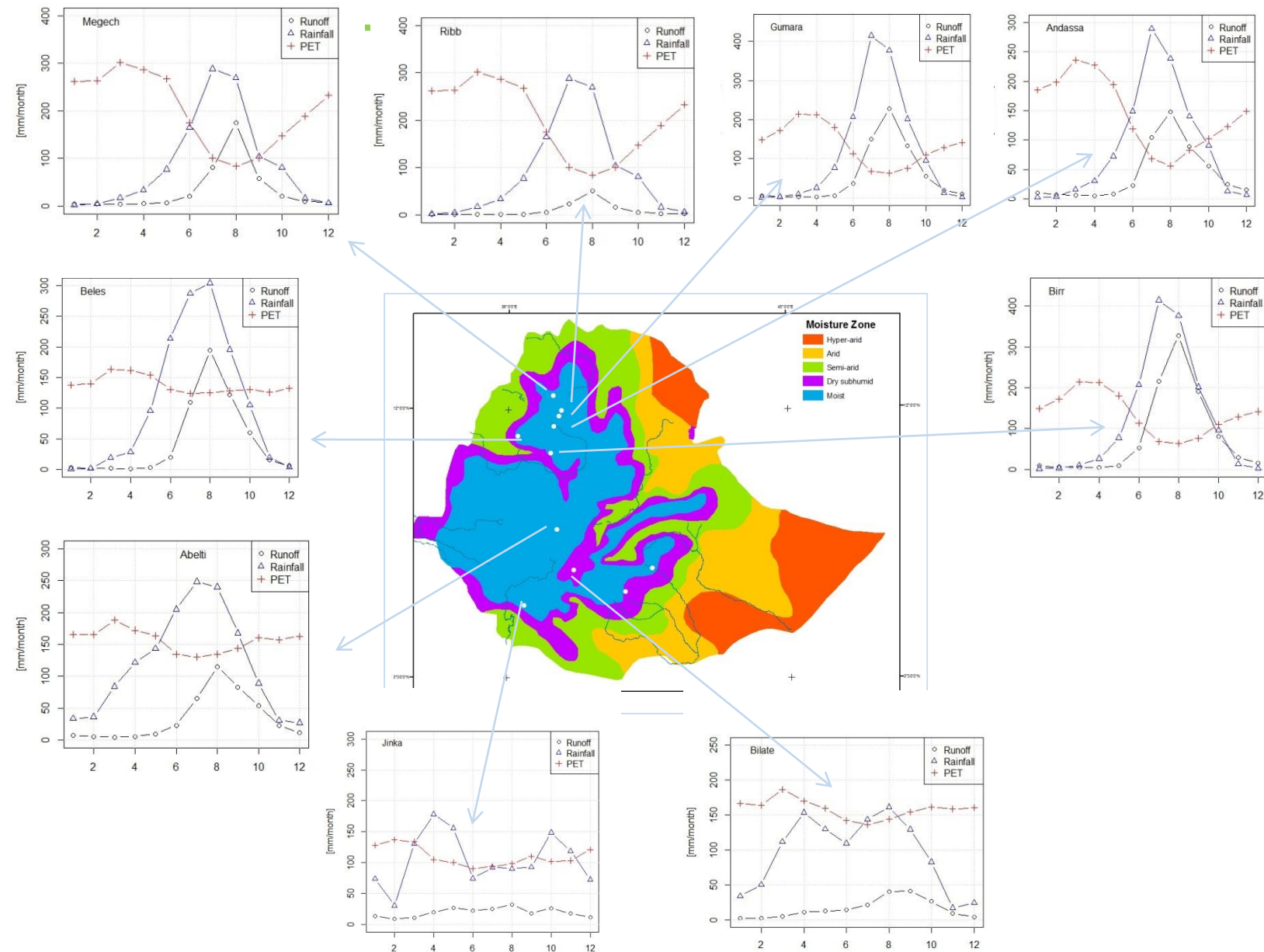
## Rainfall and runoff variability



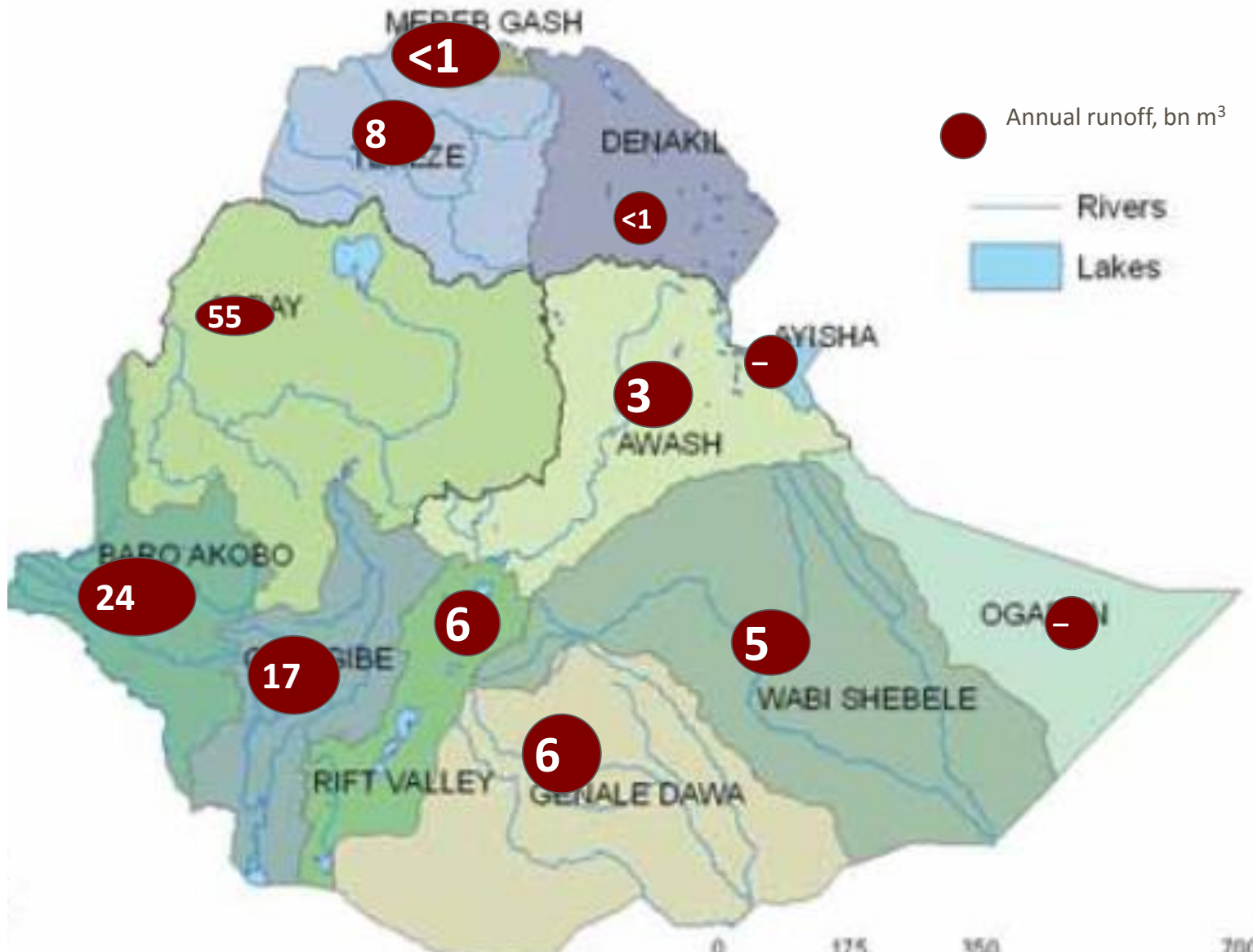




# Situation is the same every part of the of the country

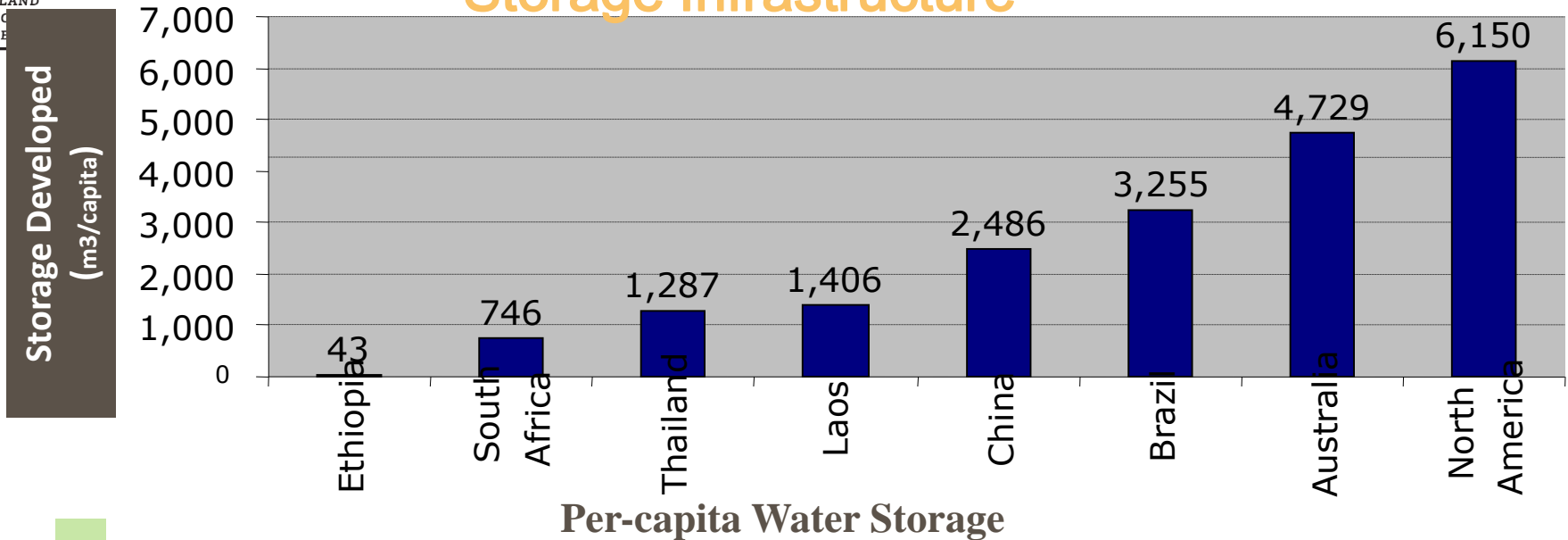


# Spatial variability tremendous

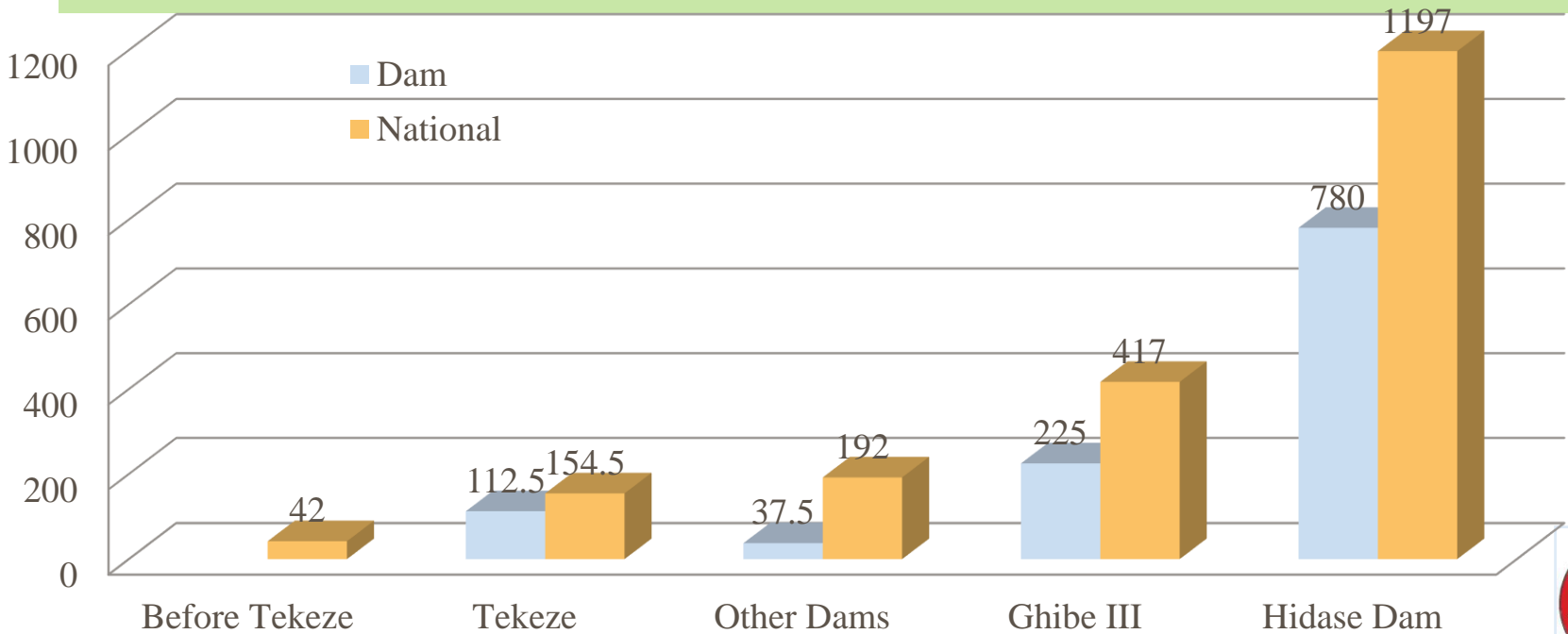




## Storage Infrastructure



## Per-capita Water Storage



# Ethiopia is now waking up!





# Planned during GTP 1

| No. | Sub Sector                           | 2010/11   | 2015/16     |
|-----|--------------------------------------|-----------|-------------|
| 1   | <b>Water Supply &amp; Sanitation</b> |           |             |
|     | Urban                                | 91.5%     | 100%        |
|     | Rural                                | 65.8%     | 98%         |
|     | National                             | 68.5%     | 98.5%       |
|     | Reduce Mal Function                  | 20%       | 10%         |
| 2   | <b>Irrigation</b>                    |           |             |
|     | Rehabilitation                       | -         | 6570 ha     |
|     | Feasibility and Design               | 462,114ha | 1208448 ha  |
|     | Construction                         | 127242.6  | 785582.2 ha |
| 3   | <b>IWRM</b>                          |           |             |
|     | Hydropower Prefeasibility            | 6447 MW   | 9227.4 MW   |
|     | Hydropower Feasibility               | 1431 MW   | 8398.4 MW   |
|     | Groundwater (1:50000)                | 3         | 22.7        |
|     | Hydrological Stations                | 85.6      | 90          |
|     | Basin Administration                 | 25        | 63          |
|     | Watershed Management                 |           | 1000000 ha  |

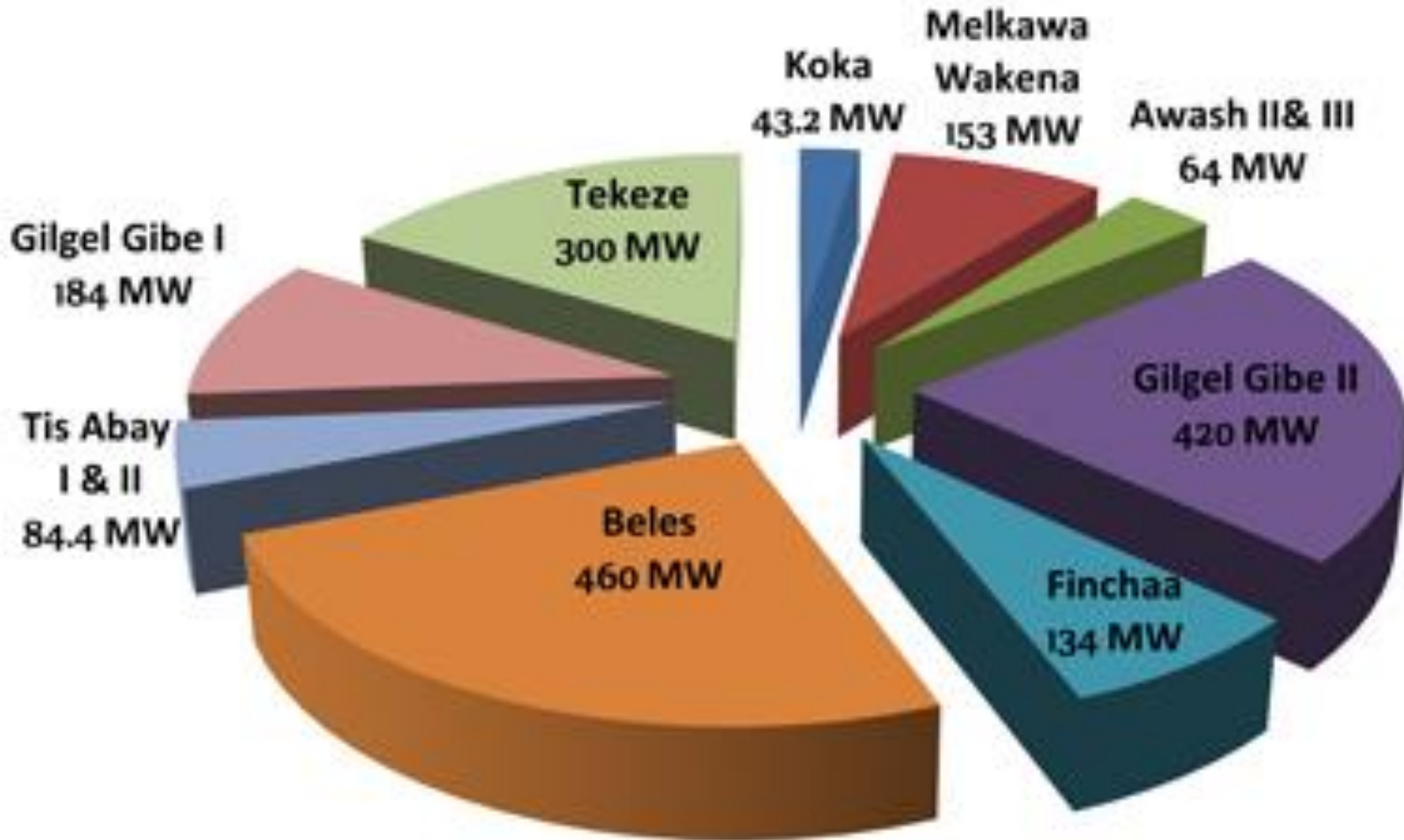


# *GTP I Planned*

| NO | Sub Sector            | 2010/11   | 2015/16         |
|----|-----------------------|-----------|-----------------|
| 4  | <b>Energy</b>         |           |                 |
|    | Hydropower Generation | 2,000 MW  | 8,000-10,000 MW |
|    | transmission          | 11,440 km | 17,000 km       |
|    | Distribution          | 126,038km | 258,038 km      |
|    | No. of customers      | 2 million | 4 million       |
|    | Electricity Access    | 41%       | 75%             |
|    |                       |           |                 |

# Hydropower developed

## Existing Hydropower Projects in Ethiopia



# Plans during GTP II (2015-2020)

| <b>Water Supply</b>  | <b>Base Year<br/>2014/15</b> | <b>2020</b> |
|--|------------------------------|-------------|
| Potable water supply coverage                              | 58                           | 83          |
| Rural potable water supply                                 | 59                           | 85          |
| Urban water supply coverage                                | 51                           | 75          |
| <b>Hydropower</b>  |                              |             |
| Power generating capacity (MW)                             | 2267                         | 17346       |
| Electricity coverage (%)                                   | 60                           | 90          |
| <b>Irrigation</b>  |                              |             |
| Area of land under large and Medium Scale                  | 658340                       | 954000      |
| Area of land developed under modern small scale irrigation | 1.3                          | 1.7         |

# Very soon the pictures will change



## 2. Water Security: Definition, Implication & cases

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Water Security – refers to the nexus between the  
**Availability**, **Accessibility**, and **Use of water**.

Water security must be seen interns of:

Water for domestic use (WaSH);

Water for food Security; and

Water for hydropower.

Water security can happen at different scale

**Regional – Lowland vs highland, Afar vs Oromia**

**Community – what would happen if wells dry**

**Household – the poor, women, emerging/pastoral regions**

Drivers of Water Security

**Climate – Variability and change**

**Population growth, urbanization/ development**

**Land degradation – decline baseflow, pollution**



## A. Awash River Basin

Awash is the most used river – for irrigation.  
Most prolific aquifer system  
Where large, medium and small scale irrigation  
are concentrated

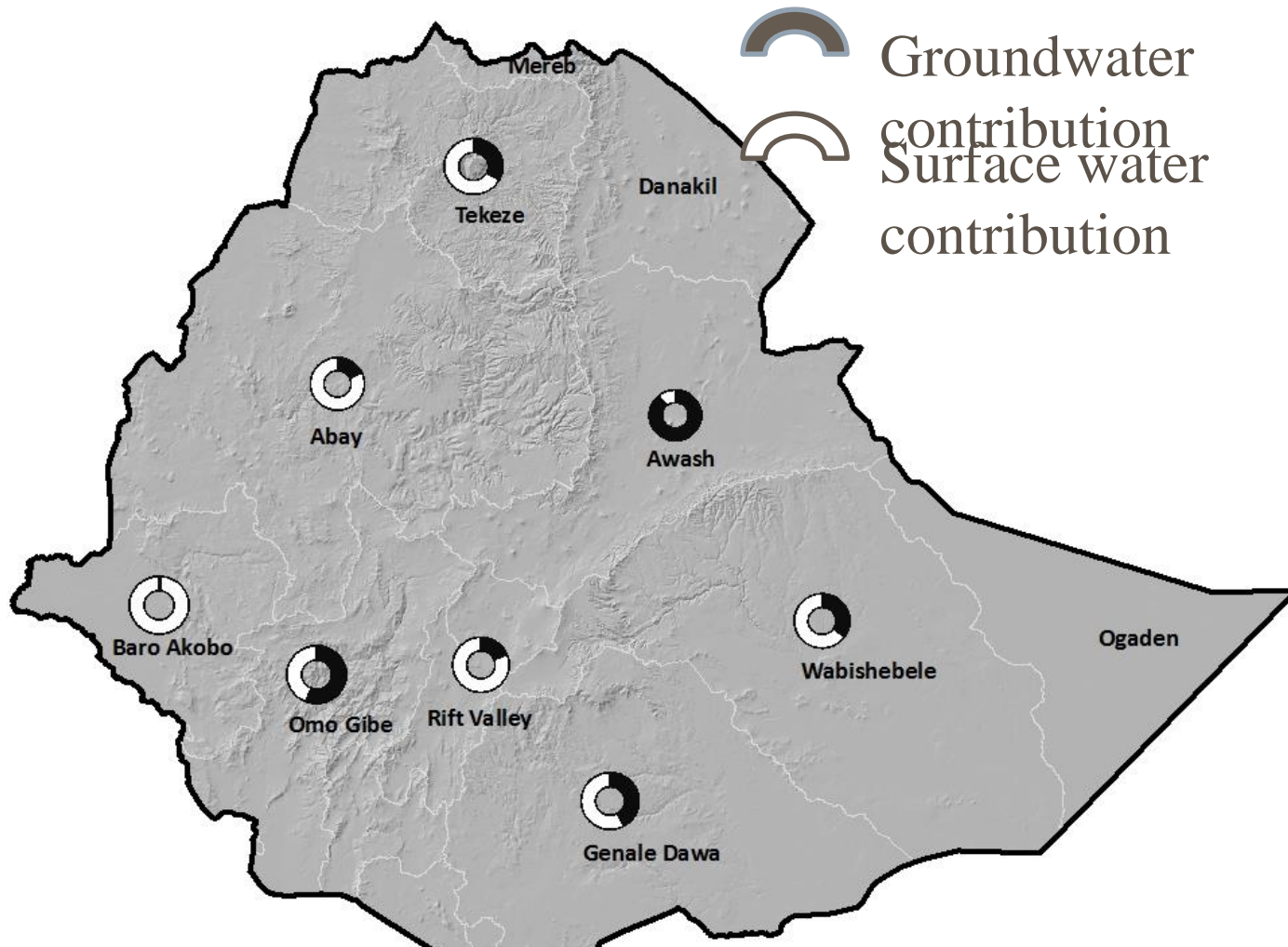
For water supply – Addis Ababa, Adama, etc.

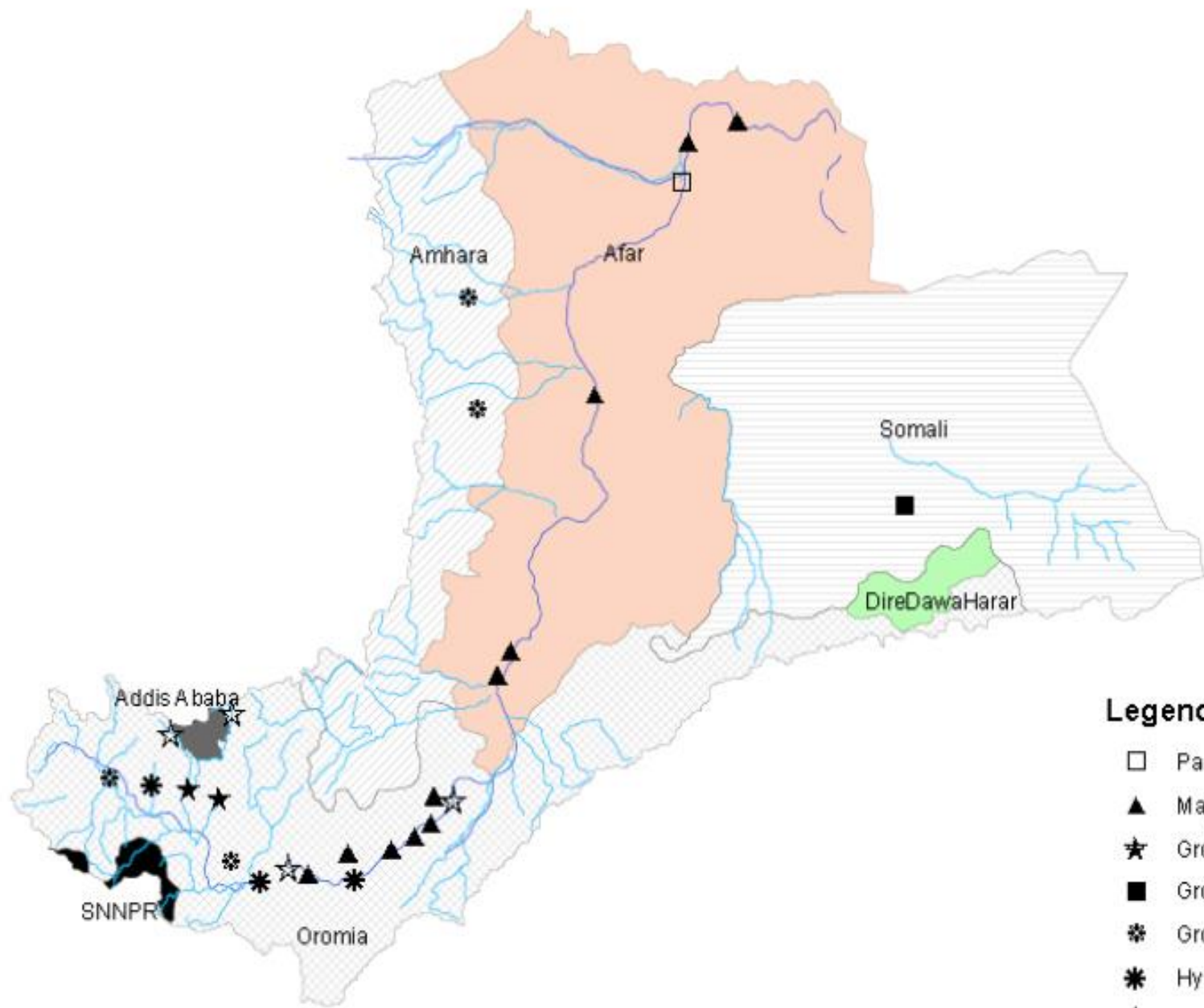
For industry: flower, textile, leather, etc.

Water shortage will be critical problem in no  
distance time.

Water pollution (industrial/domestic waste,

# Awash-High groundwater contribution to surface water flows





### Legend

- Pastoralists
- ▲ Major\_Irrigation
- ★ Groundwater\_Industrial\_use
- Groundwater\_for\_export
- \* Groundwater\_Irrigation
- \* Hydropower
- ☆ Urban\_water\_supply
- ▲ Major\_irrigation\_abstraction

## B. Lake Haramaya



*Used to supply water for Harar its environs at a rate of 60 l/s since 1961 to a population of 160000 people*

*But completely dried and the treatment plant stopped in 2004*

*Groundwater abstraction started*

### Causes of the Lake demise

- Mismanagement – **no accountability**
- Siltation – reducing the storage capacity – it was a growing in the 1980s,
- Unstained Abstraction – Chat irrigation

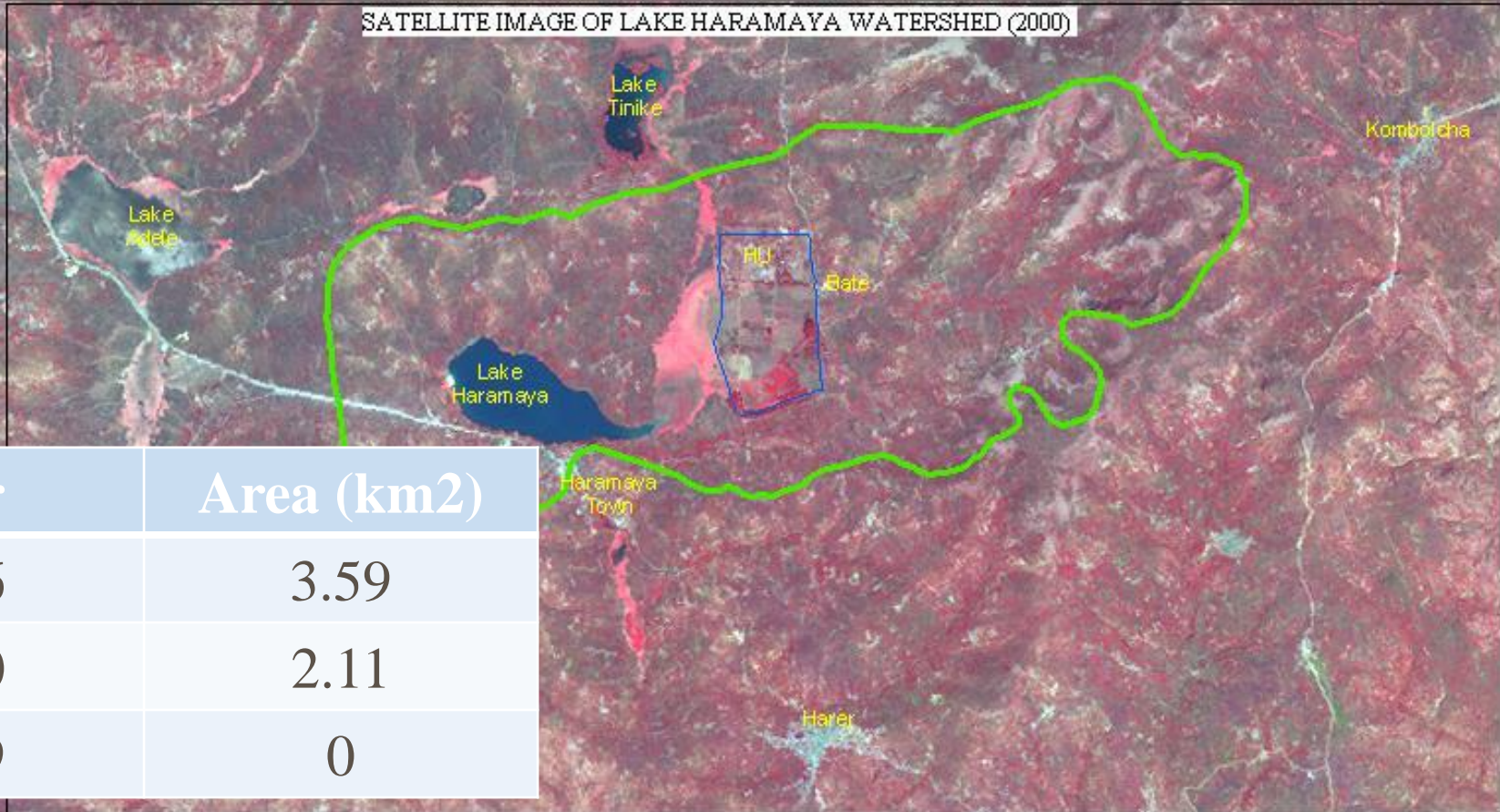




SATELLITE IMAGE OF LAKE HARAMAYA WATERSHED (1986)



SATELLITE IMAGE OF LAKE HARAMAYA WATERSHED (2000)



Year

Area (km<sup>2</sup>)

1986

3.59

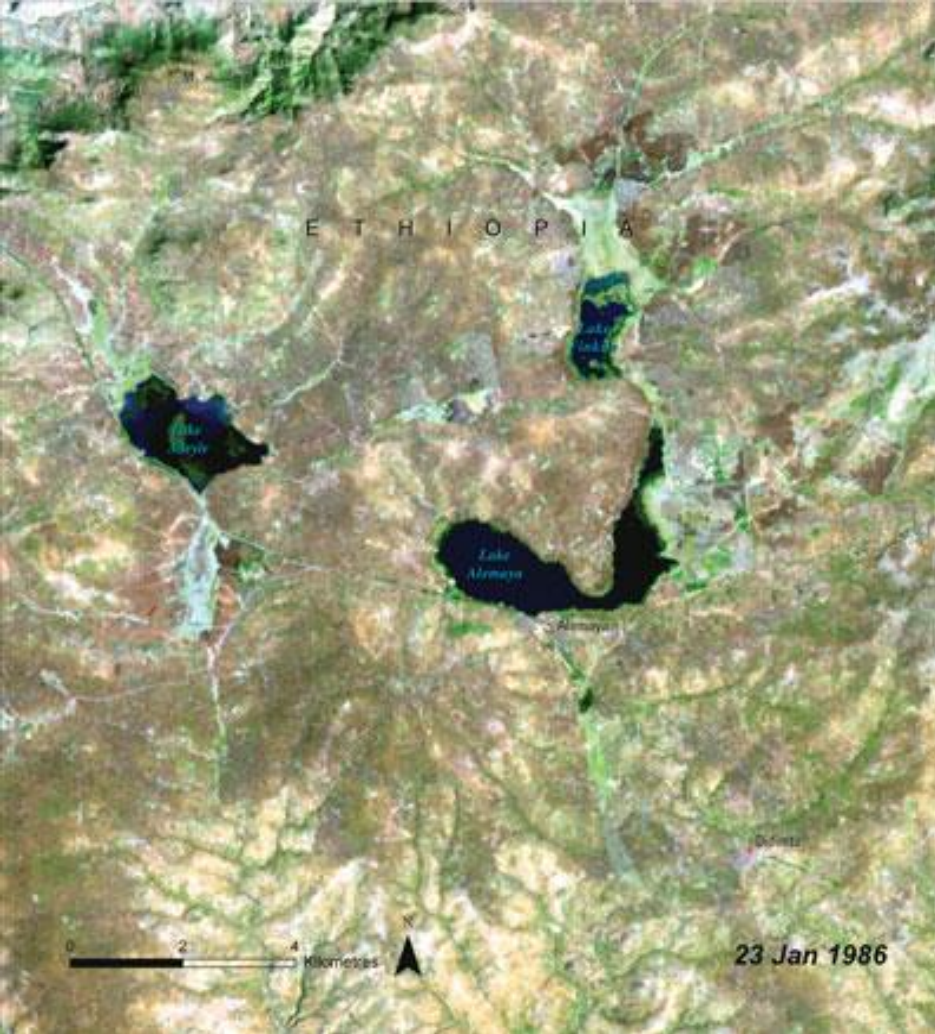
2000

2.11

2009

0

*Satellite Image of the  
three Lakes in 1985*



The three Lakes  
in 2005



# Apparently Lake Haramaya is not dead but sleeping Lake



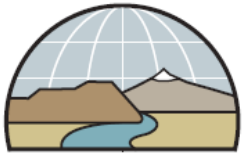
## Revive Lake Haramaya initiative

- *Task Force – from National to Woreda Level formed – regular meeting;*
- *Fud being mobilized for Watershed Development;*
- *But lack integration, and did not based on IRM principles*

How did the Lake shows revival:

- Improved watershed management ?
- Good rainfall ??
- **A reduction in water abstraction?**
- **Can we control the proliferation of irrigation pumps**





WATER & LAND  
RESOURCE  
CENTRE

### **3. Water resource management institutions and genesis**

#### **Institutional Arrangement**

**Federal Ministry of Water & Energy**  
**Regional Bureau of Water & Energy Resources Development**  
**Regulatory (Basin organizations, EEA)**  
**Utilities (WSSA, Water Boards, EEPCO)**  
**Contractors and Consultants (EWWCE, WWDSE)**

#### **Legal Framework**

- 1. Ethiopian Water Resources Management Policy 1999**
- 2. The Ethiopian Water Resources Management Proclamation**
- 3. River Basin High Council and Authorities Proclamation**
- 4. Ethiopian Water Resources Management Regulation of**
- 5. Irrigation Development Incentive Regulation of 2009**
- 6. Abbay and Awash Basins High Council and Basin Authority Establishment Regulations**



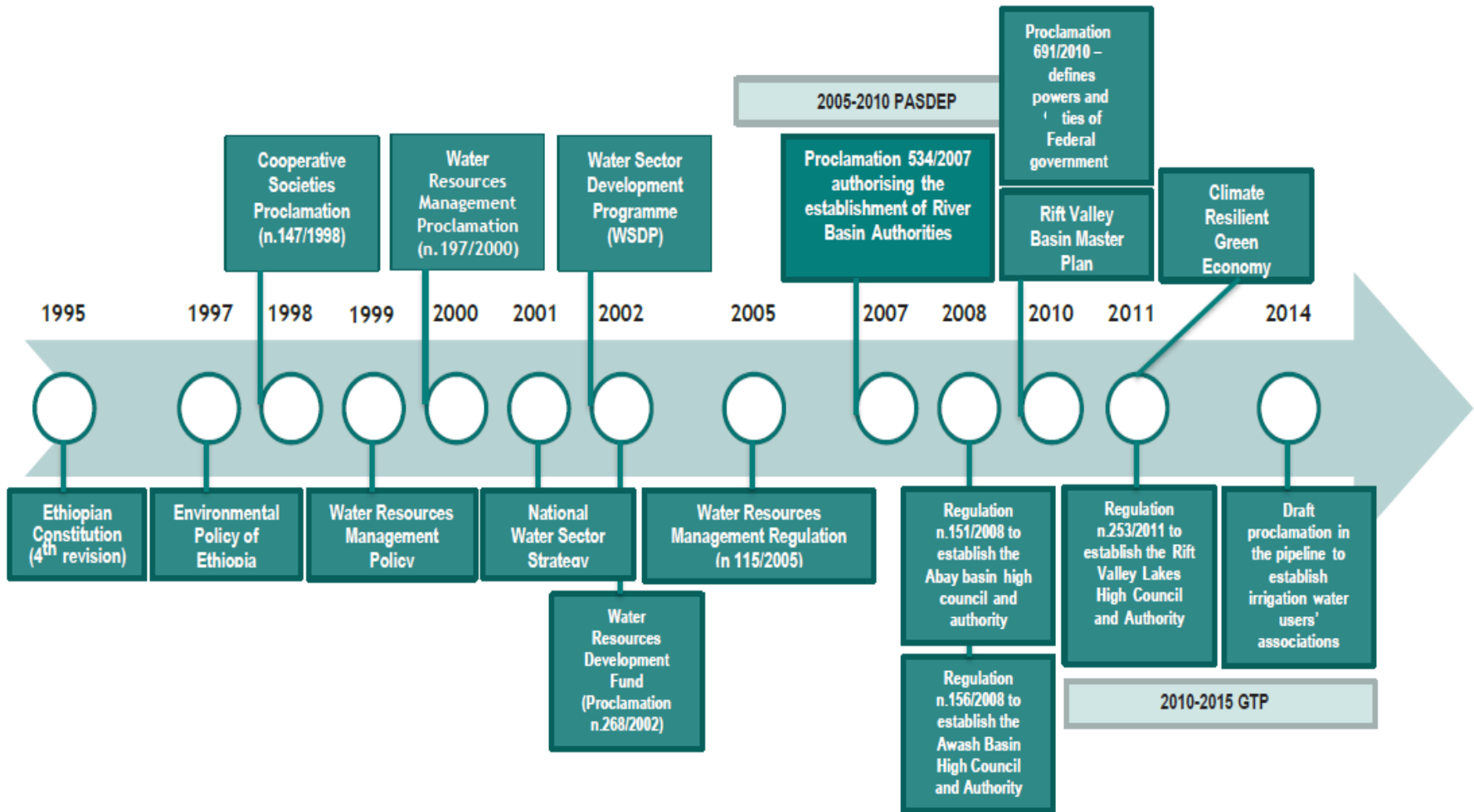


# Metamorphosis of MoWIE

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- **Pre 1956 Situation**
- **1956 Water Resources Department within the MoPWC – Blue Nile**
- **1962 Awash Valley Authority – All aspects of water in Awash Basin**
- **1971 National Water Resources Commission /the MoPW &WR**
- **1975 Ethiopian Water Resources Authority /the MoMWE**
- **1977 Valley Agriculture Development Authority - AVDA**
- **1981 NWRC (WRA, AWSSA, EWWCA, NMA) /WRDA**
- **1987 Ethiopian Valleys Development Studies Authority**
- **1993 MoNR&EP (WRDA, AWSSA, EVDSA, NMA)**
- **1995 Ministry of Water Resources**
- **2010 Ministry of Water and Energy**
- **2013 Ministry of Water Irrigation and Energy**
- **2015 Ministry of Water Irrigation and Electricity**

# We are fine in establishing institutions at high level:



## But who cares:

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When Lake Haramaya dried?

If Lake Zeway dries or polluted?

If groundwater in Awash Basin is depleted?

If Awash river is polluted and Metehara town

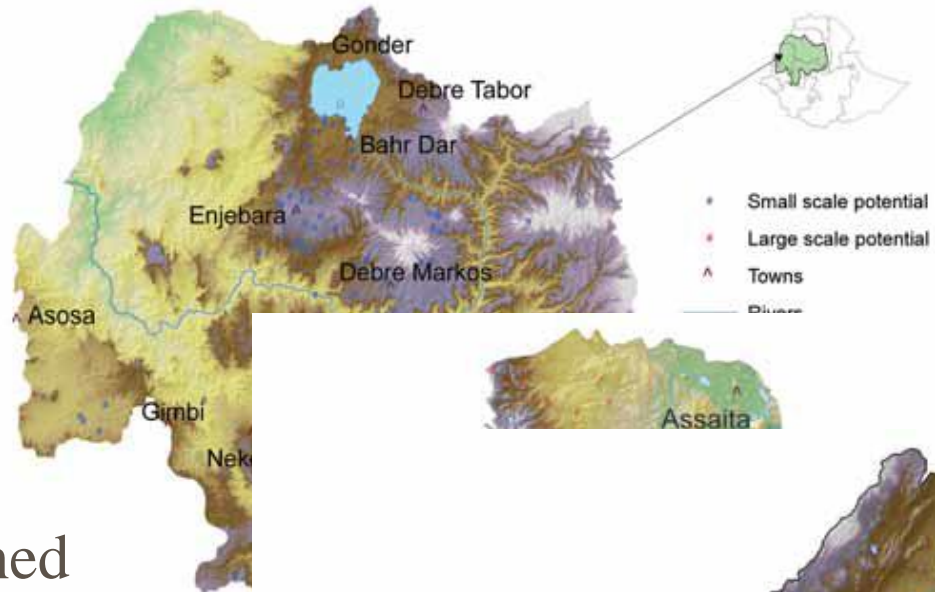
Water treatment plant can't treat?

If water doesn't reach Tendaho dam?

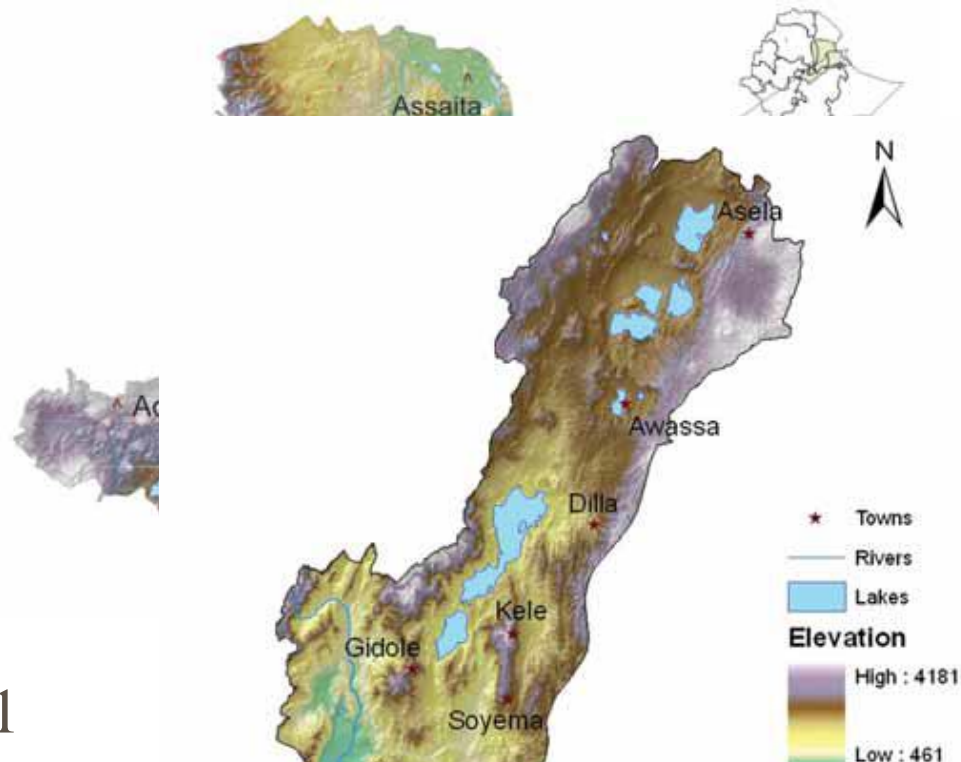
***That is when our river basin organizations  
role comes into full picture.***

# River Basin Authorities

Abay Basin  
Established 2008



Awash Basin  
Established



Rift Valley Lakes  
Established in 2011

**What have the RBA authorities have achieved since their establishment!**

## 4. Water Resource Mgmt challenges – Bottle-Neck Analysis.

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**Legal framework** – adequate but harmonization is still required between the regional and federal mandates.

**Policy/strategy and laws** – comprehensive but strategy is getting outdated and overtaken by GTP

**Support for WRM** – little commitment for WRM Is using sectors due to lack of horizontal coordination and communication between ministries and within MoWIE

**Finance** – Budget allocated for RBA is in adequate, and unpredictable; fee collection is not in practice,

**Information base** – data (surface and groundwater) is inadequate,

**Human Capacity** – deficiency in staff profile

**Equipment and systems** – monitoring equipment inadequate, information systems non-existent.

**Basin planning** – limited connections between sectoral plans and basin plans and between basin plans and federal-regional level

**Stakeholder Participation** – no strong evidence in representation, information shared and conflict resolution

**Water allocation** – unclear criteria for water allocation

**Pollution control** – no integrated pollution reduction strategies basin level

**Monitoring** – limited monitoring of water quality

**Economic management** – charges for water use and pollution permit are non- existence /inadequate

**Flood and drought** – Little evidence from learning in the past.

**Adaptive management** – no evidence that trends and future projections of water availability, demand and pollution are systematically considered in planning.

**Enforcement** – permit for abstraction and pollution only applied at times

**Institutional and technical sustainability-** staff turnover, shortfalls in long term financing for WRM institutions

**Environment and social development** – no evidence that environmental flow for eco-systems services are collected

## 5. Conclusion and Take-home message

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- Water plays and will continue to play an imperative role in growth, development and poverty reduction effort of Ethiopia.
- Water utilization in Ethiopia by all standards is very poor because of economic water scarcity.
- Due to emerging drivers (development and climate change induced variability), water insecurity is affecting many regions/ communities.
- Water insecurity is aggravated due to absence of effective institutions to manage water resources;
- The establishment of River Basin Organizations in the effective management of water resources is action in the direction.



- But river basin organizations must be effective, proactive, accountable and for which they need to be empowered and capacitated.
- Effort to develop and sustainable manage water and land resources need to be properly integrated – water doesn't come to from the tap, it doesn't come from the reservoir, it actually comes from the watershed.

# Take home-message

**Inability to develop water resources has been the cause of water insecurity in Ethiopia;**

**soon**

**Absence of effective water management will be the cause of water insecurity;**

**Hence**

**the development of effective water management institutions is imperative**

**for which**

**the commitment of the leadership is a prerequisite.**

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# Thank you

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