

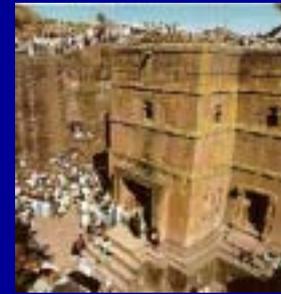
# ETHIOPIA

## Lake Tana and it's environment: Threats for sustainable management



**Eshete Dejen (PhD)**

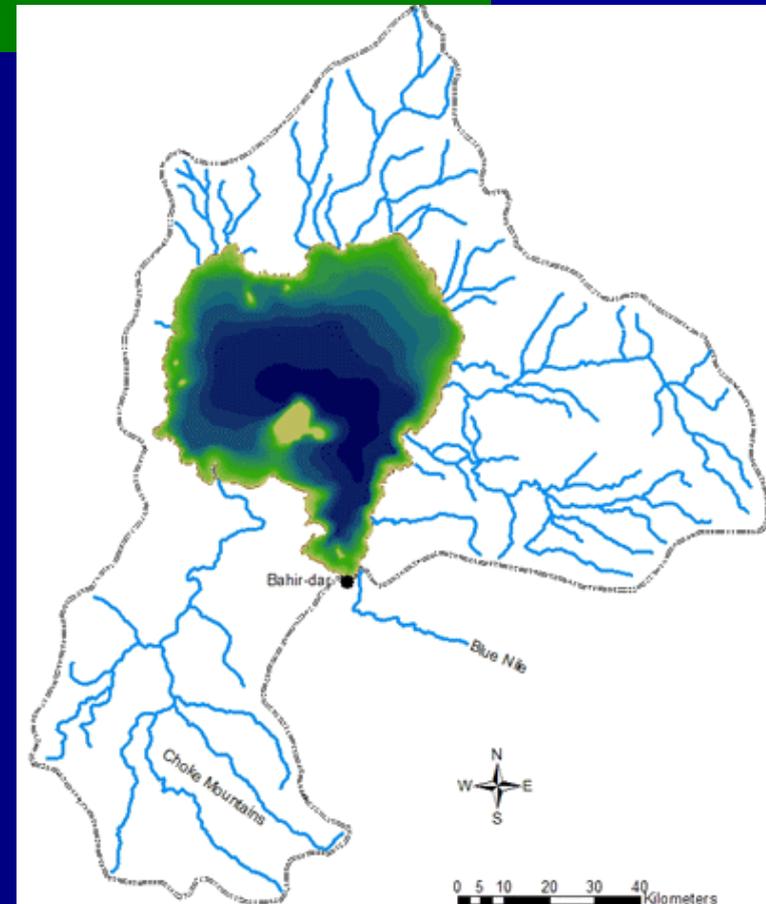
# ETHIOPIA



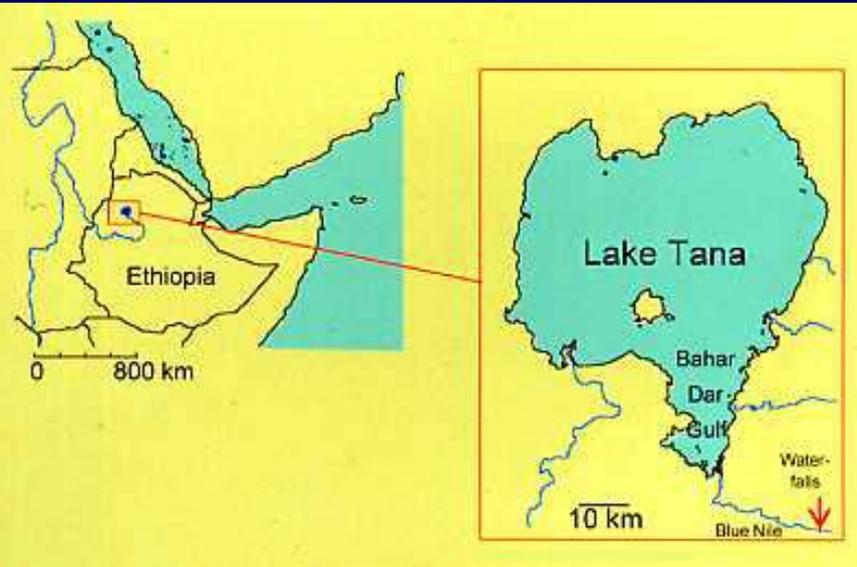
# L. Tana



- \* Largest lake of Ethiopia
- \* Turbid, low biological productivity



# LAKE TANA

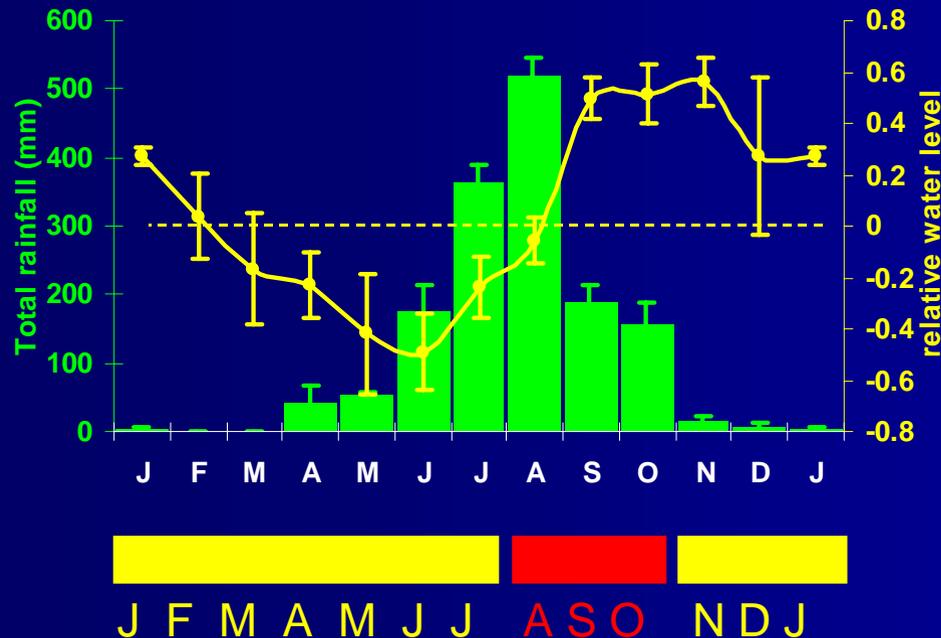


- ◆ **Location** NW Ethiopia  
altitude 1830m  
source of the Blue Nile  
separated from lower Blue Nile basin by 40m high waterfalls,
- ◆ **Area** 3050 km<sup>2</sup>
- ◆ **Depth** average 8m, maximum 14m
- ◆ **Age** 10,000 - 2 million years?
- ◆ **Catchement:** 16,000 sq.km

# L. Tana: environment

Variable	Mean $\pm$ SD	Range	Month	Month
			Minimum	Maximum
Temperature ( $^{\circ}$ C)	23.2 $\pm$ 1.5	20.2-26.9	January	May
Turbidity (NTU)	35.2 $\pm$ 17.6	12.8-84.2	December	August
Conductivity ( $\mu$ S cm $^{-1}$ )	132.8 $\pm$ 11.2	115-147.9	October	February
Total dissolved solids (mg l $^{-1}$ )	163.6 $\pm$ 10.1	148.4-178.1	August	February
Chlorophyll a ( $\mu$ g l $^{-1}$ )	6.4 $\pm$ 1.1	3.4-12.9	March	January
Oxygen (mg l $^{-1}$ )	6.7 $\pm$ 0.5	5.9-7.3	December	April
pH	7.7 $\pm$ 0.6	6.8-8.3	August	January

# Climate and Water level

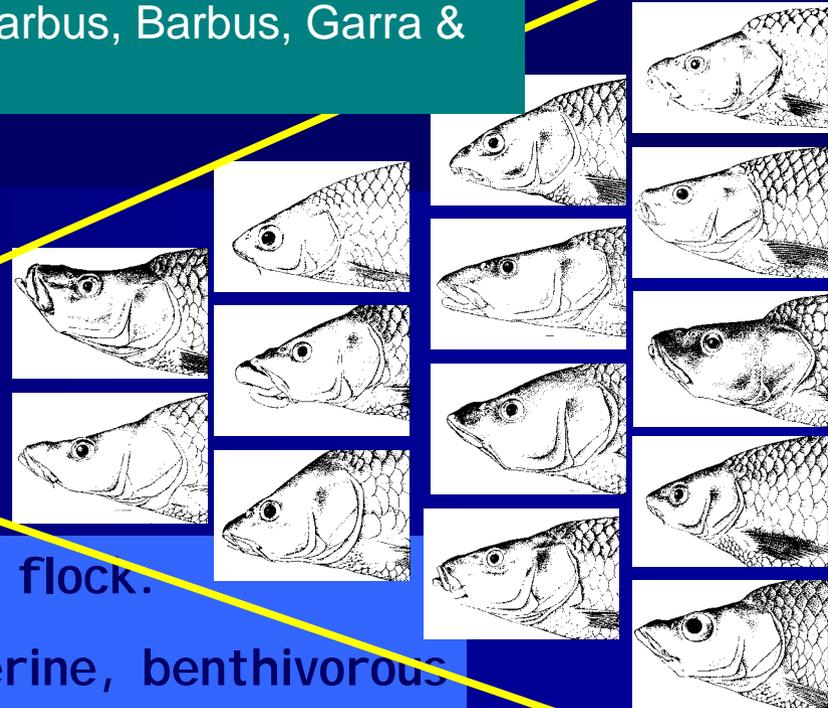


# Lake Tana: Services & Products

- Fisheries
- Water supply
- Transportation
- Hydro-electric power supply
- Irrigation
- Heritage/religious practice
- Diversity of flora & Fauna
- Tourism
- Quality of life for Bahir Dar Residents
- Livelihood for marginalized ethnic group (WOYTO)
- Waste processing
- Mining (sand)
- Wetland products

# EVOLUTIONARY Laboratory

Fish families: Cichlidae, Cyprinidae, Claridae  
Cyprinidae: Labeobarbus, Barbus, Garra & Varicorhinus



Lake Tana's *Barbus* species flock.

Evolved from ancestral riverine, benthivorous species resembling *B. intermedius* commonly found in Ethiopian highlands

All species are closely related, little genetic distance, recent origin

Rapid diversification and speciation probably occurred in the last 20.000 years, similar to cichlid species flock in Lake Victoria

# TRADITIONAL REEDBOAT FISHERY

History	Area	Season	Species	Market
>200 years	shore	all year	tilapia (65%)	local markets

Number of boats/fishermen: 400

## Fishing techniques

traps (floodplains)



small gillnets (15m)

'wigaro'



# SEASONAL RIVERINE FISHERIES

History	Area	Season	Species	Market
>200 years	upstream rivers Gumara	Aug-Oct	<i>Labeobarbus</i>	local markets Woreta, Hamusit

Number of fishermen: 100-300

Fishing

traps



scoopnets



poison



# COMMERCIAL GILLNET FISHERY

History	Area	Season	Species	Market
1986	shore	all year	tilapia	Addis Ababa
N.G.O.s	river mouths	Aug-Sep	<i>Labeobarbus</i>	
	shore	all year	catfish	

Number of boats: 20-8

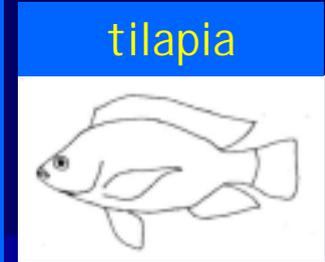
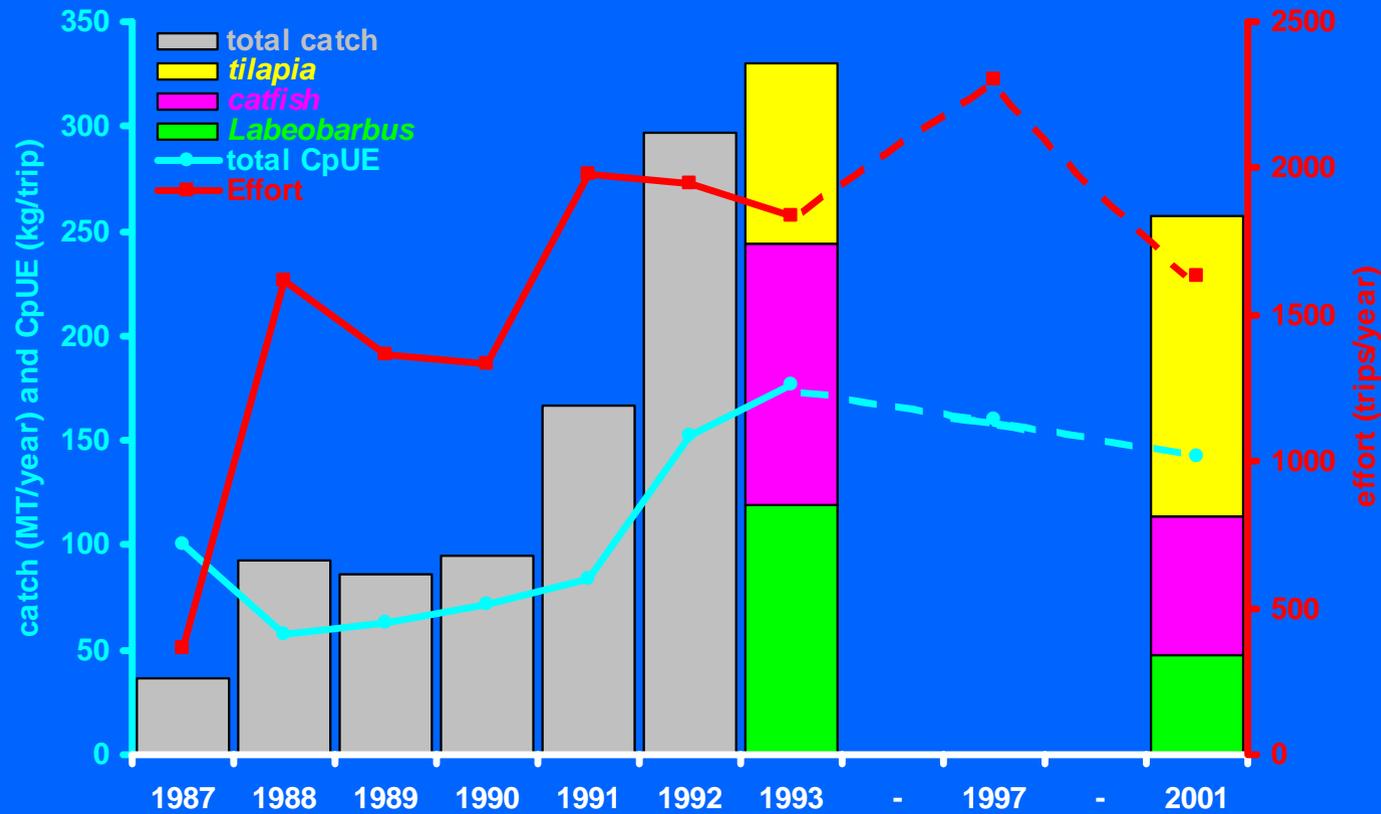
Number of fishermen: 100-50

Fishing

large gillnets (each boat has on average of 20 100m long x 3m high gillnets)

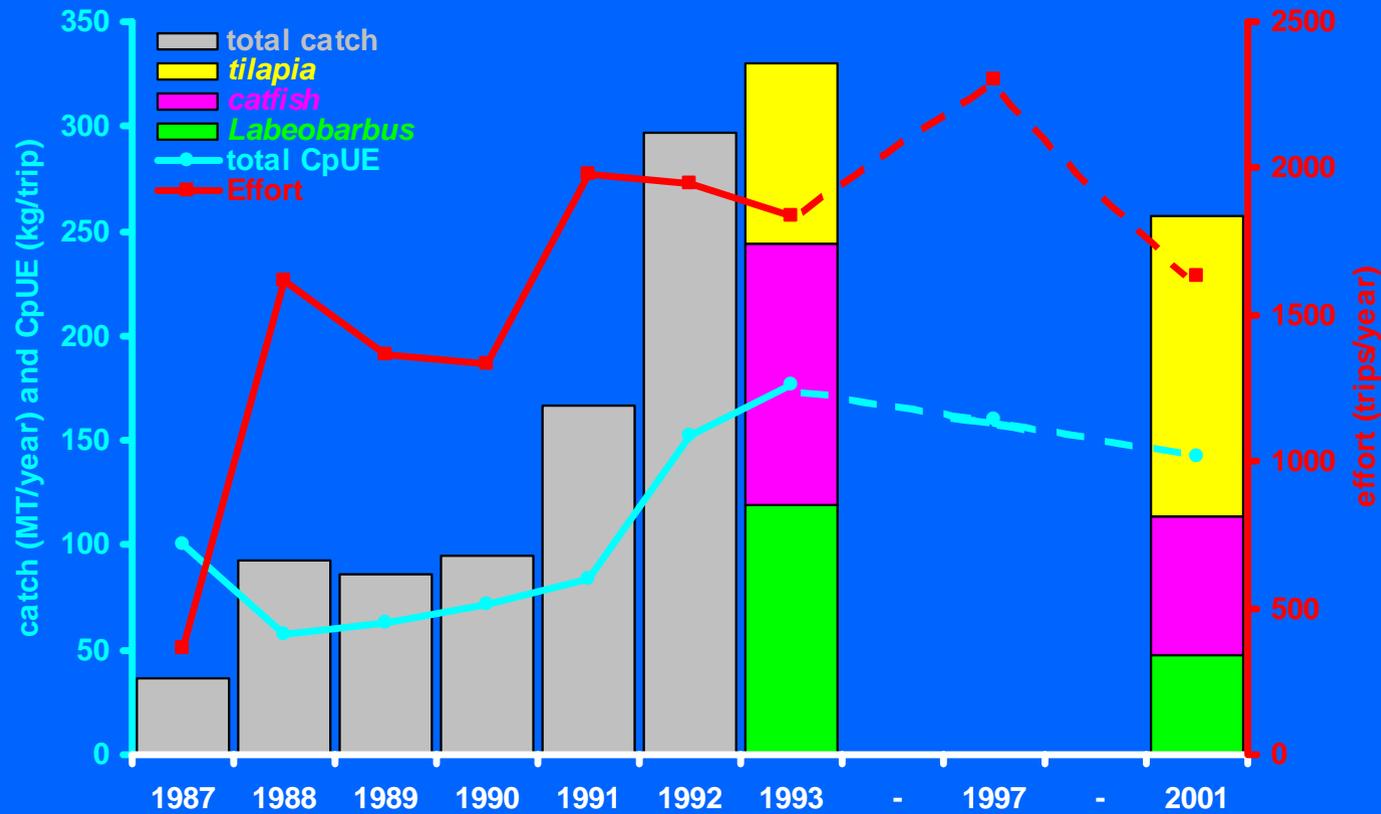


# DEVELOPMENT COMMERCIAL GILLNET FISHERY



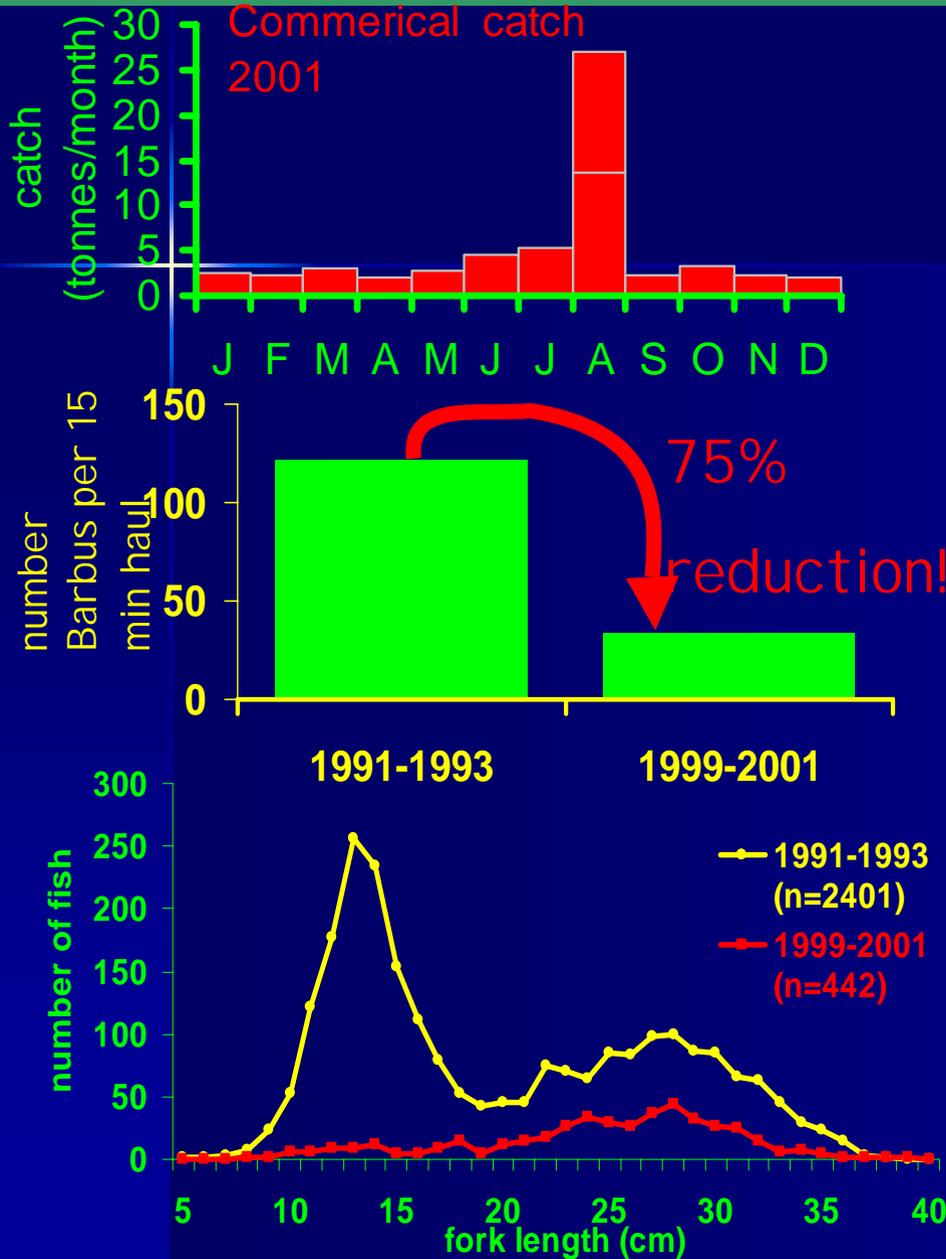
- ◆ effort, CpUE and catch decrease during late 1990s after initial increase
- ◆ increase in amount of landed Tilapia

# DEVELOPMENT COMMERCIAL GILLNET FISHERY



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# EXPLOITATION



During last century in Lake Mweru, Victoria, Malawi fisheries on large cyprinids collapsed after introduction modern commercial gillnet fishery

To protect Lake Tana's unique cyprinid diversity and maintain a sustainable source of cheap, high quality protein:

- 1) development management plan
- 2) implementation of fisheries regulations
- 3) continuation monitoring stocks and catches

# RECOMMENDATIONS FOR FISHERIES

- ◆ *Labeobarbus* stocks highly vulnerable to increased fishing pressure by commercial gillnet fishery
- ◆ disappearance of juveniles point towards recruitment over-fishing
- ◆ fisheries regulations restriction fishing near river mouths and upstream on spawning grounds during spawning season are urgently required to prevent extinction of unique *Labeobarbus* diversity
- ◆ Tilapia and African catfish affected to a lesser extent, reduction of larger adults but still healthy recruitment
- ◆ continuation of fisheries independent sampling program and monitoring fisheries important to determine effect of policy on fish stocks

# THREATS

- over-exploitation, minimizing gene pools
- introduction of exotes, upsetting the system balance
- pollution, worsening general conditions of life
- environmental degradation,  
increasing e.g. turbidity and  
lake-bound diseases (malaria)
- **UNAWARENESS** to the above threats

# GAPS / PRIORITIES

## *Society*

- public awareness, extension
- regulation and control
- fisheries section at BD-University

## *Research*

- Wetland areas / papyrusbed community
- Northern lake area
- Where are the nurseries for juvenile barbs?

## *Lake Tana Fisheries Research Centre*

- training – capacity building
- long-term monitoring

# Management Recommendations

- Lake Tana is a multipurpose lake --- IWRM should be considered
- Watershed management rather than the lake only.
- Soil conservation of the watershed area
- In utilizing the lake operational rules must be set based on optimization considering the ecosystem and the beneficiaries.
- Generate base line data and establish a data base for monitoring.
- Increase water harvesting technique to reduce sediment load from the rivers and streams.

# Management Recommendations

- Legislation & enforcement measures for use of the resource.
- Establish Lake Tana Resource Management Council.
- Research on:
  - Sediment distribution & geochemistry.
  - Sediment water interaction.
  - Effect of sediment on the aquatic life.
  - Information on the quality and quantity of urban waste.
  - Wetland resource assessment.
  - Multi-disciplinary watershed management research.

# On-going Research Activities at BD Fishery Research Centre of ARARI

It is the only specialized research centre of the Amhara Region

It is funded by the government to do research on fisheries & aquaculture

It has strong national and international collaborative projects such as

Cyprinidae ecology, evolution and exploitation team- The Netherlands

Lake Tana and threats—USAID/Cornell University

Lake Tana sedimentary analysis—University of Wales

Lake Tana socio-economics—AAU, Ethiopia

Lake Tana urban pollution—AAU, Ethiopia

Community based Lake Tana basin management—GEF/IFAD

Integrated wetland management around Lake Tana—submitted to INCO-EU



**Thank You!!**

