

Some perspectives on Research and Education of Aquatic Ecology in Ethiopia

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General perspective - key challenge to development in Ethiopia

- Our economy (GDP) is tied to **hydrology** (rainfall)

During the 1984–5 **drought**, for example, GDP declined by 9.7 %, agriculture output by 21% and gross domestic savings by 58.6 %.

- Overreliance on unpredictable surface waters (predictable GW ?) is **risky**
- **Shift** to other economic models ??

Dilemma of water resources

- 97% of the surface water is discharged outside to neighboring countries. Of the 14 river basins, 11 are **international** and contentious politically
- Focus has been on water extraction and use, not on **‘what is happening in the water (ecology)’**
- **Until water security is achieved, growth will continue to be severely constrained. (World Bank Report, 2016)**

Ecological degradation of water bodies has continued unabated

Problem No. 1: Sediment pollution



Abay (Yarenja) during dry and wet (kiremt) seasons

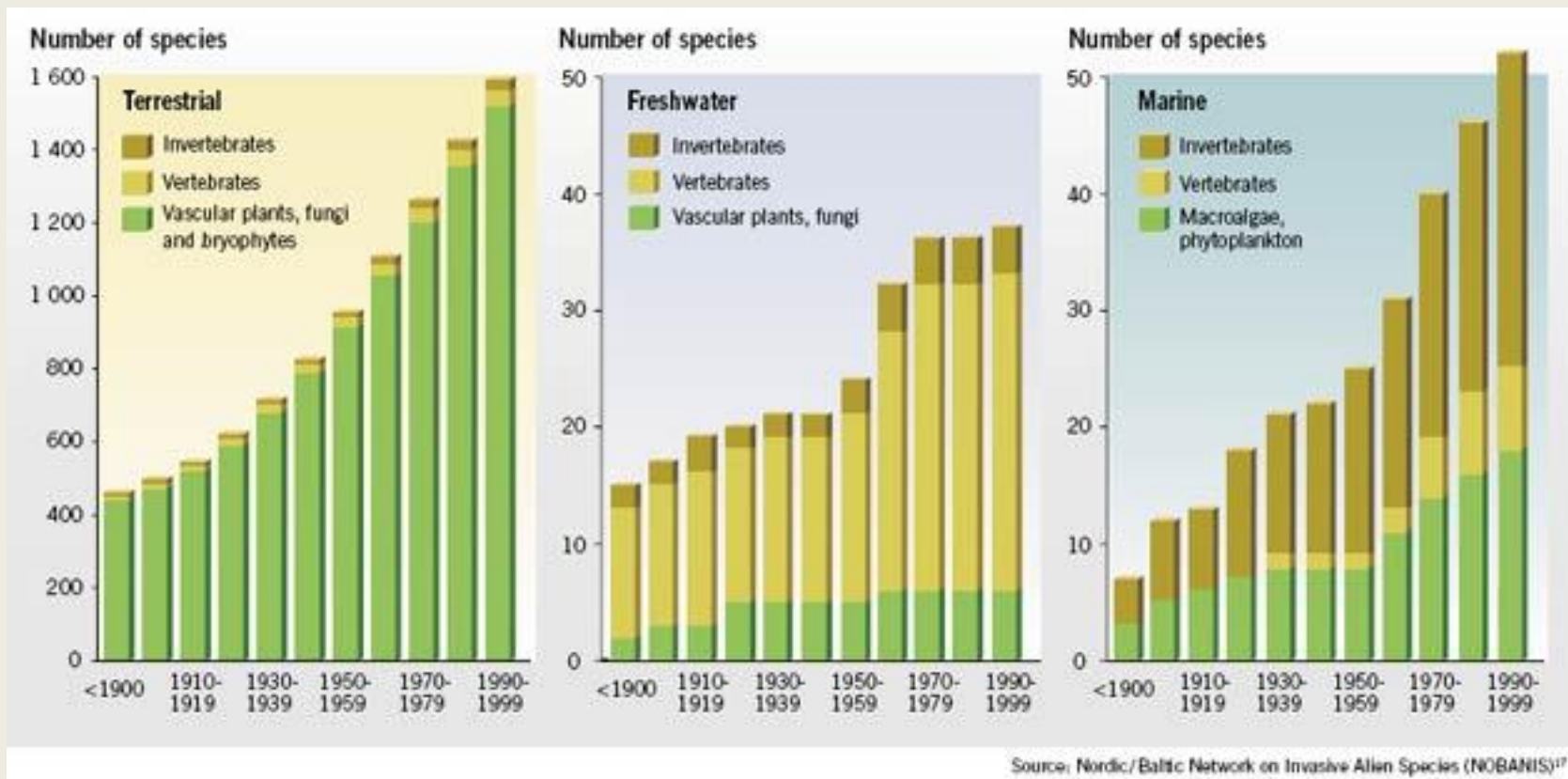


Research problems.....Ecological challenges

Water quality loss	Water security
Nutrient loss	Nutrient pollution
Soil loss	Sediment pollution
Biodiversity loss	Ecosystem services
Chocking canals, HP plants	Economic costs



2. Species loss vs habitats



100 000 species of invertebrates in sediment

Human pressures (stressors)

Accelerated extinction in last 100 years

- Terrestrial ecosystem (1900 – 2000)

Plants affected most - 5 000 spp lost in 100 years

Animals affected less - 200 spp lost in 100 years

- Aquatic ecosystems
- Marine ecosystem - less affected (less contact)
- Freshwater ecosystems -
- 50 spp. of plants, fungi lost
- 160 spp. of vertebrates lost
- 30 spp of invertebrates lost ??????

e.g. sedimentation and flow rate changes

3. Invasion by exotic weed macrophytes – water hyacinth

Koka, Finchaa, Tana.....GERD ?



4. Using lakes wrongly leads to their extirpation (forever ?)



Lake Abijata – fast shrinking to oblivion



Lake Kuriftu – livestock watering

Let us not forget the fate of Lake Haromaya (Alemaya) and the impending fate of Lakes Ziway, Abijata, Tana...



Hora-Harsedi forest protected



Resort encroachment in closed lakes



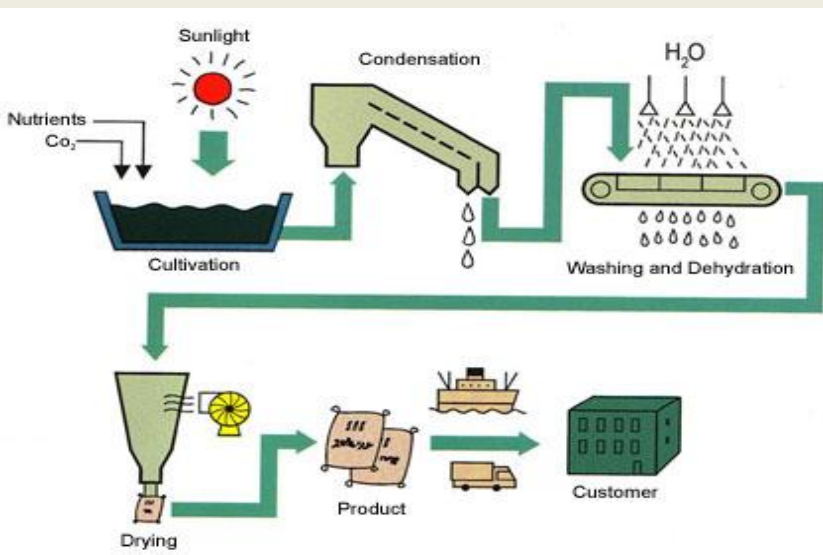
Geba River biodiversity

Human pressure – driving force of ‘losses’



Lake Shala detergent (P) pollution

Using lake resources properly Spirulina (*Arthrospira*)



Eco-tourism – untouched resource



Ecology maintains balance and sustainability

General perspective on Aquatic Ecology Education

Aquatic ecology - a recent science in Ethiopia

- FFLP (AAU-UW, CIDA, Canada) 1983 – 1990 (4 PhD, several MSc's equipment but...phased out)
- SIDA Sweden – MSc and PhD programs at AAU 1980 –
- VRIL-UOS MSc in Aquaculture, Human Ecology, etc (MU, JU...)
- AEEM – ADC (Austria) MSc.....joint AAU-BDU (2013- 2018)
- World Bank African Center of Excellence in Water Management (2017)

If nothing else, train others.....

- New universities – JU, MU (VLIR UOS), HU, BDU, AMU, GU, AU....
Departments of Wetland mgt, fisheries, Aquatic Sciences, Aquaculture....
Wildlife conservation
- Specialization better ? – ecotoxicology, wetlands, microdam

Few, if any impact, of these ventures on developmentwhy ?

Perspectives on Aquatic Research

- 2008 NTEAP research – No lab in BD area, no research?
- University researches -several publications Good for promotions, scholarships (IPGL, VLIR...)
- Not targeted AAU realized this in 2010 - **Thematic Research** on RV lakes Ziway and Hawassa (Conference on Jan 29, 2017)
- **Fragmented** in universities (JU, HU, BDU, MU) and out of reach of stakeholders
- Little impact on development (lakes, rivers, wetlands, reservoirs)...deterioration continues
- **Why has aquatic research not contributed to national development ? (like crop research)**

Perspective on Development (fisheries, **not** other aquatic resources)

- LFDP (Lake Fisheries Development Project)
- EU-funded 1983 – 2000
- Gear, sheds, stock assessment....
- When the **project phased out**, there was little to account for the effort done.....why ?
- Government realized fisheries importance last year ! (Ministry of Livestock **and Fisheries**)
- **Tana Biosphere**... good model to gauge results

Why failures ?

- Trained students flee, poor research environment and infrastructure for those willing to remain. **Deteriorating capacity** of staff and institutions (universities)
- **Engagement with stakeholders** weak or non-existent during or after project.
- Not enough attention by **Government** (until lately)
- **Sustainability** ? No institution to continue after phase out. Project discontinuity (e.g. joint research)
- **Synergy and focus lacking – one National Center**
- Is BDU-IUC poised to rectify these problems ?

Opinion on the Aquatic Ecology and Waterborne Diseases thematic group

- Capacity building of BDU Long overdue
- IUC approachthe right way (**include intra-university links e.g. ACE- WM of AAU**)
- Stakeholder involvement ... must for project success and impact, conceptual models
- State-of-the-art research methodologies most welcome – molecular, OTU's, $\delta^2\text{H}$, $\delta^{15}\text{N}$, $\delta^{13}\text{C}$**synergize with others**
- Sustainability options – good preparations but a lasting output – **Referral Water Quality Lab**

BDU-IUC focus in Limnology Center of Excellence

- Silt and nutrient pollution (biodiversity)
- Referral WQ and bacteriological lab
- Wetlands restoration (integrate with SWC)

(valley bottom and mountain seepage wetlands)



They have done it in Turkey. Why can't we ?