African Center for Aquatic Research and Education

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State of Lake Tanganyika

Haambiya, Haninga Lloyd, PhD
Lake Tanganyika Advisory Group

Countries represented:
Democratic Republic of Congo
United Republic of Tanzania
Republic of Burundi
Republic of Zambia
**Introduction**

Basic information about Lake Tanganyika and its drainage basin

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altitude (surface)</td>
<td>773 m</td>
</tr>
<tr>
<td>Surface area</td>
<td>32,000 km²</td>
</tr>
<tr>
<td>Volume</td>
<td>18,940 km³</td>
</tr>
<tr>
<td>Maximum depth</td>
<td>1,470 m</td>
</tr>
<tr>
<td>Average depth</td>
<td>570 m</td>
</tr>
<tr>
<td>Residence time</td>
<td>440 years</td>
</tr>
<tr>
<td>Drainage area</td>
<td>220,000 km²</td>
</tr>
<tr>
<td>Population in drainage area</td>
<td>&gt;10 million</td>
</tr>
<tr>
<td>Population density in drainage area</td>
<td>45/km²</td>
</tr>
<tr>
<td>Length of lake</td>
<td>670 km</td>
</tr>
<tr>
<td>Length of shoreline</td>
<td>1,900 km</td>
</tr>
<tr>
<td>Plant and animal species</td>
<td>&gt;2,000 species</td>
</tr>
<tr>
<td>Commercial fish species</td>
<td>Clupeids, Centropomids</td>
</tr>
</tbody>
</table>
Introduction...

What’s the problem?

**Figure X:** Reduction in average quantities and size caught over management regimes
The threats

- Sedimentation, pollution and overexploitation ranked Lake Tanganyika as the ‘most threatened Lake’ in 2017.
The threats...

• Over-exploitation of the fishery and siltation caused by erosion from deforested areas are considered the main threats to the health of the lake.

  – underwater habitat degradation is taking place adjacent to hill slopes.
  – rapid deforestation – creation of agricultural lands or for urban expansion - in the fast growing population centers around the lake.

  • rapid increase in the amount of loose sand and mud being washed into the lake – affecting the lake floor.
The threats...

- increased population pressure and now climate change are causing fish stocks, biodiversity, and water quality to decline.
Danger of sediment/pollution

• Hundreds of lake species inhabit the sunlit shallows.
  – Eroded sediments are being carried into the lake, affecting biodiversity.
  – Leads to the lack of drinking water for the riparian communities (untreated industrial and domestic waste directly discharged into the lake, lubricants, etc).
  – Continuous shallowing.
Danger of sediment...

• Effects on the littoral environment
  – covering benthic algae,
  – harming algal communities,
  – decreasing the foraging efficiency of herbivorous fish,
  – affecting fish populations by reducing the nutritional value of detritus,
  – decreasing habitat complexity,
  – filling crevices and other sheltered areas.
Overexploitation

• Fishing pressure is also affecting the lake.
  – fishing yield has declined dramatically - partially caused by the unsustainable growth in fisheries.
  – Between 1995 and 2011, the total fish stock has decreased by 25 %, the number of fishermen increased fourfold, while the harvest per fisherman per year decreased by 81 %.
Other pressures
Warming lake

- Global climate change related to increased greenhouse gas emissions – rendering surface waters of Lake Tanganyika warming rapidly.
  - This warming has had serious consequences for the lake's fragile ecosystems.
  - Warm water is relatively light and struggles to mix with the deeper layers of the lake - keeping the vast pools of nutrients from floating plankton, food for most fish populations.
Warming lake...

• Unfortunately, this trend is unlikely to be reversed as long as the climate in the region continues to warm.

• Even small changes in lake temperature can cause major disruptions in the lake’s ecological stability.
  – reduction in biological productivity in the lake.
The search for oil and gas deposits

• Rift lake sediments of Lake Tanganyika are well known as reservoirs of hydrocarbons.
  – consequences of actual production are still unknown – hence need for careful study and environmental planning before production proceeds.
Invasive species

• Invasive species (e.g. Water Hyacinth) are observed especially at the ports of Bujumbura (Burundi) and Kigoma (Tanzania).
  – Water hyacinth can smother aquatic life by deoxygenating the water,
  – Water hyacinth reduces nutrients for young fish in sheltered bays.
  – Traces of Oreochromis niloticus
What the future holds and Recommendations

• Lack financial resources to embark on international fundraising campaigns
  – Need to secure funds for the conservation and management of the lake’s rich natural resources.
  – Strengthen international cooperation through regional bodies such as the LTA

• Weak entry regulation to cut down on overcapacity
  – Entry into the fishery and migrations should be regulated by strict guidelines supported by policy.
What the future holds and Recommendations...

• Limited alternative livelihoods to address over dependence on fisheries
  – develop viable economic alternatives to fishing e.g. eco-tourism, cage fish farming, ...

• Poorly defined use and/or ownership rights
  – secure use rights and management rights to fishery resources

• Political interference
  – establish vigorous, fair and sustained law enforcement
  – raise profiles of stakeholder groups in policy-making through extension education
What the future holds and Recommendations...

• Insufficient interaction between scientists and LKHs
  – Support research in needy areas to in turn support fisheries management.
    (e.g. sedimentology/pollution, biodiversity, resource exploitation, climate change, human dimensions, limnology, etc.).

• De facto local community participation is low
  – policy should emphasize participation in village fisheries management committees.
  – new participants unfamiliar with concepts and jargon of fisheries management must receive necessary attention.
  – Cost of participating (time, money) must outweigh expected benefits.
Acknowledgements

• ACARE team
• Colleagues
Thanks for your attention!