Are climate change impacts the cause of reduced fisheries production on the African Great Lakes?

THE LAKE TANGANYIKA CASE STUDY
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AFRICAN GREAT LAKES
CLIMATE CHANGE AND FISHERIES

• WHAT ARE THE POSSIBLE SYMPTOMS OF A FISHERY AFFECTED BY CLIMATE CHANGE?
• HOW CAN WE RECOGNIZE CLIMATE CHANGE IMPACT ON FISHERIES?
• IS CLIMATE CHANGE THE ONLY STRESSOR?
• NO, FISHING PRESSURE, HABITAT REDUCTION, POLLUTION, INVASIVE SPECIES
• SO, HOW WILL WE MEASURE IT?
GLOBAL WARMING

- Increased frequency and severity of storms
- Regional warming causes decreased rainfall and increased evapo-transpiration
- Expansion of subtropical deserts
- Agricultural yields affected
- What about fisheries?
Evidence for deep water warming in Lake Tanganyika over last century has raised concerns about declining deep water and nutrient renewal.

Harvest reduction linked to climate change?

- Maybe
- Temperature increase of surface water
- But also in deeper waters
- Paleolimnological indicators show lakewide decline in primary productivity (O’Reilly et al)
- 20% reduction ➔ 30% reduction fish harvest
- Decline in wind velocities by 30%, but ....
- Sabasaba
Harvest reduction linked to climate change?

• Doubts about carbon isotope data analysis
• Insufficient information on nano and picoplankton (primary productivity)
• Caution conclusion on phytoplankton (larger cells)
• Increase in diatoms in the northern part of the lake ➔ clupeid abundance
• Piscivores abundant in the South (shrimp)

Burundian industrial fisheries
ARTISANAL FISHERY BURUNDI

Catch per unit of effort

YEAR

PUE KG/BATEAU/JOUR

2001 2002 2003 2004 2005 2006 2007 2008 2009

200 150 100 50 0

Apollo
Catamarans
FISH ABUNDANCE LAKE TANGANYIKA
November-December 1995

LAKE TANGANYIKA WATER TEMPERATURE
November 1995
FISH ABUNDANCE LAKE TANGANYIKA
June 1995

LAKE TANGANYIKA WATER TEMPERATURE
June 1995
ACTIVE FISHING UNITS 2011

No of active fishing units
Total 25,000

VESSELS ON LT IN 1995 AND 2011
FISHING GEARS 2011

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Projection 2017

Year

0 20000 40000 60000 80000 100000 120000 140000


Fishermen
Fishing Units
FISH PRODUCTION

• 1990s  165,000 TO 200,000 TONS/YEAR

• 2011  APPROX 55,000 TONS 3 COUNTRIES
  DRC 50% OF FISHERMEN
  TOTAL FISH PRODUCTION  110,000 TONS PER YEAR

  FROM 165,000 TO 110,000 TONS/YEAR

CO-MANAGEMENT BURUNDI

• Two groups of village-based fisheries committees banned illegal gears and conduct community surveillance (net burning)
• Closed areas
• Protection juvenile fish
• Production up from 11 to 14 thousand tonnes per year
• .... And then civil strife again
LAKE MALAWI WATER TEMPERATURE

19 October 1993

[Temperature map of Lake Malawi with color gradient indicating water temperature values.]
FUTURE?

• What are consequences of changing fisheries ecosystems for people, particularly the millions of small-scale fisherfolk (fishers, fish processors, fish traders, ancillary workers, etc) in developing countries who are among the most vulnerable to Climate Change?

Recommendations?

• Too many recommendations
• Lake Tanganyika Authority
• Financing agencies assume sustainability of research and monitoring to be provided by countries after project implementation
• Lake Tanganyika contains 17% of the world’s surface freshwater resources: international obligation to assist
RECOMMENDATIONS

• FMPs exist, so enough recommendations
• Aquaculture development (non invasive)
• Reduce post-harvest losses
• Climate related projects took place in selected areas ➔ lakewide
• Twinning of research and management organizations
• Microbial loops to be studied