

Ziwa Letu  
Climate Change, Pollution and Sustainable Use of  
Natural Resources in the Lake Victoria Region

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Current Situation of Lake Victoria – Facts, Figures and Experience

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# Sources of information

Acknowledgement to institutions and stakeholders who provided information and data for this presentation including;

- LVEMP II
- Fisheries Division – Frame Survey 2014
- Lake Victoria Basin Water Board (LVBWB)
- Tanzania Metrological Agency
- Cleaner Production Centre of Tanzania (CPCT)

# Presentation outline

- Introduction
- Threats to the LV Benefits
- Causes of Pollution and Sedimentation of the Lake Victoria
- Lake Victoria wetlands
- Waste water discharges from industries
- Lake Victoria water quality
- Water hyacinth resurgence
- Fisheries status in Lake Victoria
- Interventions by LVEMP II
- Challenges
- Recommendations

# Introduction

- The second largest freshwater body in the world with the surface area of about 68,800km<sup>2</sup> (Tanzania 51%, Uganda 43%, Kenya 6%)
- About 80m deep with an average depth of 40m.
- A shared transboundary resource of Tanzania, Uganda and Kenya
- Rwanda and Burundi are a part of the upper catchment that drains into Lake Victoria through the Kagera River.
- The Lake is part of the Nile River Basin system,
  - Burundi, Democratic Republic of Congo, Egypt, Ethiopia, Eritrea, Kenya, Rwanda, Sudan, Tanzania, and Uganda.





# Major Economic and Ecological importance of Lake Victoria

## Major Ecological importance of Lake Victoria

- It supports a wide diversity of flora and fauna
  - Important warehouses of fisheries resources both in diversity and numbers.
  - harbor around 200 different fish species

## Major Economic importance of Lake Victoria

- supporting a large fishing industry for export and local consumption (197,000 fishers and 600,000 fish trader)
- lake transportation
- hydropower generation
- Source of domestic and industrial water supply
- Food security, and supports the livelihoods of appr. 3m people.
- The fish resources provide foreign exchange: US\$300 – 400 million.
- Contributions to the GDP: Kenya, 2%, Tanzania, 2.8% and Uganda, 3%.

## Threats to the LV Benefits - environmental stresses

LV Benefits are threatened by environmental degradation resulting from various activities within the lake, littoral areas, from the basin and outside the basin combined as environmental stresses

Within the lake

- over-fishing – rising population and expansion of fish market world wide
- oil spills on accidents and normal operations
- untreated liquid wastes from marine vessels – not facilitated with waste holding facilities
- Poor/Lack of sanitation facilities in Lake Victoria Islands – direct lake pollution (liquid and solid waste)
- water hyacinth in flow and resurgence – abstraction of marine vessels and reduce dissolved oxygen
- Extended draught and over - abstraction of water from the lake



## Threats to the LV Benefits .....

Littoral areas;

- construction and farming on shoreline
  - input of sediments and agrochemicals
  - Removal/destruction of buffer zone
- conversion of wetlands
  - Removal of vegetation
- Poor/Lack of sanitation facilities in Lake Victoria Islands – direct lake pollution (liquid and solid waste)
- poor solid wastes management
- Discharge of partially or untreated waste water – industrial and municipal, hilly areas
  - Both construction and farming along sensitive littoral zone without adequate environmental mitigation measures reduces filtering ability and natural protection hence increased pollution loads into the Lake and result in loss of aquatic habitat

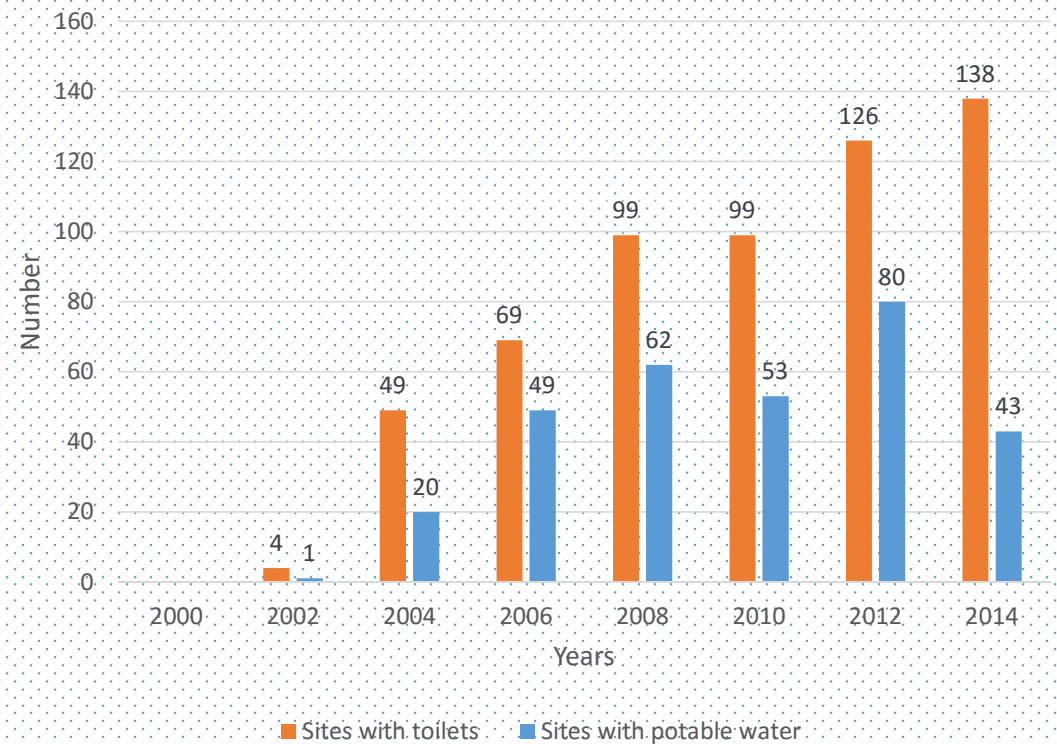


## Sanitation on landing sites

Poor sanitation on landing sites due to limited or no facilities

- Sites with toilets is only 21.5%
- Sites with potable water is 6.7%

Landing sites with toilets and potable water









## Threats to the LV Benefits .....

Basin and outside the basin – these have significant contribution to lake ecosystem

- land degradation – poor land use practices
- Deforestation – fuel, building materials, expansion/establishment of new settlements
  - Results to soil erosion
- pollution from agro-chemicals and sediment loads - poor farming practices
  - accelerate eutrophication
- nutrients (N and P) transported into the basin by air (atmospheric deposition), climate change
- Overexploitation of natural resources – caused by increased basin population

**Pollution reduces fish stocks and diversity and destroys important spawning areas, increased water born diseases, high treatment cost)**

Land degradation by  
mining activities

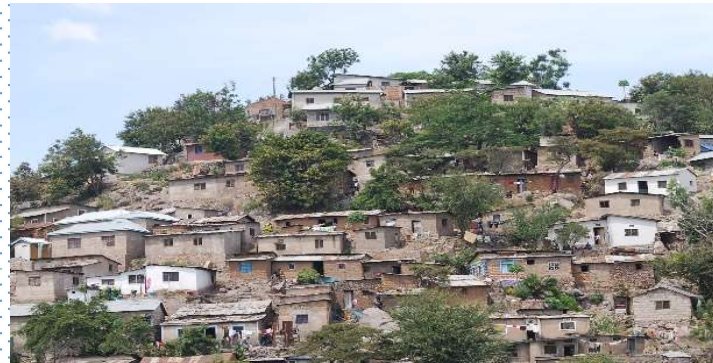


# Causes of Pollution and Sedimentation of the Lake Victoria

- Pollution mainly from fuel and oil spills, solid waste and discharge of partially or untreated municipal and industrial waste.
- Pollution by rivers and streams that are polluted by raw or partially treated municipal and industrial effluents, contaminated urban surface runoff, unsanitary conditions of the shore line settlements
- pollutants carried by eroded sediments mainly nutrients, coliforms of faecal origin, oxygen demanding substances and residue pesticides
- Land degradation and increased pressure on land due to high population growth, poverty and unsustainable agricultural practices, overgrazing - contributed significantly to soil erosion in LVB.



# sanitation of the lake and shores



# Lake Victoria Wetlands

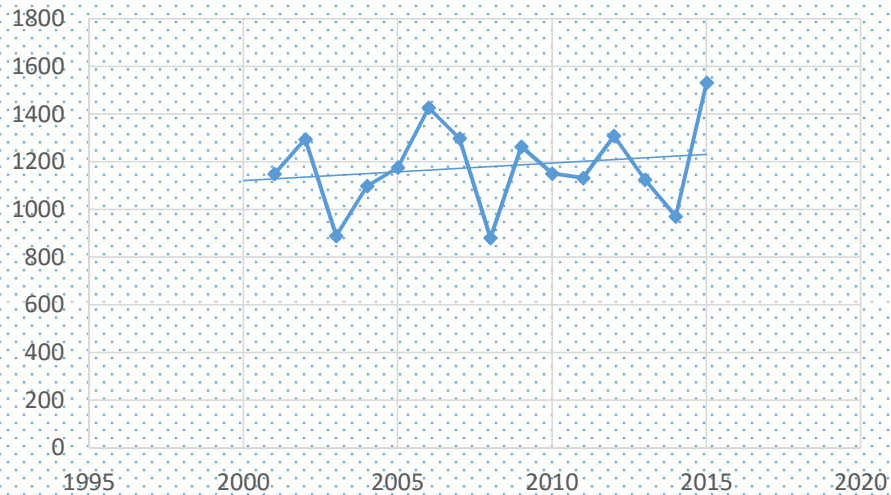
- Play critical role to the lake ecosystem such as
  - Support wide biodiversity of flora and fauna including fish breeding sites.
  - Buffer the lake from pollutants - Improve water quality
  - Fertile soil for agriculture and good for livestock grazing during dry season
  - Food including fish and other social economic functions

S/ No.	Wetland type	Area covered (ha)	%
1.	Permanent swamps, mainly reeds or Papyrus spp	58,000	14
2.	Seasonal swamps/floodplain	308,000	73
3.	Tree swamps	33,000	8
4.	Open water, mainly inland lakes	23,000	5
	Total	422,000	100

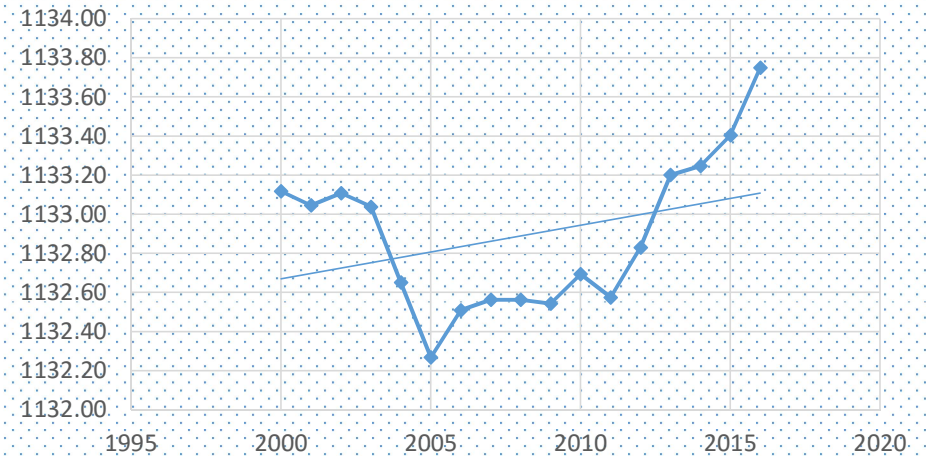
## Threats to wetlands

- These have been threatened by developments and conversions for other uses
- Estimated that 75% of the wetlands have been affected significantly while 13% is severely degraded
- Conversion is aggravated by lake water level recession due to extended draught in some years

### RAINFALL (MM)



### LAKE WATER LEVEL (M)



Lake level recession and extended draught resulted into;

- serious conversion of wetlands into farming land
- Degradation by livestock coming from upper basin
- Erosion/Destruction of facilities on beaches

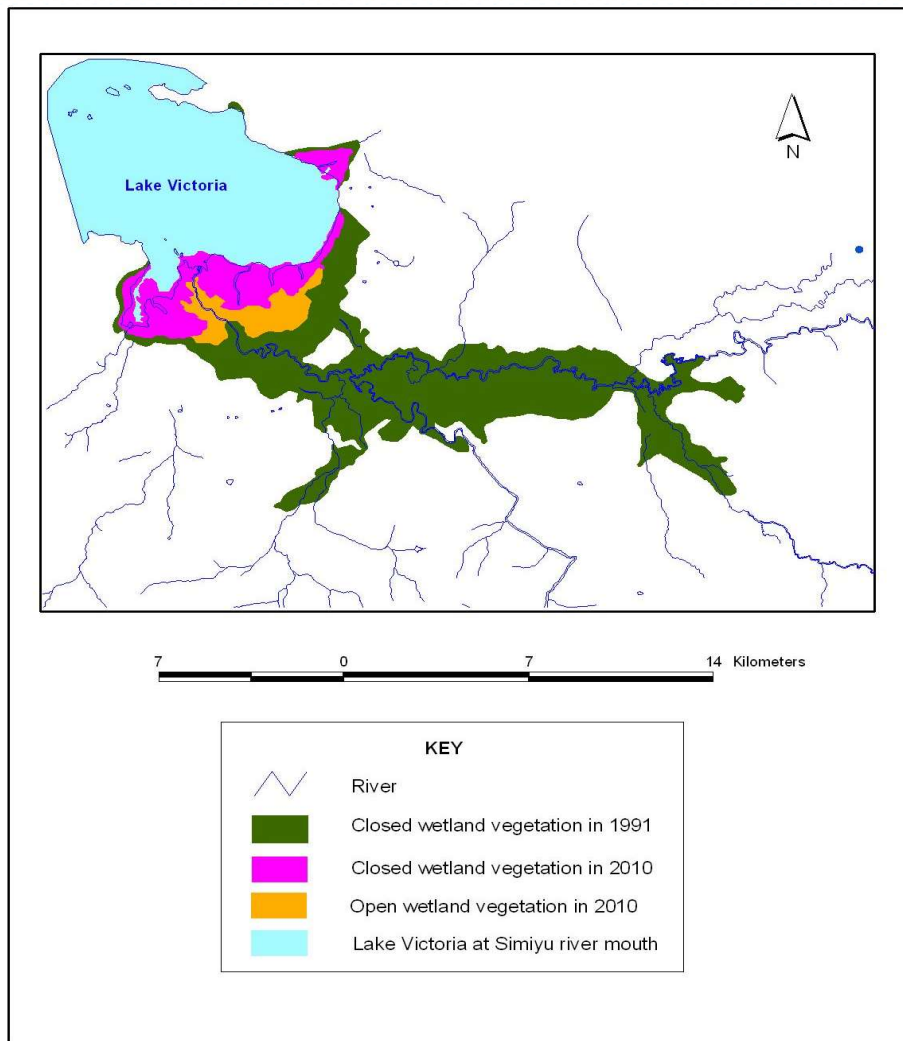
***What do the laws and regulations direct on lake buffer zone***



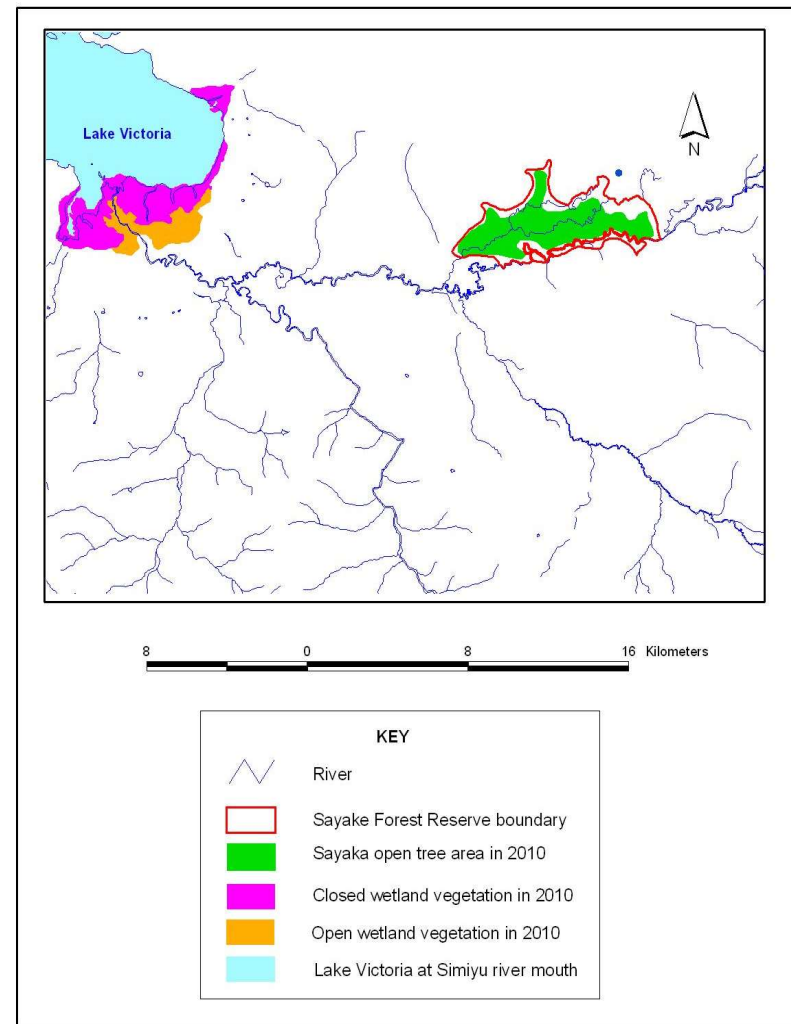
# Bush fires and converted wetlands







Simiyu Wetland degradation between years 1991 and 2010



Simiyu Wetland degradation between years 1991 and 2010

## **Waste water discharges from industries**

Waste water discharges from industries contribute to the overall quality of lake Victoria water due to the fact that most of these do not meet discharge standards

Adoption of resource efficient and cleaner production options have shown significant benefits in terms of reducing pollution, improved health and safety of the workers and financial savings

## Pollution Load of the sampled industries & hotspots by Sector

- Almost all do not meet discharge standards
- The most polluting sectors were found to be the **fish, brewery and textile** sectors

From these pollution loads estimates it is indicated that industries have significant contribution to lake water quality and hence interventions required

Sector	Pollution Load (Tons/Yr)			
	BOD <sub>5</sub>	COD	TN	TP
Fish	1,345.82	1,760.10	11.65	23.29
Brewery	687.65	859.10	6.59	5.40
Dairy	20.06	24.87	0.19	0.09
Laboratory	3.64	4.60	0.06	0.01
Edible Oil	144	0	9.9	5.28
Meat	80.34	89.31	0.55	0.58
Textile	108.68	9.25	29.68	0.70
Sewerage	77.18	245.76	3.47	4.87
Soft Drinks	119.90	19.01	2.82	0.65
Coffee	1.30		0.03	0.12
Total	2,587.27	3,012.01	64.92	40.88

# Interventions and success by CP Technologies

## Environmental benefits

- improved waste water quality discharged into the environment and environmental compliance (BOD, COD, TN and TP)
- Financial benefits
  - the eight enterprises invested a total of **USD 7,724,145.25** while the total savings amounted to **USD 3,225,724.08** in terms of reduced water, materials and energy use.

## Improved waste water quality – adoption of cleaner production options

**Nile Perch Fisheries Ltd (mg/l)**

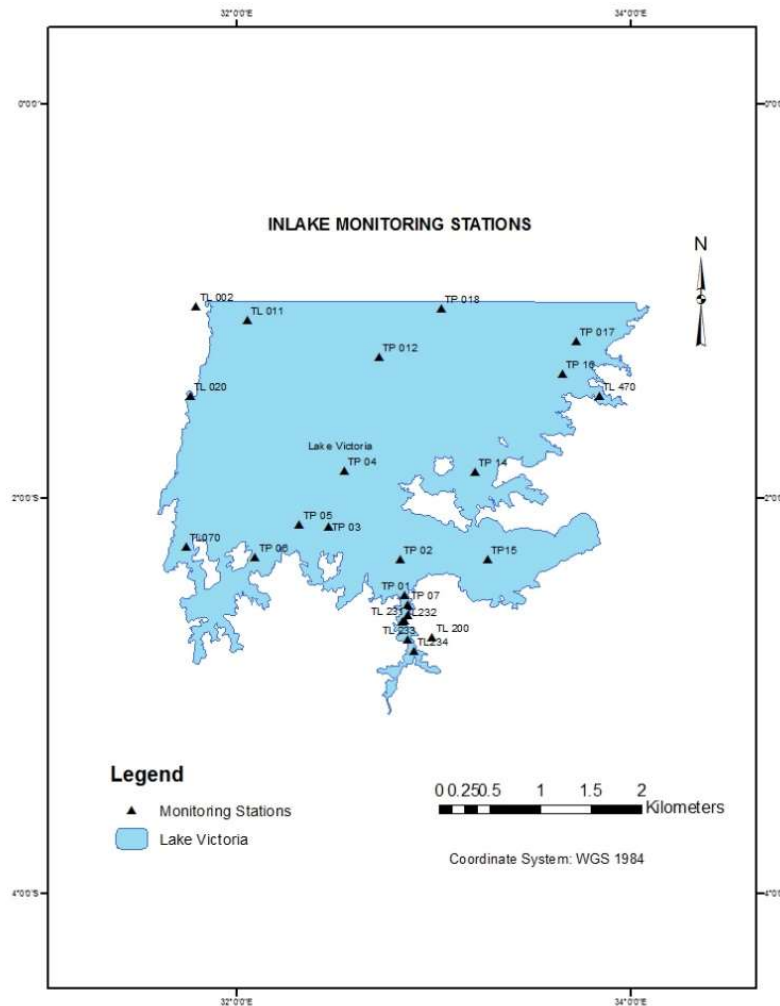
	<b>2010</b>	<b>2014</b>
<b>BOD</b>	1000	30
<b>COD</b>	584	64
<b>TN</b>	4	1
<b>TP</b>	9	4

**Musoma Textile Mill (mg/l)**

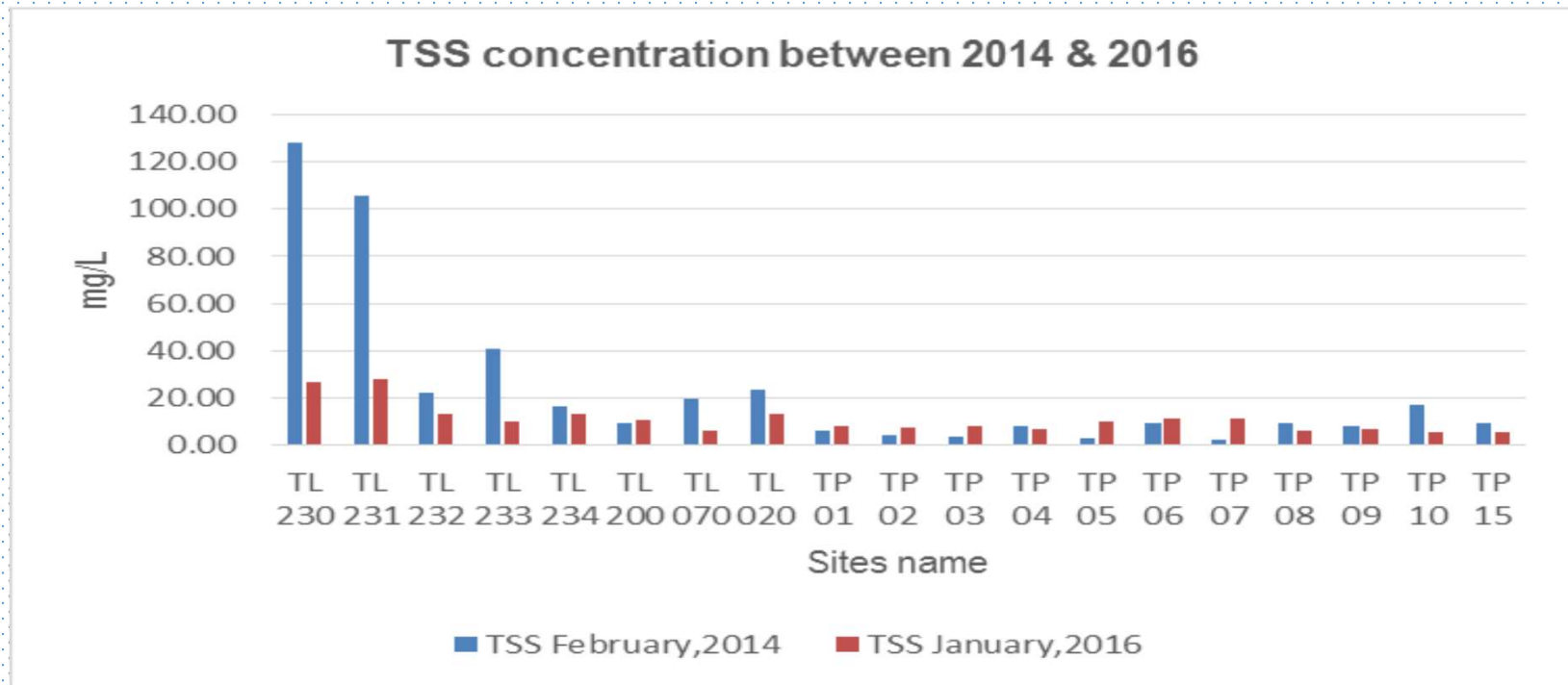
	<b>2010</b>	<b>2014</b>
<b>BOD</b>	508	113
<b>COD</b>	616	214
<b>TN</b>	78	9
<b>TP</b>	9	2



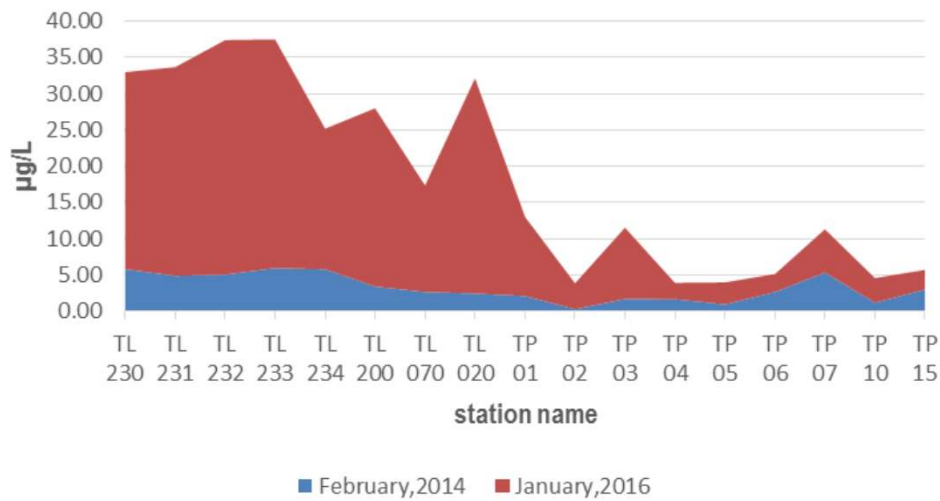
# Lake Victoria water quality – monitoring stations



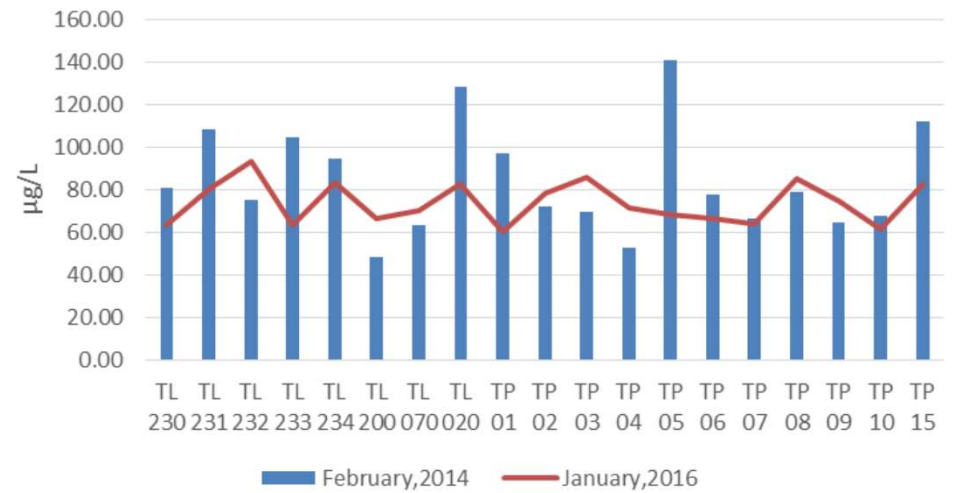
There is scanty data on water quality - non continuous monitoring.  
The available data show high TSS at the littoral zones, reduced TSS in 2016 compared to 2014



### Chlorophyll-a concentration



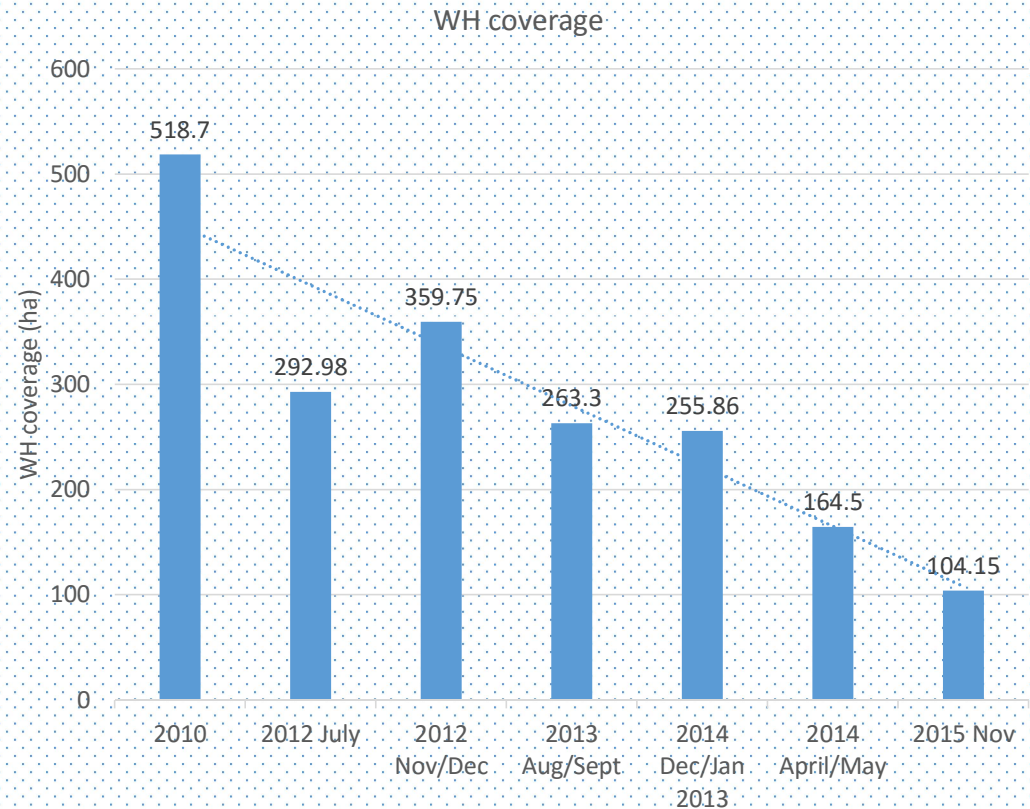
### TP concentration for monitored stations



# Water hyacinth resurgence

- Causes of water hyacinth resurgence
  - Continued entry of nutrients into the lake and other water bodies
- Other invasive weeds in the lake  
chest nut (*Trapa natans*) 12,8 ha (2010)
- Control measures applied
  - Biological control – weevils (*Neochetina eichhorniae*, *Neochetina bruchi*), mites (*orthogalumna terebrants*) and fungal
  - Manual removal

High reduction of WH cover mainly contributed by biological and manual control activities conducted by LVEMP II communities subprojects CDDs). The occurrence of new fungal pathogens at the western part of the lake (Rubafu) may have contributed to reduction



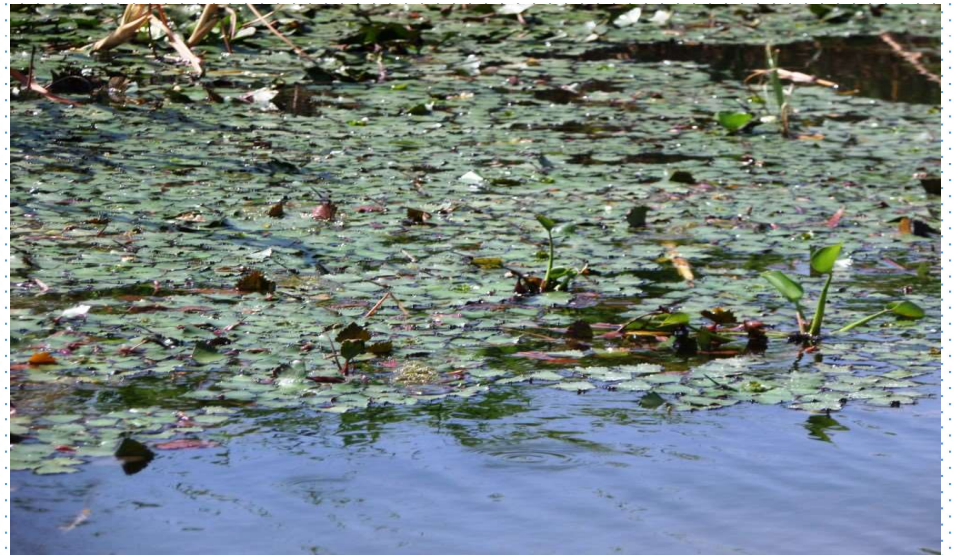


# Water hyacinth and other invasive weed

*Water hyacinth at Kaishebo –  
effects of new  
fungal pathogens*

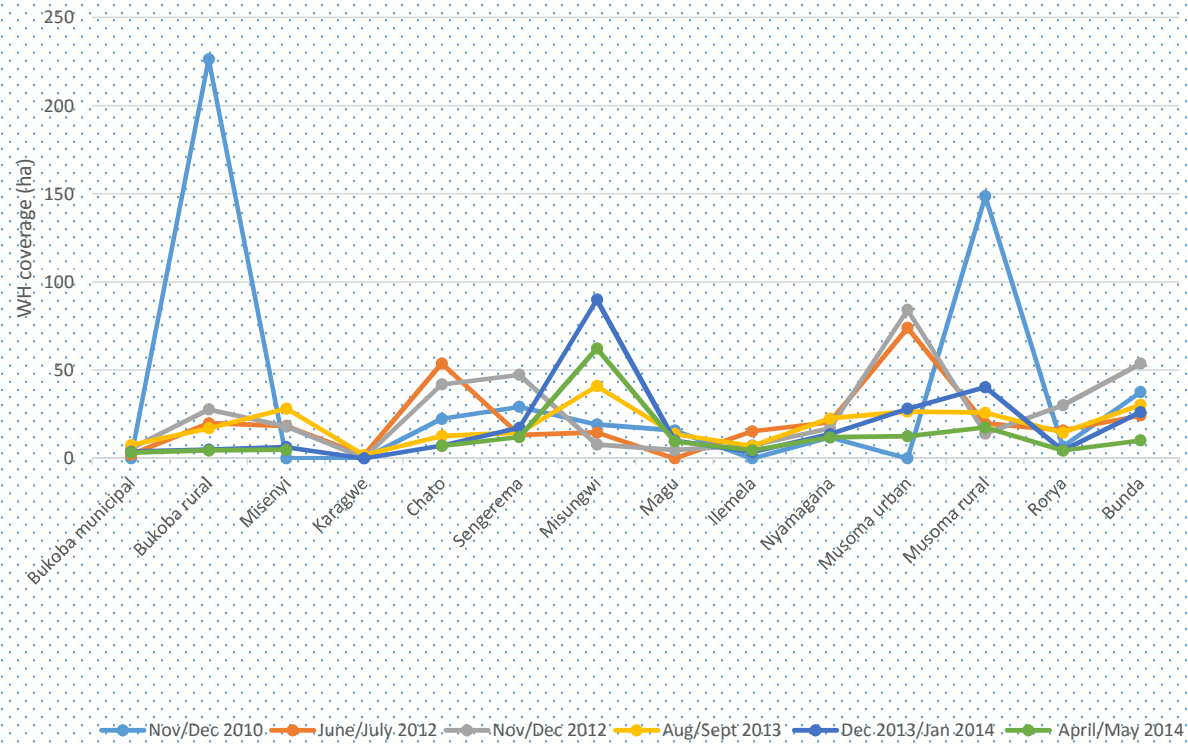


Water chest nut at Nyahiti landing site





## Water hyacith coverage at hotspots in LV

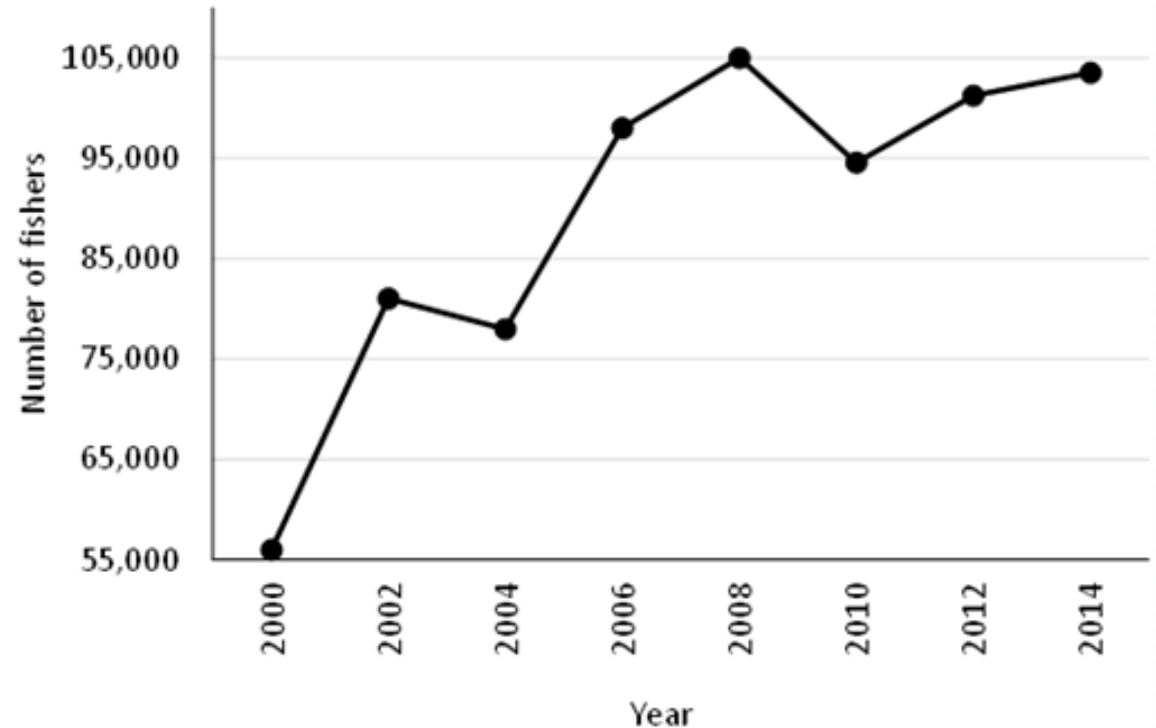


## Fisheries status in Lake Victoria

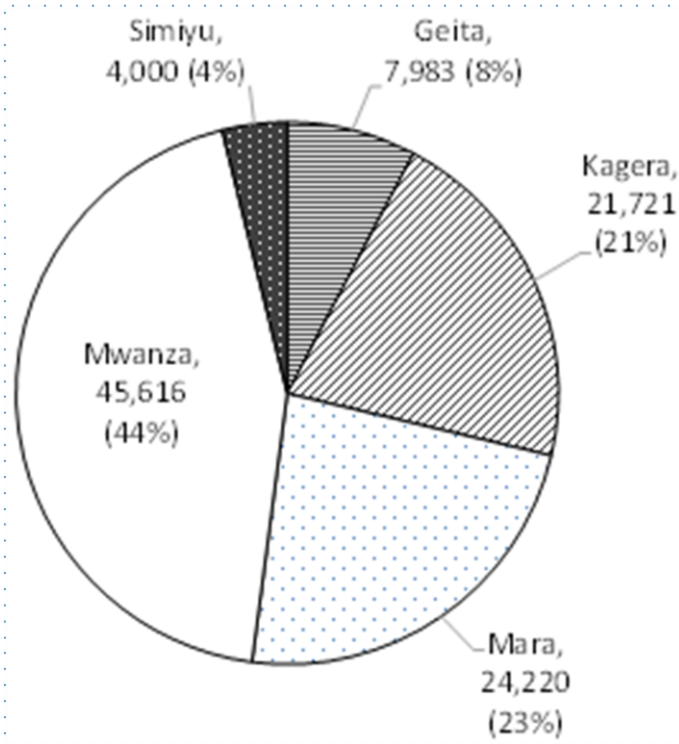
- It supports world inland fisheries of commercial species; Nile perch 27.3%, Daguaa 55.4%, Haplochromines 8.0% and Tilapiines 6.5% amounting to 834,217.30 metric tons where 58.4% is from Tanzanian part (LVFO-CAS, 2014).
- The total catch value at beach for Tanzania is estimated at USD 360,720,681 contributing significantly to the economy of Tanzania.

## Fishers for the Tanzania part of Lake Victoria 2000 – 2014

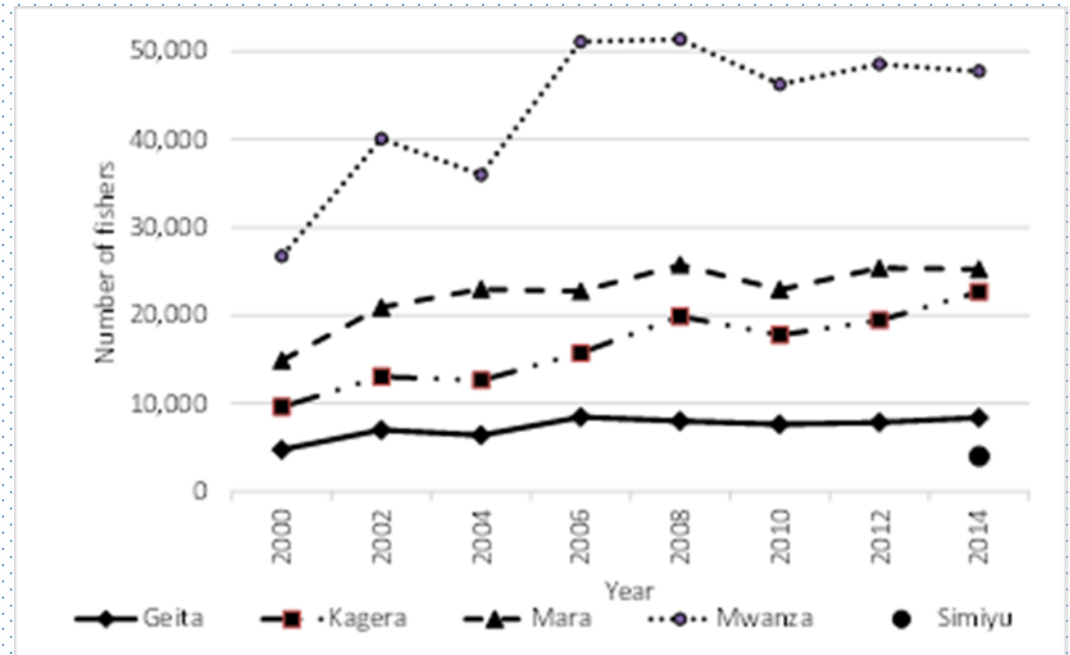
- 2014 - 103,540 total number of fishers
- This is an increase of 2,290 (2.3% increase) fishers compared to 101,250 reported in the 2012.
- Gender distribution of fishers in 2014 whereby male fishers were 99.60%



Fishers distribution by region recorded in 2014 in Lake Victoria



Trends of fishers in Lake Victoria by region for years 2000 – 2014

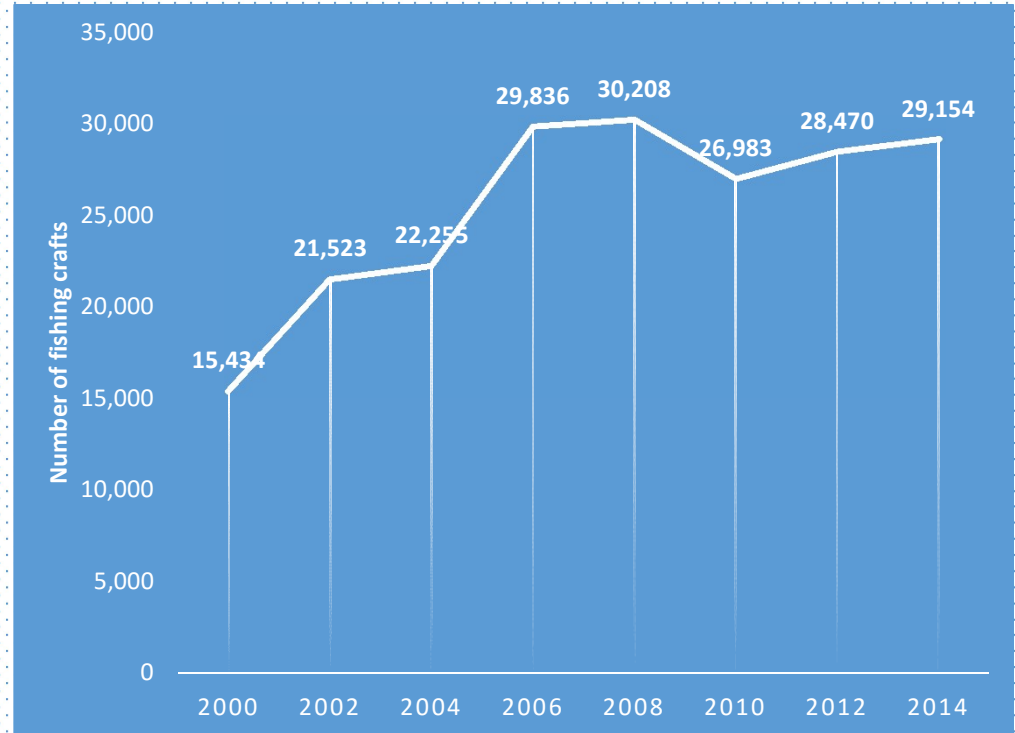
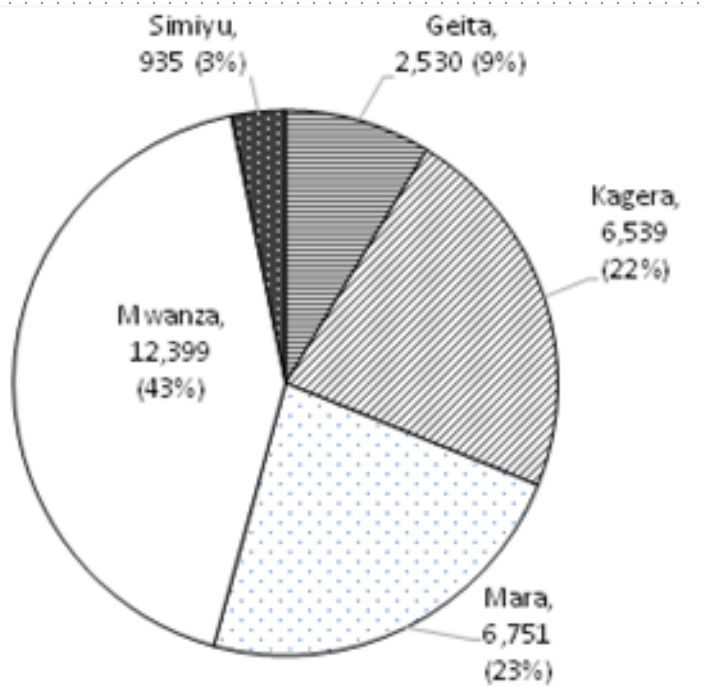




# Fishing crafts

Fishing crafts distribution by region as in 2014

Trends of fishing crafts for years 2000 - 2014



# Interventions by LVEMP II

The objectives of the Project are to contribute to:

- the improvement of the collaborative management of the trans-boundary natural resources of the LVB among the Partner States; and
- the improvement of environmental management of targeted pollution hotspots and selected degraded sub-catchments for the benefit of communities who depend on the natural resources of LVB

# Achievements

## Reduction of lake pollution and improve sanitation

- Promotion of cleaner production technologies to date trained 118 enterprises and 81 adopted CP options
- Constructed sludge treatment facility for Bukoba Municipal
- Rehabilitation of Mwanza City abattoir and construction of waste water treatment facility (artificial wetland integrated with bio digester
- Lateral and house connection to main sewer line for approx. 1,000
- Construction of 14 toilets at schools in Mwanza
- Constructed 47 public toilets in the basin - beaches, schools, markets
- Procurement of 3 Cesspit Emptier in the process

# Interventions in the basin

Implementing 341 CDDs and 20 CMIIs at different stages of completion

- construction/rehabilitation of charco dams, shallow and deep wells, rain water harvesting tanks - Increased water availability in the project area by approximately 2,800,000 cubic metres
- Tree planting
- Bee keeping and sunflower farming
- Contour farming/soil and water conservation practices
- Horticultural, cotton, maize, peas farming – good farming practices
- Dairy cattle keeping
- Fish farming
- Water hyacinth removal and control



# Challenges

- Low awareness of environmental issues and their management
- Weak integration of institutions
- Lack/expensive of alternatives of environmental degrading demands e.g for cooking
- Weak enforcement/inadequate facilitation on natural resources management

# Recommendations

- Awareness raising
- Strengthen institution integration
- Capacity building/facilitation to regulatory authorities
- Strengthen enforcement and compliancy
- Promote hygiene/sanitation campaigns
- Continue advocating adoption of cleaner production options

Thank You For Your Attention