

DAGAA FISHERY OF LAKE VICTORIA

Julius Otienoo Manyala,

Moi University, Department of Fisheries

P. O. Box 3900,

ELDORET, KENYA

Tel: 0733 397285

Email: manyalajo@yahoo.com

BACKGROUND

- **Sustainable economic growth**
- **Resource use**
- **Development**
- **Fisheries management measures**
- **Lake Victoria Fisheries anagement Plan (FMP)**
- **LVFO**

MAJOR OBSERVATION

a) *Economic Importance of “dagaa”*

The economic importance of “dagaa” is reflected in several macro and micro-economic activities in Kenya, Tanzania and Uganda that include:

- Employment opportunities to local people**
- Protein source to poor/middle class**

consumers

- Protein source for animal feed industry**
- Supports local, national and regional trade**

Tanzania

- **Involves traditional boat seining by local fishermen**
- **Use of catamarans (lift netting) by fishermen who have migrated from Lake Tanganyika.**
- **Mosquito net for boat seining is used by the local fishermen**
- **The official mesh size in Tanzania is 10 mm but nets as low as 5 mm are still in use for “dagaa” fishing**
- **Always using light for about 15 days fishing period during dark phases of the moon**
- **Some women own fishing boats (<2%)**

Uganda:

- **Boat seining is the main method of fishing.**
- **Some women own fishing crafts and gears (less than 2%)**
- **Men carry out actual fishing**
- **Fishing with light during dark phases of the moon for about 15 days.**

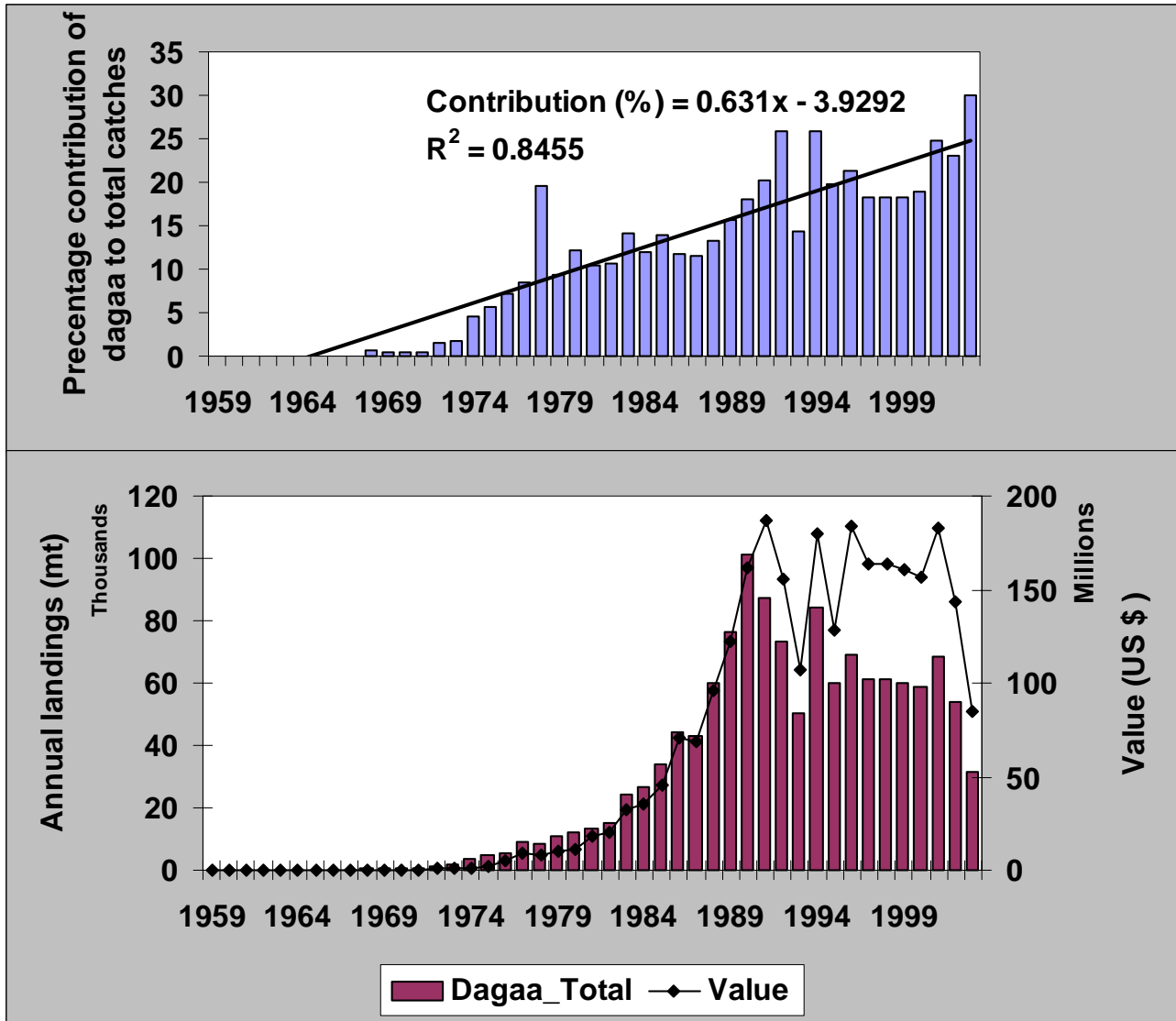
Kenya:

- **Boat seining is the main method of fishing**
- **Some women own fishing crafts and gears (less than 2%)**
- **Men carry out actual fishing**
- **Fishing within areas less than 6 m depth takes place throughout the month**
- **Light attraction is not used in many areas within the Nyanza Gulf.**
- **Light is always used in the deeper waters around the islands where fishing also takes place during dark phases of the lunar cycle**
-

Economic significance:

- **“Dagaa” can be rated first in terms of employment opportunities and second in terms of economic gains to Nile perch (*Lates niloticus*).**
- **The scope and magnitude for employment in dagaa fishery were identified to include a spectrum of stakeholders**

Dagaa Landings and Value



Kenya

- **The national trade is more pronounced while there is limited regional trade in “dagaa” apart from occasional demand by relief agencies to supplement or add nutritive value to relief food.**

b) Fishing, processing and marketing

- **Processing is done almost entirely by women**
- **The fishing grounds in Tanzania are mainly offshore**
- **In Kenya and Uganda, fishing areas are concentrated on the inshore areas and uses the boat seine method.**
- **The main “dagaa” collection points are Kirumba Market in Mwanza and Musoma.**

- **Marketing of the fish is at 3 tiers namely:**
 - i) Local consumption**
 - ii) Regional consumption and**
 - iii) For fishmeal industry:**

Tanzania:

- **is sold to traders from Shinyanga, Mtwara, Dodoma among many other regions**
- **“Dagaa” for human consumption marketed in various countries in the region including**
 - i) Zambia, DRC, Burundi, Rwanda, Kenya and Malawi**
- **“Dagaa” for fishmeal in Dar-es-Salaam**
- **“Dagaa” for fishmeal is also exported to market in various countries in the region including Zambia, DRC, Burundi, Rwanda, Kenya and Malawi.**

Kenya

- **Nationally found in almost every small market, urban centres and major towns**
- **Unconfirmed reports indicate that some “dagaa” that come to Kenya finds its way to Sudan (Dafur)**
- **“Dagaa” for fishmeal in Eldoret, Nakuru, Nairobi, Thika and Kwale District at the coast.**

Uganda:

- **Sold in Gulu, Kitgum, Arua, Iganga, Mbale for human food**
- **Exported to DRC, Burundi, Rwanda, Kenya “Dagaa” for fishmeal in Dar-es-Salaam**
- **“Dagaa” for fishmeal to Nuvita (Engaano), Grainmill, Bico, Spire Road etc and several small scale millers**

c) *Biology and behaviour*

d) Infection by *Ligula intestinalis*

- **About 6% of adults infected by *Ligula intestinalis***
- **Highest infestation in Uganda**
- **Second infestation in Kenya and Tanzania**
- **Consumers for dry fish do not see the infestation as a serious problem since they do not even see the worm**
- **Consumers of fresh fish would however like to have the fish dried and handled in a more hygienic manner and with less of the tape worm**

f) *Impact of “dagaa” fishing on juvenile of other fish species*

Tanzania

- **Seems to have very little impact on the juveniles of other fish species. The by-catch consists mainly of haplochromines.**

Kenya and Uganda

- **Negligible by-catch of juveniles in offshore areas but high by-catch in bays**

g) Economics of “dagaa” fishing

- **Boat: TShs. 200,000.00**
- **Fishing nets: TShs. 220,000.00**
- **Lamp: TShs. 25,000.00 X 4**
- **Fishing operations: 2.5 litres of kerosene per lamp per fishing night that costs TShs. 850.00 per litre**
- **Depreciation on equipment**

g) Economics of “dagaa” fishing

- **Mean catch: 240 Kg/Boat/Day**
- **Bucket weight: 20 Kg**
- **Fresh weight value: TShs. 7,000.00 per bucket**
- **Dry fish value: TShs. 5,000.00 per bucket**
- **Based on these value: Cost benefit analysis done that factorizes in the fixed annul and daily costs**

Estimated Returns from Fishery

| Returns from the fishery | | Low | High |
|--------------------------|-------------------------|------------|--------|
| | | Kenya | |
| Exchange Rates: | US \$/Day Equivalent | 19.02 | 29.37 |
| US \$ = KShs. 75.00 | US \$./Month Equivalent | 228.18 | 352.47 |
| | | Uganda | |
| US \$ = UShs. 1650.00 | US \$/Day Equivalent | 20.94 | 35.33 |
| | US \$./Month Equivalent | 251.27 | 424.00 |
| | | Tanzania | |
| US & = TShs. 1125.00 | US \$/Day Equivalent | 27.82 | 36.27 |
| | US \$./Month Equivalent | 333.87 | 435.20 |
| | | Catamarans | |
| US & = TShs. 1125.00 | US \$/Day Equivalent | 42.93 | 62.04 |
| | US \$./Month Equivalent | 515.20 | 744.53 |

Those fishers who use outboard engines to go further offshore spend an additional TShs. 1,500.000.00 to buy and engine of 25 HP.

h) Utilization and value addition

- **Process by sun drying for human food**
- **Processing and preservation and packaging for human food in Tanzania and Kenya**
- **Use in animal feed industry**
- **Use in child nutrition in hospitals (Uganda and Kenya)**

h) Utilization and value addition

- **Salted and 0.5% ww of pepper added**
- **Sealed in polythene bags in weights of 200g, 400g, 800g and 1,000g.**
- **The selling price is TShs 500.00, 1,000.00, 2,000.00 and 2,500.00 for the respective weights**
- **These products are packaged at Nyagezi and a label added to show the contents.**

Animal Feeds:

- **Tanzania: Based in Dar-es-salaam and traders have to transport the fish all the way from collection points in Lake Victoria.**
- **An animal feed industry started at Igombe is no longer operational (Dutch assistance)**
- **Uganda: Main animal feed processor (Novita in Jinja) uses “dagaa” as one of the main sources of protein to manufacture animal feeds and fish feeds (30 tonnes every 20 days).**
- **Other minor factories include Ugachic and Bugeree in Kampala. Within Jinja, there are many**

Animal Feeds:

- **Kenya: Unga Feeds, United Millers are the main animal feed producers**
- **Both utilizes daga for feed production**
- **Data on quantities and products are not easy to get**
- **The factories operate under the Ministries concerned with industrial development and not fisheries institutions**

i) Food security, nutrition, production and prices

Contribution:

- **Food availability**
- **Affordability**
- **Divisibility**
- **Shelf life**

Risks:

- **Competition with animal feed industries**
- **Changes in pricing due to market liberalization**
- **Weak policies on use of dagaa in animal feed industries**

FISHERY, BIOLOGY AND ECOLOGY OF “DAGAA” IN LAKE VICTORIA

Little scientific information is available:

- **Okedi (1973)**
- **Wanink (1989)**
- **Wandera (1990)**
- **Manyala (1991)**
- **Chitamwebwa (1992)**
- **Wandera (1992)**
- **Katunzi (1992)**
- **Manyala *et al.* (1992)**
- **Manyala (1994)**
- **Manyala (1995b)**
- **Manyala (1995b)**
- **Mannini (1992)**

Table 1: Fecundity and breeding seasons of *R. argentea* in lake Victoria and qnnual breeding patterns based on relative condition.

| Fecundity | Region | Author |
|--------------------------------------|--|------------------------------|
| Mean ova = 2292 (582 - 4771) | Winam Gulf, Mwanza Gulfs, Musoma, Bukoba | Okedi, 1973 |
| F = 0.005875 * TL ^{2.95} | Mwanza Gulf | Wanink, 1989 |
| F = 0.00000033 * TL ^{5.376} | Winam Gulf | Manyala <i>et al.</i> , 1992 |

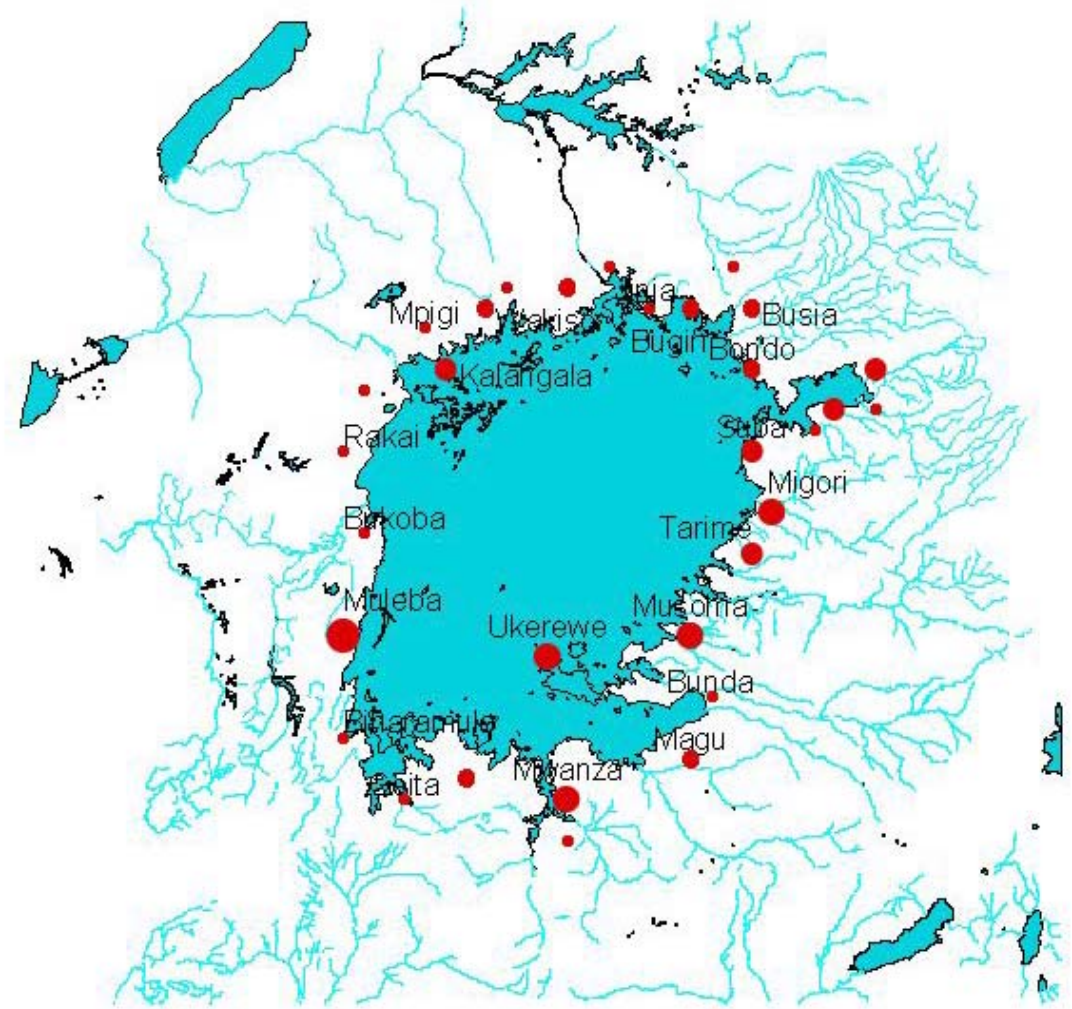
Table 2: Size at massive maturity of *R. argentea* in Lake Victoria

| Males | Females | Region | Author |
|--------------------|--------------------|--|------------------------------------|
| 40-41 mm SL | 43-44 mm SL | Pilkington Bay | Wandera, 1992 |
| 63.0 mm TL | 54.0 mm TL | Winam/Mwanza Gulfs, Musoma,Bukoba | Okedi, 1973 |
| 34 mm SL | 36 mm SL | Winam Gulf | Manyala <i>et al.</i>, 1992 |

Table 3: Growth parameters and mortality rates of estimated by different authors in Lake Victoria

| L_{∞} | K | M | F | Z | Region | Author(s) |
|--------------|------|------|------|------|------------------|---------------|
| 67.8 | 0.58 | 0.88 | 1.98 | 2.86 | Winam Gulf | Manyala, 1991 |
| 64.5 | 0.92 | 2.37 | 1.22 | 3.59 | Uganda waters | Wandera, 1992 |
| 63.4 | 0.94 | - | - | 3.23 | Winam Gulf | Manyala, 1992 |
| 52.0 | 1.14 | - | - | - | Mwanza Gulf | Wanink, 1989 |
| 59.0 | 0.74 | 1.12 | 1.89 | 3.47 | Inner Winam Gulf | Manyala, 1995 |
| 62.0 | 0.74 | 1.12 | 1.39 | 2.97 | Mid Winam Gulf | Manyala, 1995 |
| 58.0 | 0.68 | 1.07 | 1.80 | 3.38 | Outer Winam Gulf | Manyala, 1995 |
| 62.0 | 0.66 | 1.04 | 1.45 | 3.03 | Mbita Area | Manyala, 1995 |
| 58.0 | 0.63 | 0.99 | 1.77 | 3.35 | Open lake | Manyala, 1995 |

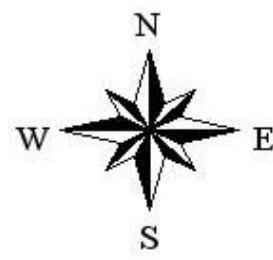
Dagaa Effort Distribution (>50% Composition)



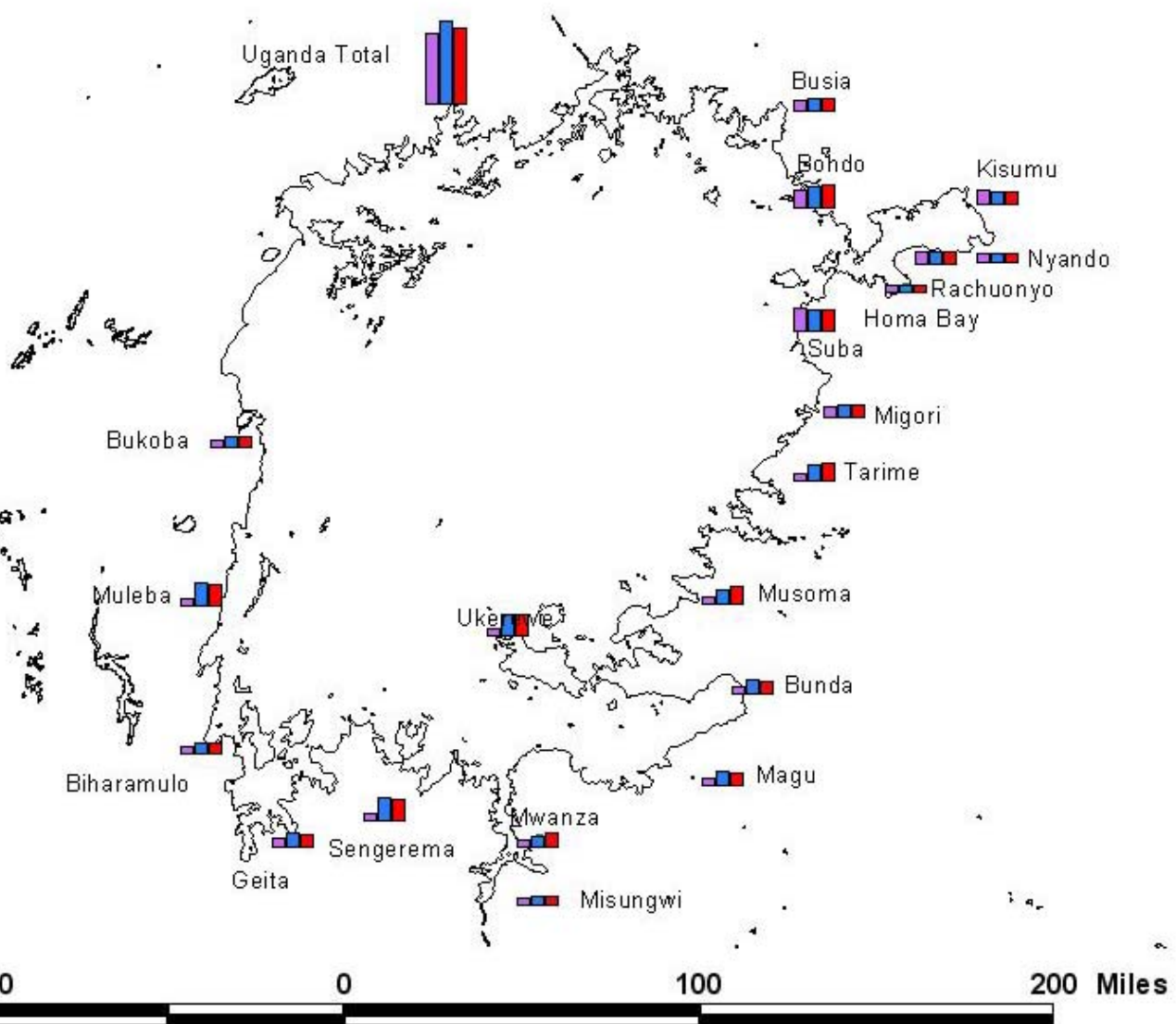
Effort distribution.d

- 0 - 1.8
- 1.8 - 6.1
- 6.1 - 13.2
- 13.2 - 20.5
- 20.5 - 27.8

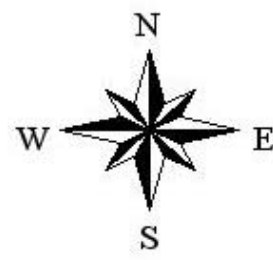
△ Eariversgeo.sh
■ Ealakesgeo.sh



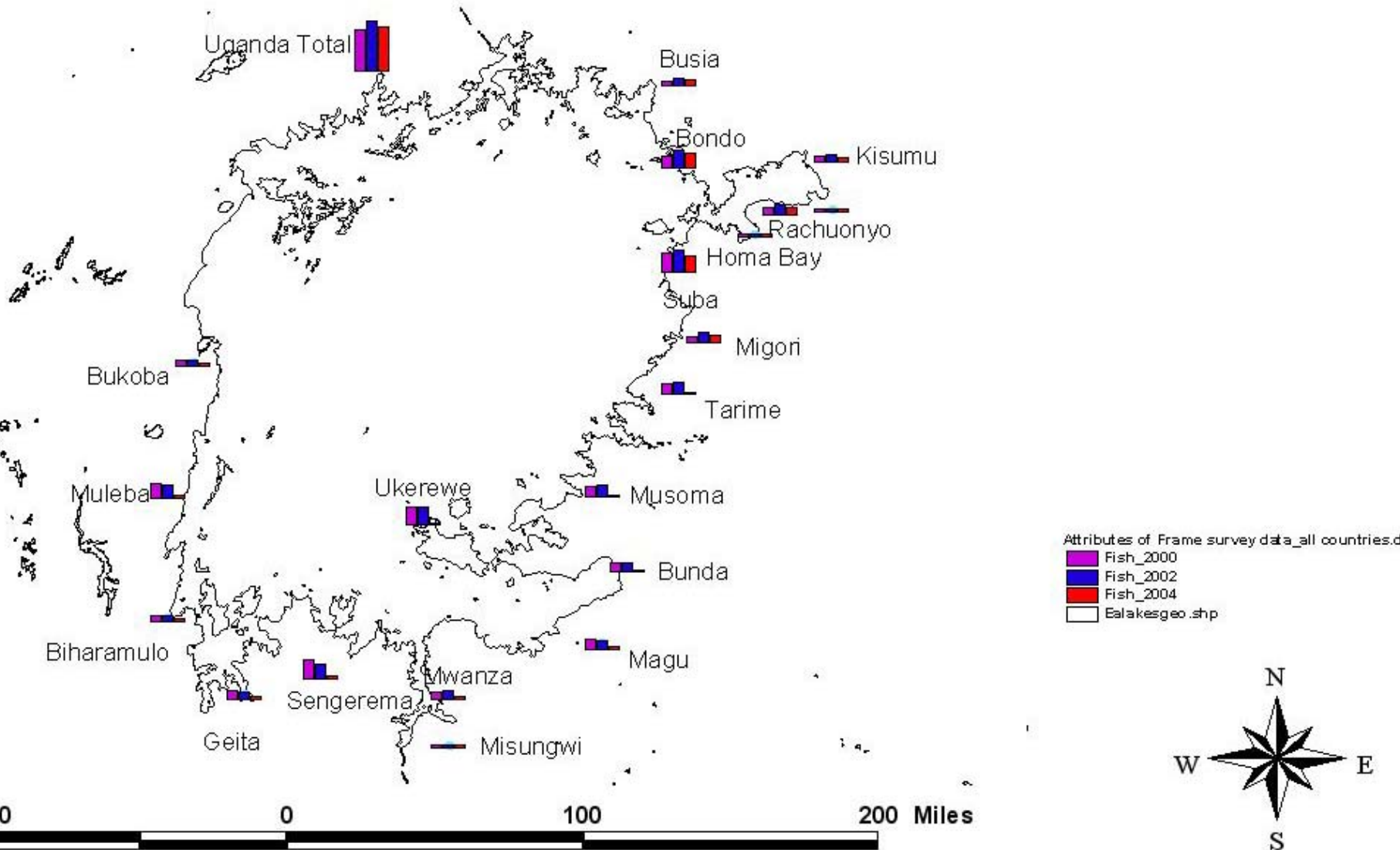
Number of Fishing Crafts by District



Frame survey data_all countries.
Fcrft_2000
Fcrft_2002
Fcrft_2004
Ealakesgeo.shp



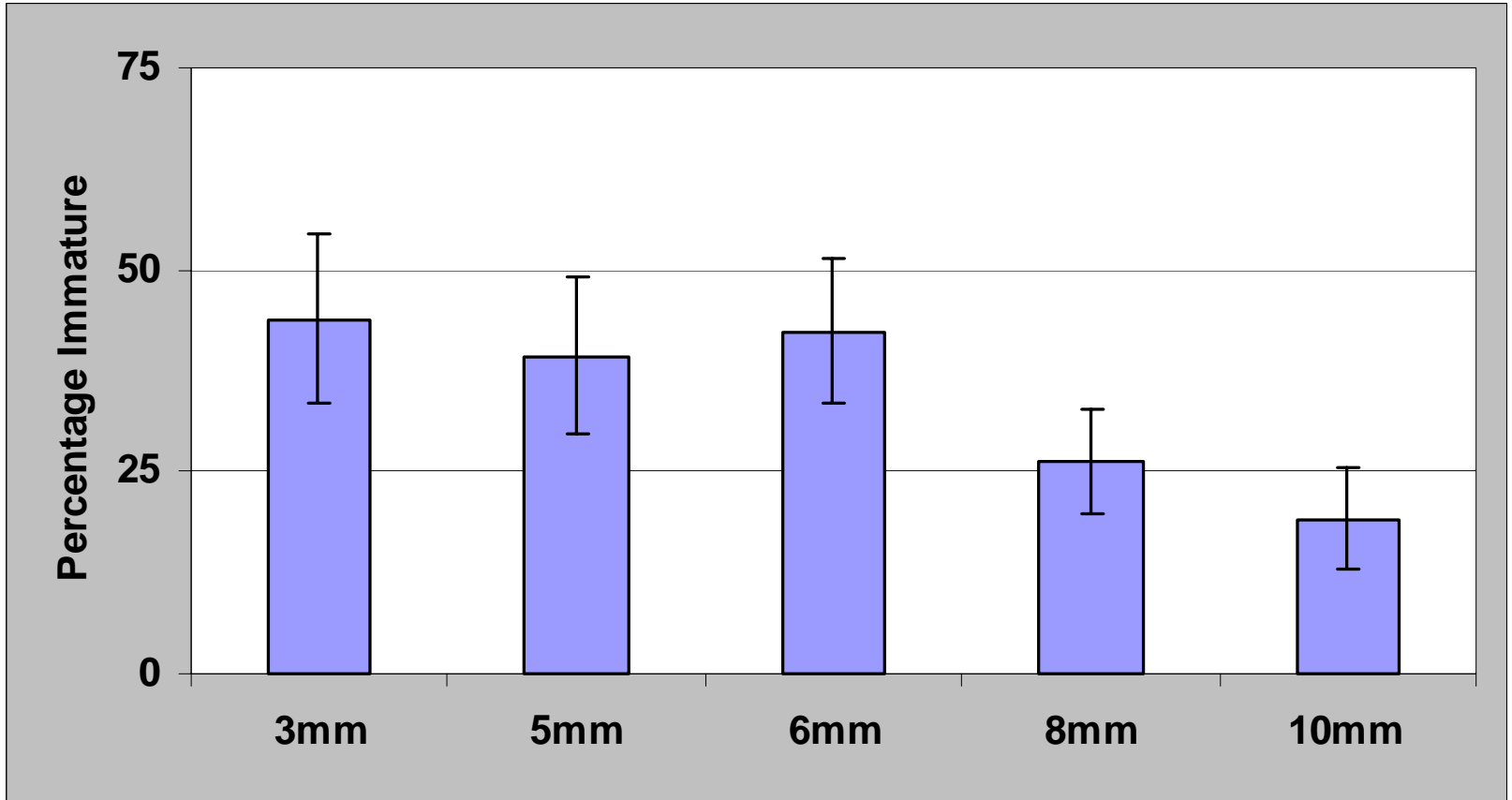
Number of Fishers by District



Conclusions

- High potential of offshore exploitation
- Catamaran offer better returns
- Mesh size below 5mm catch high proportions of immature fish
- Quantities utilized for animal feed are not easily available but it is estimated that 60-80% goes to animal feed
- Value addition for human consumption is done on small scale but technology exists in Tanzania, Kenya and the region

Immature Dagua (Lakewide)



Recommendations_1

- **Fishing grounds**
 - **Bays (<4km width) and shallow near-shore waters (<2km) are breeding & nursery grounds of Dagaa and other fishes. Fishing should therefore not be carried out in these waters**
 - **Open offshore waters contain mainly mature Dagaa. Fishing for “Dagaa” should be done offshore (>2.0 km)**

Recommendations_2

- **Mesh size**
 - All meshes catch immature Dagaa when operated in waters containing juvenile fish.
 - Large mesh nets (8 & 10mm) catch higher proportion of mature Dagaa than small meshes (3, 5 & 6 mm) especially in waters where juveniles occur (K & U)
 - (T) Catches do not differ significantly between mesh sizes
- **The 8 mm mesh net was found appropriate for Dagaa exploitation on Lake Victoria on the basis of harmonization**

Recommendations_3

- **The most popular products to be developed include:**
 - **Sun dried “dagaa” for general nutrition**
 - **Sun dried and salted products general nutrition**
 - **Enriched flours for adults nutrition**
 - **Enriched flours for children nutrition**
 - **Protein concentrates as food additives**
- **Develop quality standards for dried “dagaa” based on sensory assessment and biochemical analysis.**

Photo Gallery

Tanzania – Kirumba Market





**Tanzania: Nyagezi-Kijiweni
Women drying and selling
dagaa by the lakeshore**



**Tanzania: Nyagezi-Kijiweni
Women patiently waiting
for dagaa landings**

Kikondo Beach - Uganda





Mases Fish Landing: Uganda
Dagaa packaging and storage before sale

Mases Fish Landing: Uganda
Dagaa landings from island collection points



Mainuga Beach: Kenya
Dagaa nets



Mainuga Beach: Kenya
Dagaa fish drying on
fishing nets



Sirare Border Post



Dagaa transportation across Tanzania-Kenya Border



Thank You