

Research Application Summary

**Feeding, reproductive biology and aquaculture potential of *Clarias liocephalus* in the wetlands of south western Uganda**

Yatuha, J.<sup>1</sup>, Kang'ombe, J.<sup>1</sup>, Rutaisire, J.<sup>2</sup> & Chapman, L.<sup>3</sup>

<sup>1</sup>University of Malawi, Bunda College of Agriculture, P.O. Box 219, Lilongwe, Malawi

<sup>2</sup>Aquaculture Development and Research Centre, Kajjansi, Uganda

<sup>3</sup>Department of Biology McGill University, 1205 Avenue Docteur Penfield, Montreal, PQ, Canada H3A 1B1

Corresponding author: jeremiah\_kang'ombe@yahoo.com

**Abstract**

*Clarias liocephalus* is a data-deficient air breathing cat fish in wetlands of Western Uganda. It is highly demanded as live bait in Nile perch fishery of Lake Victoria and as food by local communities. Because of high demand, smaller sizes are harvested, an indication of possible stock depletion. To satisfy this demand sustainably requires baseline information on the species' life history traits. This study will provide information on the species' food, feeding habits, aspects of reproductive biology and growth response under controlled conditions. Findings will provide benchmark information for sustainable economic, environmental and dietary utilization of the species.

Key words: Breeding biology, cat fishes, feeding habits, Uganda, wetland system

**Résumé**

*Clarias liocephalus* est un poisson moustachu à respiration d'air dont les banques des données sont insuffisantes et se trouve dans les zones humides de l'Ouest de l'Ouganda. Il est très sollicité comme appât vivant, dans les pêcheries de la perche du Nil du lac Victoria et comme nourriture par les communautés locales. En raison de la forte demande, des alevins sont pêchés, ce qui est une indication de l'épuisement des stocks possible. Répondre à cette demande exige impérativement des informations de base sur les caractéristiques de l'espèce dans sa généalogie. Cette étude fournira des informations sur l'alimentation de l'espèce, les habitudes alimentaires, les aspects de la biologie de la reproduction et la réponse à la croissance dans des conditions contrôlées. Les résultats fourniront des données de référence pour la croissance économique durable, l'utilisation de l'environnementale et alimentaire de l'espèce.

Mots clés: Biologie de la reproduction, poissons moustachus, habitudes alimentaires, Ouganda, système des zones humides

## Background

Although more than 100 species of the genus *Clarias* catfishes have been described in Africa, data on their basic feeding and breeding biology are quite scanty (Coche and Edwards, 1989). Catfish studies have been mainly on the African catfish *C. gariepinus*. This has left out small but equally valuable species like *C. liocephalus*. This species is found in wetlands and streams of South Western Uganda and widely distributed in East African wetland systems (Teugels, 1986; Chapman, 1995). *C. liocephalus* in Mbarara region is harvested for sale as food and as live bait in the Nile perch fishery of Lake Victoria. There is generally little information about this species apart from general information on its distribution patterns (Greenwood, 1966; Teugels, 1986; Chapman, 1995).

## Literature Summary

Fish is an important source of protein in the diet of many communities worldwide. In Uganda, fish comprises approximately 50% of animal protein in the average diet (NFP Uganda, 2004). Recent studies have indicated a remarkable decline in fish stocks and species diversity in the major aquatic systems of Uganda (FAO, 2005; Balirwa, 2007). Fish consumption in some communities in Uganda has steadily declined because of the decrease in supply caused by growing demand from internal and external markets, increasing human population, improved methods of fishing and loss of habitat (Machena and Moehl, 2001; NFP, 2004). The national average per capita fish consumption is estimated to have declined from about 14kg per person per year before 1990 to between 4kg and 8kg per person per year after 1990 (FAO, 2005). There has been a steady decline in the catches of *C. liocephalus* in the wetlands of Mbarara region and this is attributed to high demand of the species as live bait in the Nile perch fishery as well as increased use of wetlands for agriculture (Ajangale, 2007). Given the existing information about this species, there are knowledge gaps on the species' basic life history traits of feeding and reproduction (Chapman, 1995).

## Study Description

The study will be conducted in the wetlands of Mbarara, South Western Uganda, 0° 39' 30S and 30° 40' 33E. Information on food and feeding habits will be obtained by analyzing stomach contents to be sampled over a period of 12 months. The study will identify what the species feeds on, describe ontogenic dietary shifts, determine temporal and spatial variation in food choice, and measure relationships existing between habitat variables (like DO, Temperature, water depth, ammonia) and feeding patterns. Stratified and random sampling designs will be used in

mapping transects to represent major habitat types in the wetland. Baited traps will be used to capture the specimen. Reproduction potential will be assessed by obtaining information on sex ratios, the spawning seasons, fecundity, size at sexual maturity, spawning periodicity, spawning behavior, and times of highest reproductive activity in the species' natural habitat. Feeding experiments will be performed to evaluate the growth rate and proximate body composition of *Clarias liocephalus* fed on diets with different levels of crude protein formulated from locally available ingredients. The goal is to finally determine optimum protein requirement of the species under captivity. The experiments will be conducted in an earthen pond using happas as experimental tanks. Feeding trials will be done over a period of twelve weeks. Growth performance will be measured in terms of weight gain, Condition factor, Specific Growth Rate (SGR) and Food Conversion Ratio (FCR).

### Research Application

*Clarias liocephalus* is an important source of food protein in the diet of rural communities in Mbarara region. It is also sold to earn money and has ecological attributes as a part of wetland biodiversity. Because of this combination of economical, conservational and nutritional value, and the fact that few studies have been done on the species' basic life history traits, the findings of this study will contribute to the wider national and regional goals of food security, sustainable utilization of natural resources and poverty alleviation in rural communities.

### Acknowledgement

We are indebted to the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) for funding this study and to staff in the Department of Aquaculture and Fisheries Science and Bunda College of Agriculture, Malawi for their invaluable contribution in the preparation of this project proposal.

### References

- Ajangale, N. I. 2007. The aquaculture potential of indigenous catfish (*Clarias gariepinus*) in the Lake Victoria Basin, Uganda. PhD Thesis, University of Stirling, UK.
- Balirwa, J.S. 2007. Ecological, environmental and socioeconomic aspects of the Lake Victoria's introduced Nile perch fishery in relation to the native fisheries and the species cultural potential. *African Journal of Ecology* 45:120-129.
- Chapman, L. J. 1995. Seasonal dynamics of habitat use by an air-breathing catfish (*Clarias liocephalus*) in a papyrus swamp. *Ecology of Freshwater Fish* 4:113-123.

- FAO (Food and Agriculture Organisation). 2005. FAO year book of fishery statistics: Aquaculture production, 2003. Vol.96/2. FAO, Rome, Italy.
- Greenwood, P.H. 1966. The fishes of Uganda. The Uganda Society. Kampala, Uganda. pp. 85-86.
- Machena, C. and Moehl, J. 2001. African aquaculture: A regional summary with emphasis on Sub-Saharan Africa. Technical Proceedings of the conference on Aquaculture in the third millennium, Bangkok.
- National Fisheries Policy (NFP) for Uganda, 2004. Kampala, Uganda.