MINISTRY OF AGRICULTURE ANIMAL INDUSTRY AND FISHERIES

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INTRODUCTION

Uganda is gifted by nature; it has a very large number of aquatic species.

The waters of Uganda contain an impressive array of fish species—over 90 in all. This count does not include the Haplochromis complex, which itself is made up of more than 200 species.

Currently there are four farmed species - Oreochromis niloticus, Oreochromis esculentus, Clarias gariepinus, all native species and Cyprinus carpio an introduced species.

However there are on-going efforts of diversification to increase number of farmed fish species especially the high value species.

INTRODUCTION

Breeding of AqGR is done by the Government aquaculture research station - the Aquaculture Research and Development Centre (ARDC), and private hatchery operators.

Movement of AqGR within the country is unrestricted which may be detrimental to conservation, sustainable use and development of the AqGR.

For importing or exporting AqGR, the restriction is mostly on the live species where one is required to get explicit permission the Commissioner

INTRODUCTION

Biotechnology use in Uganda on AqGR is still on very small scale and limited mostly to selective breeding. No efforts have been put in generation of transgenic organisms.

A number of drivers have had impacts on the AqGR including habitat loss and degradation; pollution of waters; climate change; purposeful stocking and escapees from fish farms; invasive species due to species translocations and introduction of parasites and pathogens of AqGR .

There have been a number in situ and ex situ conservation efforts for AqGR in the fisheries sector by the National Fisheries Resources Research Institute (NaFIRRI); Universities and Fisheries Training Institute involved in research and training; Government resource managers - the Directorate of Fisheries Resources Uganda (DFRU); Fish farmers associations; BMUs

INTRODUCTION

Gender issues in conservation of farmed AqGR and their wild relatives are limited to a few areas.

Uganda has in place a legal framework designed for conservation, sustainable utilization and development of AqGR albeit with a number of gaps.

About status, future plans and needs for research, training, extension and education on conservation, sustainable use and development of AqGR, the institutions within the country that are involved include; the government research institute - NaFIRRI, a number of Universities and the Fisheries Training Institute (FTI). These institutions are greatly limited in capacity both human and infrastructure.

INTRODUCTION

The Country has also signed or adopted a number of networks for supporting conservation, sustainable use and development of AqGR.

Information systems geared toward the same efforts include Websites and libraries in NaFIRRI, Makerere University Kampala, and DFRU. Uganda has also entered into International collaborations for the conservation, sustainable use and development of AqGR.

The country has desires and has in place efforts to conserve, sustainable utilisation and developing of farmed AqGR and their wild relatives, but these efforts require urgent enhancement to achieve the intended goal.

Use and Exchange of Aquatic Genetic Resources of Farmed Aquatic Species and their Wild Relatives within National Jurisdiction

- Farmed aquatic species over the last 10 years, have production increasing
- The expected trend over the next 10 years will be increasing production
- The identification and naming of farmed species, subspecies, hybrids, crossbreeds, strains, triploids, other distinct types is to some extent accurate

The Use and Exchange of Aquatic Genetic Resources of Farmed Aquatic Species and their Wild Relatives within National Jurisdiction

- Genetic data for farmed aquatic organisms is to a minor extent available though not used in management
- To some extent aquatic organisms farmed in the country are sourced as wild seed or from wild brood stock

The Use and Exchange of Aquatic Genetic Resources of Farmed Aquatic Species and their Wild Relatives within National Jurisdiction

- (%) of management of breeding programmes and efforts for the genetic improvement of farmed aquatic species
  - Percent managed by public sector - 75%
  - Percent managed by private sector - 25%
  - PPP - 5%

The Use and Exchange of Aquatic Genetic Resources of Farmed Aquatic Species and their Wild Relatives within National Jurisdiction

- Most significant examples where genetic improvement contributed to increased production and indicate whether they were developed by public, private or public/private partnerships.
  - *Oreochromis niloticus* Traditional selective breeding by Public,Private and PPP
  - Mono-sex production by private and PPP
  - Traditional selective breeding by public, private and PPP
  - *Clarias gariepinus - no mono sex or triploids but other with private sector*

Aquatic genetic resources (AqGR) of farmed aquatic species in Uganda

Farmed species	Information- Genetic type, Availability of genetic data, Trends in production Over the	For example important traits improved, how data are used in management or name of breed, source of information, Etc.
Oreochromis niloticus	Native, wild, selective bred type, strains and trend increasing	•Strains include Albert, Edward/George, Kyoga & Victoria •Genetic data are available but limited within research institutions and in some hatcheries. •Traits for genetic improvement include high growth rate, increased fillet, low food conversion ratio and disease resistance.

Aquatic genetic resources (AqGR) of farmed aquatic species in your country

Farmed species	Information- Genetic type, Availability of genetic data, Trends in production Over the	For example important traits improved, how data are used in management or name of breed, source of information, Etc.
Clarias gariepinus	Native, wild, selective bred type, cross breeds, strains and trend increasing	•Strains include Lake Albert, Lake Edward, Kyoga, Wamala and Victoria •Genetic data available but limited within research institutions. •Traits for genetic improvement include high growth rate, increased fillet, low food conversion ratio and disease resistance.

Which aquatic species in your country are thought to have potential for domestication and future use in aquaculture?

Farmed species	Is the species native to your country?	Comments For example main sources of information Yes/No
Labeo victorianus	Yes	•Aquaculture Research and Development Center - Kajjansi library; Internet
Lates niloticus	Yes	As above
Bagrus spp	Yes	As above
Barbus altianalis	Yes	As above
Oreochromis esculentus	Yes	As above
Protopterus aethiopicus	Yes	As above
Oncorhynchus mykiss	Yes	As above

Please list the aquatic genetic resources of farmed aquatic species your country has transferred or exchanged with other countries over the past 10 years.

species	Genetic alteration of exchanged material, detail and type of genetic material	Country or countries involved with Exchange/Comments
Oreochromis niloticus	Genetic alteration Traditional selective Breeding, export and living specimen	Many
Clarias gariepinus	Genetic alteration Traditional selective Breeding and export	many

Wild relatives of farmed aquatic species

species	use	Comments
Oncorhynchus mykiss	Capture fisheries /research	Rainbow trout is found in streams in colder areas of the country - Mt. Elgon region where it is a delicacy. It farmed in Europe, USA, Canada and neighboring Kenya.

Please list the aquatic genetic resources of wild relatives of farmed aquatic species your country has transferred or exchanged with other countries over the past 10 years

species	Details of transfer or Exchange mark all/Type of genetic material exchanged Country	Comments
Oreochromis niloticus	Export tissues /living organism to many countries	Transfers were legal in most cases for purposes of genetic analyses, genetic improvement programs and provision of seed for culturing of the species.
Clarias gariepinus	Import/export tissues DNA and living material to many countries	transfers were legal in most cases for purposes of genetic analyses, genetic improvement programs and provision of seed for culturing of the species.

Please list the aquatic genetic resources of wild relatives of farmed aquatic species your country has transferred or exchanged with other countries over the past 10 years

species		
Oreochromis niloticus		
Clarias gariepinus		
Cyprinus carpio		

Drivers and Trends in Aquaculture: Consequences for Aquatic Genetic Resources within National Jurisdiction

What countermeasures might be taken to reduce adverse impacts on the aquatic genetic resources that sustain current aquaculture and/or provide for its future development?

Genetic improvement - through this program the government and research hope to develop fast growing strains with low food conversion ratios, which can allow increased crops and yield in year; Capacity building - through this program we shall achieve increased and better quality human capacity and infrastructure to manage, utilise and conserve better the AqGRs; with better policies and legislation, planning and strategies the AqGRs will be exploited in a better way while conserving them for the future;

What countermeasures might be taken to reduce adverse impacts on the aquatic genetic resources that sustain current aquaculture and/or provide for its future development?

The conservation efforts both 'in situ' and 'ex situ' will be explored to maintain the genetic diversity of the AqGRs; application of best practices in brood stock and genetic resources management will also aid in maintaining the genetic diversity and avoid inbreeding in the AqGRs; and the diversification farmed species especially the high value species will lead to increased aquactic resources production and productivity while reducing pressure on the few currently farmed AqGRs.

STEPS IN PREPARATION OF COUTRY REPORT, UGANDA

- A National Focal Point for the coordination of the preparation of the country Report was nominated and communicated to FAO but has since retired
- A national committee was set up composed of One Genetic Researcher from the National Fisheries Resources Research Institute (NaFIRRI) – Aquaculture Research and Development centre – Kajjansi); two Officers from the Directorate of Fisheries Resources, two from Private sector (Namuyenje Mixed Farmers and AA Fisheries and Aquaculture Ltd)
- The national committee held meeting to review progress and consult widely with key stakeholders.
- Stakeholders consulted included National Environment Authority, Uganda National Bureau of Standards, Fish farmers, Makerere University and other tertiary institutions, BMUs etc

STEPS IN PREPARATION OF COUTRY REPORT, UGANDA

- The NTC team finalized the Country Report and submitted to FAO in English
- The Country Report will be an official government report.

CHALLENGES

- Lack of financial resources could not allow wider stakeholder consultations but key players were targeted to acquire the information
- Many organizations don’t have organized data and information there is need to identify all stakeholders and designate sub- focal point officers to gather information on agreed areas
- Need to mainstream this data requirement in the fisheries and research national institutional budgets