

Epizootic Ulcerative Syndrome (EUS): the awareness and preparedness to combat an outbreak in east Africa

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Abstract

Africa reported the first case of Epizootic ulcerative syndrome (EUS) like disease in fish in 2006. The disease was characterized by ulcerations and mortality of affected fish. This was in the Chobe and upper Zambezi Rivers in Botswana and Namibia respectively. It was confirmed as EUS, by the OIE reference Laboratory in Thailand with the support of the Food and Agriculture Organization FAO in 2007. In 3 years, between 2008 and 2011, the entire Zambezi River including the Chongwe River and its tributaries were affected. The Okavango Delta in Botswana was also affected from the Western Cape Province of South Africa but Zambia was most affected. With the presence of favorable conditions such as exposure of fish to acidified water due to environmental pollution, heavy rainfall and flooding occasioned by climate change, the risk of EUS spreading to other water bodies within the region appears to be high. Lake Victoria being the largest fresh water body (68,000km²) in Africa with a fish species diversity of over 600 aquatic species, an outbreak of EUS in East Africa would be a direct threat to the fish industry which is dependent on the lake. An assessment of the levels of knowledge and preparedness was carried out. This involved the various stakeholders in the fish industry around the Lake Victoria Basin and fish farmers in case of spread of this disease to currently non- affected water bodies of East Africa. The awareness levels in the three countries about the disease was low but as for other fish diseases, the countries were confident of being able to combat an EUS outbreak if it would occur.

Introduction

Epizootic ulcerative syndrome (EUS) is a seasonal epizootic infection of fish. It has a complex infectious etiology characterized by the presence of the invasive oomycete *Aphanomyces invadans* or *A. piscicida* (Baldock *et al.*, 2005). The infection is histologically characterized by penetrating hyphae surrounded by granulomatous inflammation and (most of the time) raw ulcerations. It is considered an epizootic condition of wild and farmed freshwater and estuarine fish (Blazer *et al.*, 2002). EUS is officially recognised as a notifiable disease by the Network of Aquaculture Centres in Asia-Pacific (NACA) and internationally by the World Organisation for Animal Health (Office International des Epizooties, OIE Manual, 2).

EUS has been reported from 24 countries in four continents: America, Africa (Southern), Asia and Australia. The first ever reported case of the ulcerative syndrome was in farmed freshwater fish in Oita Prefecture, Kyushu Island, Japan in 1971 (Egusa and Masuda, 1971). It was later found in estuarine fish, in eastern Australia in 1972 (Baldock *et al.* 2005). EUS spread further into South- East and South Asia, and into West Asia, where it has reached Pakistan (Callinan *et al.* 1995). Other areas in which it has been reported include the United States of America (USA) the causative agent in all these areas was the same fungus (Blazer *et al.* 2002).

On the African continent, the first outbreaks of the disease occurred in 2007 in Botswana, Namibia and Zambia. These countries are connected to the Zambezi-Chobe river system. There were isolates of the causative agent reported later in focal points South Africa.

Following the incursion of this disease into the water body systems in Africa coupled by the intensive cross border trade in fish and fish products and fish harvesting gear, there is a risk of the disease finding its way into Lake Victoria thereby threatening the livelihoods of the individuals leaving around the lake or even the countries whose economies depend on fishing.

Methodology

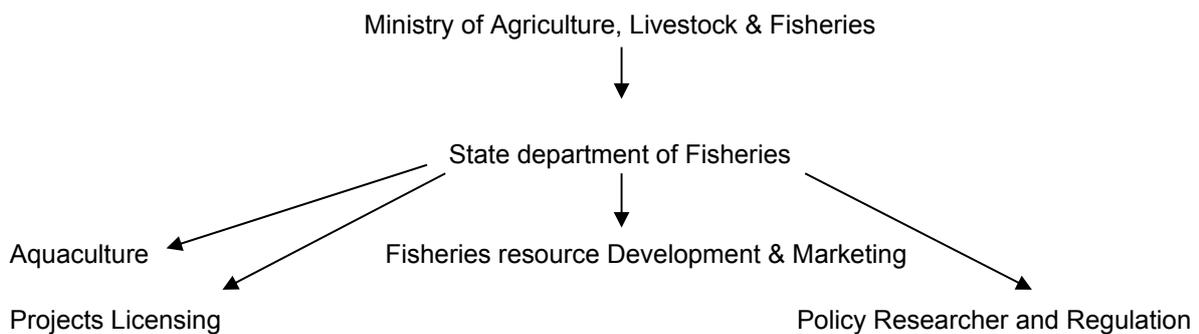
Visits were made to the three East African countries Kenya, Uganda and Tanzania which share the Lake Victoria. In Kenya, interviews were held at the fisheries headquarters in Nairobi and with fisheries officials in Kisumu. Also interviewed was a member of faculty at the University Of Nairobi Faculty of Veterinary Medicine. This is since has experience on various fish diseases and has offered consultancy to the Fisheries department and has carried out various research projects on fish diseases. In Uganda an official from the fisheries department and another one from the National fisheries research institute were interviewed. In Tanzania, government officials in the fisheries department, a fish farm manager and members of faculty at the University of Dar es Salaam were interviewed. The semi - structured interviews were centered on awareness of the stakeholders on EUS and the levels of preparedness to manage a EUS outbreak in case it occurs in the region.

Map of the Lake Victoria ports in the three countries.



Findings

Kenya : Ministry organizational structure



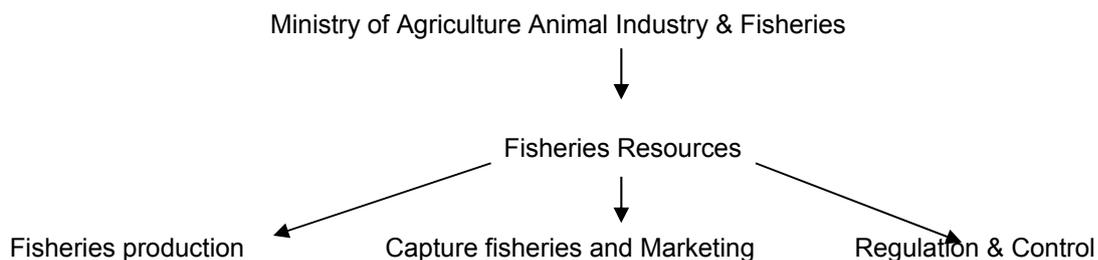
In Kenya, 3 government officials were interviewed. One was a senior officer in the Department of fisheries while the other 2 were junior officials working around Lake Victoria. Of the three individuals, only the senior official was aware of the earlier outbreak of EUS in southern Africa. None of the officers interviewed were aware of the causative agent or diagnostic methods for confirming EUS. The officials in Kisumu said that in case of an outbreak, the region could be affected severely as surveillance could be affected by border disputes between Kenya and Uganda.

There exists a fish disease division at the fisheries department and it has a number of experts in fish diseases who can be able to diagnose various fish diseases depending on their clinical presentation of the disease. This division has officers at the various beaches who carry out surveillance at the various fishing villages and markets. Officers at the district level are mandated to inspect fishing gear; these have been documented as possible contributors to EUS transmission.

From the interviews, the government officers were of the opinion that Kenya would be in a position to manage the disease in case it occurred in collaboration with other countries.

The member of faculty at the University of Nairobi was aware of EUS, its earlier outbreak in southern Africa and that it is caused by a fungus. He explained that with the human resource capacity at the university, they should be able to make a diagnosis with the routine staining techniques recommended by the OIE manual of aquatic fish disease diagnostics

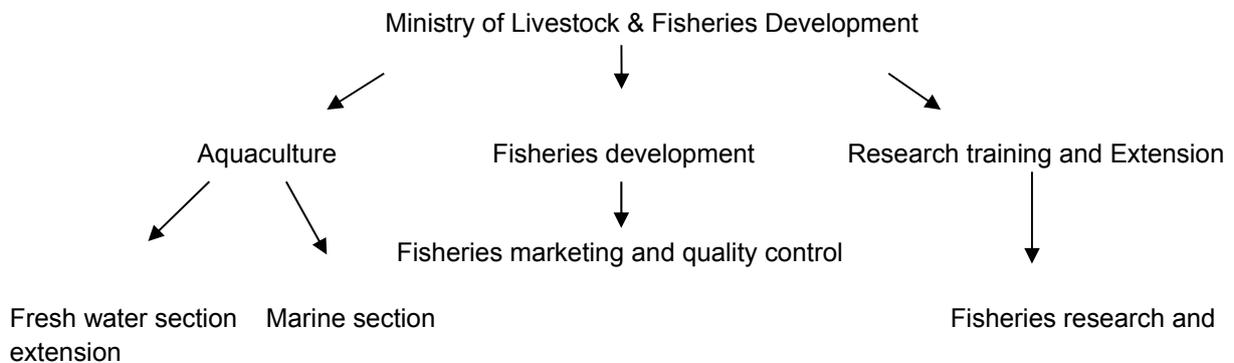
Uganda : Ministry organizational structure



2 government officials from the Directorate of Fisheries Resources in Entebbe were interviewed. One is a senior officer at the Directorate while the other is a junior officer.

The senior officer was aware of EUS and its previous outbreak in the Zambezi River. This knowledge he had acquired from personal literature search and also from a previous training by the Food and Agriculture Organization (FAO) in Namibia. The other source of information was the FAO extension document on EUS. The junior officer was completely unaware of this disease and the interview served as his first source of information. Within the directorate, there is no department fully dedicated to fish diseases and fish health although the government has fish inspectors manning the fishing districts. The inspectors visit fishing points at the shores of the lake, fish markets and therefore can easily pick any abnormalities in fish in case it occurs. Fishermen have also organized themselves into fishing groups which are usually in touch with government officials and report any unusual occurrences at the various beaches.

Tanzania : Ministry organizational structure



In Tanzania, a senior officer in the Fisheries Department was interviewed together with three other junior officers from the same Department, drawn from the fish diseases and aquaculture divisions.

The senior officer had learnt of EUS in a regional meeting of the Southern African Development Community (SADC) in Botswana and expressed fear for Tanzania since some of its water bodies to the south border some of the countries earlier affected. These water bodies include L. Nyasa, Ruvuma and River Songwe. To prevent the incursion of this disease into Tanzania, fishing gear coming into the country is thoroughly inspected and continuous fish disease surveillance is done at the fishing ports and fish markets.

By itself, the fisheries department is believed not to have the capacity to diagnose a fish disease such as EUS but cooperation exists between the Department, the government chemist and institutions of higher learning such as Sokoine University of Agriculture and the University of Dar es Salaam's Department of Aquatic Science and Fisheries. They also work together with the Tanzania Fish Research institute.

The Department had also put in place strict measures with regard to the trade in gold fish from Lake Nyasa and Tanganyika. The illegal trade in goldfish was wide spread and this posed a risk of foreign fish disease outbreaks.

An interview with the management of a private fish farm in Dar es Salaam exposed the risks in the aquaculture sector. The entity produces mature fish for sale, fish food and also fingerlings for other farmers. The management was not aware of EUS and relies on the Department of Fisheries for technical assistance on fish diseases. Their source of

mature fish in Lake Victoria or fish farmers around the lake and this could contribute to spread of fish diseases.

At the Department of Aquatic Science and Fisheries, University of Dar es Salaam, there is no focus on fish diseases but on fish ecology and environment, fish parasitology and aquaculture. The institution does take part in research on fish related topics, including investigations of fish deaths (massive deaths in R. Wami)

The members of staff interviewed had not heard of EUS. Following discussions, the team felt that with the research capacity of the department, it should be able to diagnose EUS in case an outbreak occurs.

Discussion

No outbreak of Epizootic ulcerative syndrome (EUS) has so far been reported in East Africa. With climate change, enhanced trade and informal cross border movements, the likelihood of introducing this disease in the region from the affected areas of Africa is high. EUS infection is facilitated by abrasions of the fish body, exposure to acidified water, viral dermatitis, bacterial dermatitis, skin damages by parasites, heavy rainfall and flooding, and use of contaminated fishing gear.

The knowledge gap on EUS of the various custodians of the fish industry is evident. Most of the information on this disease, available to government officials has been acquired from international trainings or trainings by international organizations. Individuals holding these offices have advanced academic qualifications and have also been involved in research in their various fields of expertise.

From the findings of this work, knowledge gained from trainings by senior officials is not passed on to junior officials who most of the time handle the real field situations.

The diagnosis of EUS relies on field diagnostic methods, clinical methods and agent detection and identification methods. Most research and learning institutions possessing fish disease specialists claim to be able to make a tentative diagnosis of EUS. Such provisional diagnosis is important since it can help in the mitigation of an outbreak whilst further confirmatory tests are carried out in labs such as the OIE Reference Labs.

Cross border disputes such as those witnessed between Uganda and Kenya over the Migingo Island can hamper joint efforts in disease surveillance, terms of information sharing on fish diseases and diagnostic assistance. Such disputes can also facilitate illegal trade in fish and fish products as well as contaminated fishing gear which can pose additional risks of disease outbreaks.

Conclusions

- An outbreak of EUS in Lake Victoria can lead to significant losses of income to the fisheries industry, negatively affect the biodiversity of the lake, have serious social impacts on communities dependent on fishing and be a potential public health risk from infected fish due to opportunistic Bacterial infections.
- To the senior officials of departments of fisheries in the region, EUS is not a completely new subject, but it is for junior staff. This is because these high ranking officials represent their countries in international meetings and courses/trainings where such issues are discussed.
- Cross boundary disputes pose a challenge to continuous monitoring of fishing activities and surveillance of fish diseases.

Recommendations

- Training should be offered to the various government officials in the fish industry on fish diseases such as EUS, especially to junior / field staff.
- Senior officials who attend international workshops should be facilitated to be trainers so as to disseminate information gathered during international seminars and conferences.
- There should be efforts in capacity building for line institutions through joint training for the 3 countries to enhance awareness and preparedness to handle a EUS outbreak.
- Biosecurity across borders should be enhanced so as to ensure risks of entry of EUS are reduced. This can be facilitated by border inspections and surveillance.
- Through the legislative authorities, proper regulations such as certification of all forms of fish trade could be put in place to ensure the risks of EUS spread in the region is reduced.

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