Abstract

This study is being conducted to understand the risk factors associated with Epizootic Ulcerative Syndrome (EUS) in fish of the Zambezi River basin. The disease broke out in 2006 causing high mortality in various fish species including Barbus and Clarius spp. Biodiversity of the fishery as a result has been threatened, thus posing food insecurity to over 700,000 people in 2000 villages with Zambia being affected most. Disease outbreak was preceded by heavy rains that resulted in excess flooding in the plains of the Zambezi river. Acidic soils of the plains reduced water pH and was implicated as a risk factor associated with EUS outbreak. However, disease outbreaks have subsequently been reported in non acidic agro-ecological zones. An active surveillance coupled with participatory epidemiological study is therefore being carried out to further investigate the risk factors, prevalence, severity and spatial distribution of the disease.

Key words: Clarius spp. fish diversity, Ulcerative syndrome, Zambia

Résumé

Cette étude est menée afin de comprendre les facteurs de risque provoqués par le syndrome ulcéreux épizootique (EUS) sur les poissons du bassin du fleuve Zambèze. La maladie a éclaté en 2006 entraînant une mortalité élevée de diverses espèces de poissons y compris les espèces Barbus et Clarius. Par la suite, la biodiversité de la zone poissonneuse a été menacée, ce qui a posé l’insécurité alimentaire à plus de 700.000 personnes dans 2000 villages, la Zambie étant le pays le plus touché. L’épidémie de la maladie a été précédée par de fortes pluies qui ont provoqué des inondations excessives dans les plaines du fleuve Zambèze. Les sols acides des plaines ont réduit le pH de l’eau et étaient considérés comme un facteur de risque associé au déclenchement du syndrome ulcéreux épizootique. Cependant, les épidémies ont ensuite été rapportées dans des zones agro-écologiques non acides. Une surveillance active couplée à une
Background

A mysterious fish kill was reported in Sesheke district of Zambia on the Zambezi River in November 2006. It was then suspected that fish died of chemical poisoning or anthrax contamination. Namibia and Botswana had similar experiences in October 2006 and May 2007, respectively. Subsequent samples of *Barbus poechii* and *Clarius gariepinus* from Lake Liambezi in Caprivi were sent to the epizootic ulcerative syndrome (EUS) laboratory in Thailand where it was confirmed that fish were dying from EUS (Samui *et al.*, 2007). Initial studies conducted on the Zambian side of the river implicated low water pH as the risk factor associated with EUS outbreak (Choongo *et al.*, 2009). On the contrary, recent EUS outbreaks on the same fishery have been reported upstream in non-acidic agro-ecological zones. This development warrants further epidemiological investigations.

Literature Summary

EUS is a disease characterized by red spots and ulcers on the fish skin. Since its outbreak, the disease has persisted, posing serious threats to fish production and the overall biodiversity of the Zambezi river which is one of the major fisheries of Zambia (FAO, 2009). Furthermore, over 2000 villages and some 700,000 people on the Zambian side of the Zambezi river are at risk of food insecurity because fish is the cheapest available source of protein (FAO, 2009) in addition to being the only source of revenue for many people in the rural districts.

Previously EUS has been reported in 24 countries in North America, Southern Africa, Asia and Australia; the most recent outbreak being reported in Zambia (FAO, 2009). According to Khan *et al.* (2002) the epidemiology of EUS is poorly studied in many affected countries. This research, therefore has been designed to determine the risk factors associated with EUS, susceptibility of first species to the disease, and disease distribution.

Study Description

The study will be carried out for 2 years, i.e., 2010 and 2011. During this period, the cold, hot and rainy seasons will be earmarked. Water will be sampled using the van don sampler.
from selected localities of the river basin to establish temperature, pH, alkalinity, salinity and *Pfiesteria*. The above parameters will be measured using the CS4-1200 multi-parameter gadget (Lind, 1985).

Active surveillance of the river will be carried out and seine nets used to catch 320 fish per selected location for species susceptibility studies. Captured fish will be separated by species and checked for lesions. Where lesions are not easily associated with EUS the fish is regarded as suspect and recorded independently as such, fish photographs, species and length will be taken. Lesions will be dissected, put in 10% formalin in labeled bottles. The length of 5 fish for each species without lesions will be measured. Any slow, sick-looking fish by the edge of water will be collected by scoop net and similar preservation as above. Seine and scoop nets will be dried in sun for at least 2 hours before next use. A visit to close fish markets will be done and fresh fish observed for lesions. Preserved specimens will be taken to the University of Zambia laboratory for histological confirmation (Baldock *et al.*, 2005).

Surveillance for EUS will be conducted in aquaculture facilities. At least 160 fish will be sampled and treated as for the river fish. Geographical distribution of EUS in the river will be assessed starting from the lower part of the Zambezi moving upstream. Besides active surveillance, a questionnaire for fishers and aquaculture farmers will be used to collect additional information about EUS. Rainfall and hydrological data will also be collected.

**Research Application**

Identifying risk factors will allow for the design of EUS control measures for the fishery. Bio security measures required to mitigate the spread of EUS especially in aquaculture facilities will also be put in place. An up-to-date status of EUS in Zambezi river will also be determined. The disease is a regional concern therefore information generated from the study will be shared with relevant stakeholders.

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