

Introduction

Food and agriculture are key to achieving the entire set of SDGs, and many SDGs are directly relevant to fisheries and aquaculture, in particular SDG 14 (Conserve and sustainably use the oceans, seas and marine resources for sustainable development). Nile tilapia (*Oreochromis niloticus*) is the foremost cultured species (FAO 2005). In 2014, the global tilapia production was valued at 4.5 million tons and is expected to surge to 7.3 million tons by 2030 (FAO 2014). Worldwide harvest of farmed tilapia has now surpassed 800,000 metric tons, and tilapia are second only to carps as the most widely farmed freshwater fish in the world. Specifically, Egypt represents over 90% of the commercial Arab aquaculture production and currently ranks second to China with regard to global tilapia output (FAO 2005).

Tilapia are a good fish for warmwater aquaculture. They are easily spawned, use a wide variety of natural foods as well as artificial feeds, tolerate poor water quality, and grow rapidly at warm temperatures. These attributes, along with relatively low input costs, have made tilapia the most widely cultured freshwater fish in tropical and subtropical countries.

Aquaculture production in Kenya is dominated by Tilapia which makes about 90% of the production. The production is done throughout the year mainly under semi intensive pond systems and cages. However intensive production in tanks and raceways is on the rise. As at the end of 2016 there were about 65,000 ponds (including tanks and raceways) covering about 2,500 Ha and 1,663 cages with a total volume of about 12,850m³. These production units are owned by about 67,000 fish producers. Majority of the fish ponds are operated by small scale, semi intensive farmers with 1-4 ponds measuring between 200m² to 300m². Majority of aquaculture farms are found in areas with moderate to high rainfall i.e. Nyanza, Western, Central Rift Valley, Eastern and the Coastal Region. Over 90% of the cages are found in Lake Victoria.

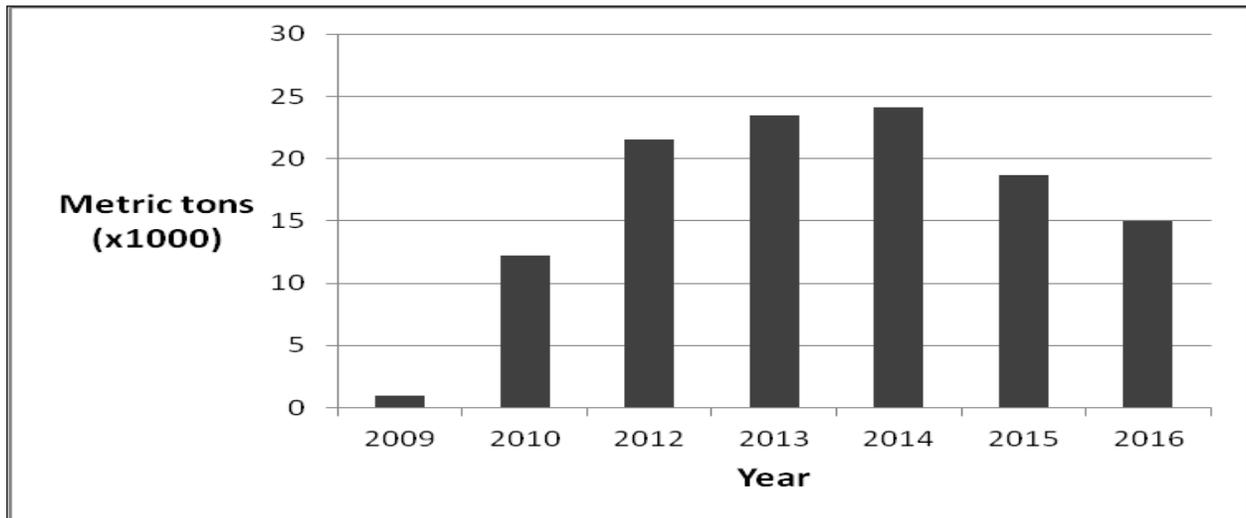


Figure 1 Kenya aquaculture production trends between 2009 and 2016, main species harvested from ponds and cages is Nile tilapia.

Oficina Internacional de Epizootias (Spanish: World Organization for Animal Health)



Fig 2: Map of Kenya Showing distribution of Water bodies, They include Marine (Indian Ocean) and Inland Waters; Lake Victoria, Lake Turkana, and Major Rivers (We need a better Map)

Species of fish farmed are:

1. Nile tilapia (*Oreochromis niloticus*)
2. African catfish (*Clarias gariepinus*)
3. Common carp (*Cyprinus carpio*)

Fish farms and Hatcheries are mainly concentrated in Western Kenya (around the Lake Victoria basin) and Central and Eastern (Tana river basin)

Producers are focused on three levels:

1. Cage fish production – Food fish or grow-outs
2. Pond fish either liner or earthen ponds – food fish
3. Hatchery - seed production

The three practices are at either semi or intensive levels of production and as carrying capacities rise, monitoring water quality gains in importance because fish becomes more susceptible to diseases.

Objective:

To strengthen aquaculture biosecurity governance, knowledge and capacities on TiLV pathology, diagnostics, surveillance, emergency preparedness and information dissemination through a National Action Plan as well as establishing networking support to aquaculture biosecurity and Aquatic Animal Health (AAH) management

Specific Objective will be to:

- Investigate presence or absence of TiLV in farmed and wild tilapia
- Develop mechanisms for Securing early detection of TiLV in the country
- Adopt farm level TiLV biosecurity and tilapia Best Management Practices (BMPs)
- Continue capacity building and training among stakeholders and participating institutions
- Maintain freedom of TiLV status in the country; surveillance

The Outcomes will be:

- Effective biosecurity governance through well-planned TiLV national action plans to reduce the negative impacts of the disease.
- Enhanced information and knowledge on good and effective aquaculture biosecurity and Aquatic Animal Health (AAH) management practices shared among participating institutions and fish farmers
- To Increase profitability to producers through increased healthy tilapia sold and consumed

This Plan of Action is based on the following strategic lines of action:

- a) Promote strong and accurate investigative mechanism or surveillance to ascertain the health status of a given population aimed at early detection and control systems

- b) Develop strategic disease diagnostic mechanisms for those tilapia showing signs of health deterioration
- c) Strengthen laboratory capacity to support diagnosis, surveillance, and maintain freedom of healthy animals to ensure they are not carrying subclinical infections.

The proposed strategic lines of action and objectives are in line with the **five strategic** lines of action and objectives of the FAO framework on TiLV: partnerships, technical support, and resource mobilization; surveillance, data collection, and formulation of policies; prevention and control of transmission; screening, care, and treatment; and a strategic research agenda. The adjustments hereby proposed are intended to achieve specific regional and country goals and targets in the short term (12 months).

The five strategic directions are:

- Information for focused action: know the presence or absence of TiLV epidemic and response – the “who” and “where”;
- Interventions for impact: defining an essential package of interventions – the “what”;
- Delivering for equity: identifying the best approaches for delivering services that ensure equity and quality – the “how”;
- Financing for sustainability: identifying sustainable and innovative models for financing TiLV responses – the financing; and
- Innovation for acceleration: addressing gaps that require innovative approaches – the future.

STRATEGIC OBJECTIVES AND ACTIVITIES

Strategy 1: Surveillance

Objectives:

- a) To detect the Presence or absence of TiLV in Kenya.
- b) To detect early signs of TiLV and take appropriate preventive and control measures in Kenya.

Activities

TARGET: Farmed and Wild Populations

- a) Tilapia from the Wild =
- b) Farmed Tilapia =

Diagnostics

Required to confirm or determine the presence or absence of a disease in the country.

- a) Laboratories available in the country are not competent to test TiLV.
- b) Fish Quality Control Laboratory in Kisumu to be used as a referral laboratory in Kenya for TiLV Testing.

Target Population

What is Population?

- a) Population refers to all fish species susceptible to TiLV in all stages of production in rivers, dams and lakes in Kenya and all imported farmed susceptible fish species in all stages of production.

Optimum Temperatures for TiLV

TiLV occurs mostly at water temperatures ranging between 22-32°C and the ideal water quality parameters for optimum growth and survival of the target fish species are elaborated in Table 1 and Table 2.

Table 1: Recommended water Quality Parameters for Hatcheries

Type of Hatchery	Parameters					
	pH	Temperature (°C)	Dissolved oxygen (ppm)	Nitrites (ppm)	Nitrates (ppm)	Salinity (ppt)
Fresh water prawns	7.0-8.5	28-30	>5.0	<0.1	<2.0	-
Marine shrimps	7.0	28	>5.0	-	<0.1	35
Finfish	6.5-8.5	28-30	>4.0	-	<0.1	-

Table 2: Recommended Water Quality ranges for Fresh Water Cultured Fish

Parameters	Cold water fish	Warm water fish
Temperature (°C)	14 – 17	22 – 32
Salinity (ppt)	0 – 25	0 – 25
Alkalinity/hardness (as CaCO ₃) (mg/l)	40 – 70	40 – 70
Ph	6.5 – 8.5	6.5 – 8.5
Dissolved oxygen (mg/l)	≥ 5	≥ 3
Phosphate (mg/l)	10 – 100	10 – 100
Unionized ammonia (NH ₃) (mg/l)	< 0.5	< 0.5

Suspect TiLV Case Definitions;

a) A TiLV Case:

A fish showing clinical signs similar to the ones associated with TiLV followed by mortality/death.

b) Suspect TiLV Location:

Refers to a location or country where one or more suspect TiLV fish have been found.

c) Confirmed Case:

A fish confirmed via Histopathology, viral isolation or PCR to be infected.

Sampling

The CA shall design and implement annual monitoring program for TiLV in fish from trans-boundary and inter-county lakes, rivers, dams and selected fish farms.

The frequency of sampling for TiLV Monitoring will at least twice per year.

Duplicate samples of fish shall be sampled from randomly selected cages/farms or sampling sites. The assumption here is that the samples drawn shall represent the same fishing grounds, same species and dietary habits

The samples will be handled aseptically and preserved appropriately until tested for TiLV.

Table 3:TiLV Monitoring Plan

Parameter	Matrix Analyzed	Frequency	Requirement
TiLV	Liver, Spleen, Brain,Kidney, Mucus, Blood, Gills	At least twice per year	Shall be Absent

During implementation of the sampling plan, the following shall apply:

- Samples shall be taken at farm level, on fish at all stages of farming including live fish imports.
- Samples shall be accompanied by sample submission forms (i.e. Documentary Evidence).
- Procedure for disease screening shall be adhered to and Screening of specific fish disease shall be done in accordance with the Animal diseases Act CAP 364.

The procedure for screening will include;

- a) Selection of diagnostic criteria for identifying infected or progeny at risk and development of a response plan.
- b) Tracking of sampled stock including progeny until screening results are received and reviewed.

Diagnostics/Testing

The following shall be conducted;

- a) **Gross Pathology or checking of Clinical Signs;**

Erosion of the skin, haemorrhage at the base of fins and opercula, scales protrusions, abdominal swelling, skin-darkening, gill pall or ocular alteration.

b) Histology;

Liver, Spleen, Kidney, brain...

c) Confirmatory Tests;

Samples shipped to a competent laboratory.

Data Management

A Data Base of the Technical Reports/Results/questionnaires shall be established.

TiLV Validation

This will be done by the CA and Experts in Aquatic Animal Health Diseases.

Fish Quality Assurance

- i) A National Surveillance Team (NST) Shall be established
- ii) Training of the NST on emergence and diagnosis of TiLV
- iii) Review of the Manual of Standard Operating Procedures to Include TiLV Monitoring
- iv) Review of the Laboratory Manual to include SOPs for TiLV.

Management Commitment

- i) Work plan
- ii) Financial commitment/support (i.e.cost of sampling, cost of laboratory tests, analysis of data...)
- iii) Employment and Training of competent personnel

Bio-security Plans in Farms/Cages

Every aquaculture facility shall have an effective bio-security program incorporating;

- a) Disease prevention,
- b) Disease monitoring,
- c) Management of disease outbreaks,
- d) Cleaning and disinfection between production cycles, and
- e) General security precautions.