Sustainable systems

Participatory evaluation of retaining cage in reducing post-harvest loss on Lake Langano

Getachew Senbete1 and Meseret Taye1,
1Zeway Fisheries Resources Research Centre P. O. Box 229 getachewsenbete@yahoo.com

https://doi.org/10.59411/qzpd4122

Contents

How to Cite:

Senbete, G. ., & Taye, M. (2023). Participatory evaluation of retaining cage in reducing post-harvest loss on Lake Langano. *Sustainable Systems*, *4*(1). https://doi.org/10.59411/qzpd4122

ABSTRACT

Fish post-harvest loss is one of the challenges in the fishery sub-sector of our country. Lack of appropriate technologies, poor infrastructure and handlings are some of the main causes for the elevated post-harvest loss. This experiment was conducted on Lake Langano during July 2006-June2007 with active participation of fishermen. The objective of the experiment was to evaluate the retaining cage in fish post-harvest loss on landing sites. Nine cages, having a volume of about 2m3 each were constructed and provided to fishermen using beach seine on the lake. Fishermen were given training on how to use the material before the commencement of the experiment. On average 150 kg of live fish was transferred to each net immediately from the beach seine end code to the retaining cage and set in the lake at the depth of 2m. During the experimental period, a total of 5990 kg of fish (entirely Oreochromis niloticus) was transferred to the cages and set in the water. After 13 hours on average 5919 kg of the fish was sold as fresh fish. Death recoded was 432.5 kg (7.2%) of the total fish but was still fresh and marketable, whereas total spoiled fish during the experimental period was 78.5 kg (1.3 %). Depth at which the net was kept, density, size of the fish caught, gear type, time and weather condition were observed to have effect on survival of the fish. In conclusion, this technology showed promising result in post-harvest loss reduction at the landing site and hence should be popularized among other fishermen.

Keywords: Lake Langano, lake fishery, post-harvest, Retaining cage.

1. Introduction

Fish are a rich source of high-quality animal protein, contributing over 15% of the world's total animal protein (FAO, 2004). Despite the abundance of fish resources and the high potential for aquaculture, animal protein intake in most African diets, including

Ethiopia, is insufficient, leading to health issues, especially among vulnerable groups like children and pregnant women (Van Eer et al., 2004). Fish, being a comparatively affordable protein source in Ethiopia, has the potential to address malnutrition. However, despite the estimated capture fishery potential of 60,000 tons annually (LFDP, 1997), the current consumption is reported to be less than 0.3 kg per person (FAO, 2003).

With a continuously increasing demand for fish, estimated at 85,000 tons recently and projected to rise to 120,000 tons by 2015 (ONAR, 2004), there is a growing need for aquaculture technologies to supplement capture fisheries. Additionally, reducing post-harvest losses is crucial, with Africa experiencing an estimated 40% loss of the total annual catch due to spoilage, breakage, unfit size, discard, and other processing-related losses (FAO, 1989).

2. Materials and Methods

2.1. Description of the Study Area

The study was conducted on Lake Langano, one of the rift valley lakes situated 190 km south of Addis Ababa. The semi-arid region experiences an annual rainfall ranging from 600-800 mm. Lake Langano covers an area of 241 km2 with a mean depth of 17 m. It receives water from the Arsi highlands through small streams such as Lephis, Gedemso, Sedesedi, Gerebula, Meti, and Tuffa. The lake's overflow joins Lake Abijata through the Horakalo stream.

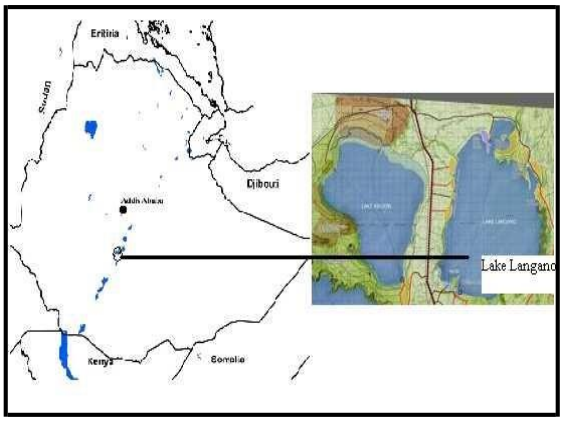

Fig. 1. Map Showing the Location of Lake Langano

Lake Langano, distinguished for its tourism, pristine beachfronts, and high-quality resorts, has gained recognition as a source of fish. Recent studies reveal that commercially important fish species in the lake include Oreochromis niloticus, Clarias gariepinus, Carp, and Barbus species, with O. niloticus dominating (Lemma Abera and Getachew Senbete, 2009).

2.2. Methods

Six oval-shaped cages, constructed from a 1cm2 mesh net (see Fig. 3), each with a volume of 2m3 and a metal ring on the inner wall, were used in the study. Fishermen were trained on how to use the retaining cage. Harvested fish were immediately transferred from the beach seine to the retaining cage while it remained in the water. The cage, with the fish, was anchored at a mean depth of two meters. The experiment, conducted during the dry season from January to April, involved keeping fish in the water for varying durations and at different sites of the lake.

3. Results and Discussion

During the experiment, 5990 kg of tilapia were transferred to the cage from 66 beach seine settings. After an average of 13 hours, 5919 kg of fish were sold as fresh marketable fish. Recorded deaths amounted to 432.5 kg (7.2% of total fish), but these fish remained fresh and marketable. The quantity of spoiled fish (discarded) during the experimental period was 78.5 kg (1.3%). This discarded amount (1.3%) was deemed small compared to the recorded post-harvest loss, which exceeded 30%% (Yared Tigabu *et al.,* 2006).

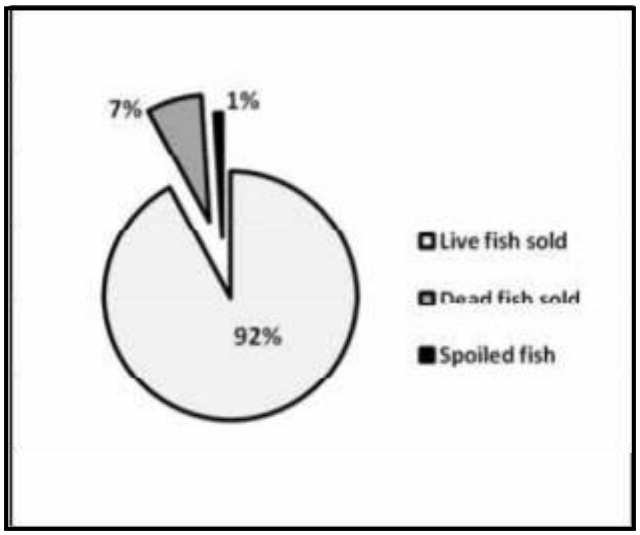

Fig. 2: Percentage of Spoiled, Dead, and Live Freshly-Sold Fish

The retaining cage demonstrated several advantages based on feedback from fishermen in comparison to their previous practices. Firstly, it maintained fish weight and kept the fish alive and fresh, contrasting with dead fish kept at the shore. As a result, fish from the retaining cage had higher market demand and commanded better prices due to their freshness and minimal weight loss. Secondly, when fish is harvested and stored at the shore, various factors contribute to losses beyond spoilage, such as theft, predation, and scavenging birds. Thirdly, materials from retaining cages, in comparison to fish kept at the shore, encountered fewer hygienic problems, leading to improved food safety.

Fig 3: Fishermen Selling Fish from Their Retaining Cage

Fishers reported that various factors influenced the retaining time of the fish in the cage. The depth at which the net was kept, the size of the caught fish, fish density, and weather conditions were observed to impact fish survival. Shallow areas, where water easily heated up, were not suitable for the experiment as low dissolved oxygen levels in the warm water led to faster fish mortality. Extremely deep areas with high currents caused mechanical damage to the fish. Larger fish demonstrated higher survival rates compared to smaller fish, possibly due to their greater competence for space. This encouraged fishermen to selectively keep bigger fish and release smaller ones.

Overall, fishermen rated the cage as the best material for reducing post-harvest loss at the landing site. The difficulty in keeping harvested fish fresh for more than 6 hours under traditional care highlighted the significance of the retaining cage. Consequently, this material could be employed by private resorts and hotels in areas like Langano to serve their customers with fresh, live fish.

References:

- FAO (2004). Training series. Simple methods for aquaculture. Management for freshwater fish culture. 21/2; fish stocks and farm management.
- FAO (2003). Fishery country profile of Ethiopia. FID/CP/ETH. Rev. 3. Link
- FAO (1998). Fish utilization and marketing services. Responsible fish utilization.
- Lemma Aberra and Getachew Senbete (2009). Spatial and temporal variation of Fish Communities in Lake Langano.
- Lake Fishery Development Programme (1987). Unpublished document.
- ONAR (2004). Fisheries Resource Development Plan Study. African Development Fund.
- Van Eer, A; van Schie, T, and Hilbrands, A. (2004). Small-scale freshwater fish farming (Second Edition). Agromisa Foundation, Wageningen.
- Yared Tigabu, Abera Degebasa, and Ahmed Mohamed (2006). Kinds and levels of post-harvest losses and the possible ways to reduce the losses in Lake Ziway. Ethiopian Society of Animal Production. Addis Ababa. pp. 141-148.