

The Status of Tilapia Aquaculture in Lake Sebu, South Cotabato

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Abstract

Tilapia culture in Lake Sebu started in the early 1970's and is now considered the backbone of the economy and major driving force of the development of the Municipality of Lake Sebu. About 19% of Lake Sebu's 354 ha water area is used for aquaculture. The present tilapia production system is not as intensive as in other lakes in the country. The daily 3-ton tilapia harvest is marketed in the different towns within the province and in neighboring provinces. Municipal Ordinance 01, Series of 1994 regulates fish cage establishment within the lake. The local government unit launched a semi-annual 'Oplan Linis', a clean up operation to remove floating debris, water hyacinth, and other vegetation along the lakeshore. Reforestation has been implemented as part of the watershed management program. For centralized marketing and effective collection of revenues, a fish port was opened in January 1997. The tilapia industry in Lake Sebu is now confronted with several setbacks. Poor-quality seeds require a longer culture period and, despite higher inputs, still result in low production. Fish kills, locally termed 'kamahong', are becoming more frequent and devastating. Market competition is another problem. Producers of intensively fed tilapia from Lake Sebu have to contend with a large volume of unfed and low priced tilapia from Lake Buluan (Lutayan area).

Introduction

Lake Sebu ($6^{\circ} 10.45' N$ and $124^{\circ} 43.95' E$) lies about 700 m above sea level and is located in the mountainous but peaceful Municipality of Lake Sebu, South Cotabato. S'bu is a T'boli term which means water and the municipality was named after it. The lake has a water area of 354 ha with a maximum depth of 57 m at the center and 5 m on the average near the shoreline (Socio-economic Profile 1995).

The first tilapia introduced in the lake was Mozambique tilapia *Oreochromis mossambicus* brought by Mr. Cesar Freyra in 1956. A few years after its introduction, the tilapia grew in number. In 1972, a fish pen project was initiated by Dr. Jose Velasquez from Manila. Many Ilongo immigrants followed him (Dongon 1994). Almost in the same year, farming of tilapia in fish cages was introduced by Mr. Freyra. Nile tilapia *O. niloticus*, a better species, was introduced in the mid 70's. The Nile tilapia was cultured for 4 months without supplemental feeding and harvested when they reached 300-500 g each. The tilapia industry grew fast and is considered today as the backbone of the

economy and the major propeller of Lake Sebu's development. The industry contributes more than 50% of the annual municipal income and employs 10% of its total labor force (Loco 1994).

Tilapia Aquaculture in Lake Sebu

Two types of fish cages are used in Lake Sebu: the floating type used in deep areas and the fixed type in shallow areas mostly near the shoreline. Cages are made of polyethylene net mostly of sizes 17 (CC), 14 (GG) and 12 (HH). Cages range from 9 x 16 m to 10 x 25 m. On the average, a cage has an area of 200 m² and a depth of 3-5 m. Big bamboo poles are widely used as cage frames and floats. Although more economical in the long run, empty plastic carboys as floats and wooden planks as catwalk are being used by a few fish farmers because the initial capital outlay is costly.

Stocking rates are quite low compared to those in other lakes in the country. Stocking rates range from 12 to 25/m². Usual stocking size is 5-10 g. Nile tilapia of sizes 22 (DD) and 17 (CC) sell at P0.13-0.15 and P0.20-0.25 each, respectively. Tilapia seeds are procured from hatcheries in the municipalities of Banga, Surallah, Norala and Marbel, all in South Cotabato. A few cage operators have established hatcheries along the lake shore for their own use. The seeds are reared to a size of 5-10 g before they are transferred to grow-out cages.

During the early stage of the tilapia industry in Lake Sebu, feeding was not practiced, but the fish reached the marketable size of 300-500 g after 4 months of culture. The proliferation of fish cages in the 80's depleted the natural food and forced the farmers to give supplemental diet to their culture stocks. Finally in the mid-80's, complete diets were given. Most cage operators do not follow a good feeding program. Feed ration is based on estimates, which result in either under- or overfeeding. Only a few follow a daily feeding rate of 3-5% of body weight. Majority of the farmers rely on commercial pellets but some formulate their own feeds. Even with complete feeds, one cropping period lasts 5-6 months, or even 8 months. Seldom do stocks reach marketable size in just 4 months, unlike how it was 15-20 years back. The longer the culture period, the higher is the cost of production.

At present, 66 ha of the 354 ha lake area is already used for aquaculture. Nile tilapia is the only species being cultured. There are 358 cage operators (Hechanova, pers. comm.) operating about 5,000 cages in the lake. A cage can produce 600-800 kg tilapia per crop.

Marketing System

Harvesting of tilapia is normally done very early in the morning. Harvested fish are then categorized into size classes as follows: big (1-4 fish/kg); medium (5-6 fish/kg); small (8-9 fish/kg); very small (11-12 fish/kg); and assorted (13-15 fish/kg). The prevailing farm gate prices agreed by both the producers and the wholesalers are P34, 32, 28, 22, and 15/kg, respectively. The producers sell their fish to the wholesalers, who in turn, sell to the retailers. Finally, the retailers sell the fish to consumers in the marketplace.

For centralized marketing, the local government established a fish port, one of four proposed, in January 1997. This fish port aims to (a) control the movement of outgoing tilapia from Lake Sebu, (b) effectively collect revenues, and (c) establish uniform size classification of tilapia.

About 3 tons of tilapia are harvested daily and distributed to the different towns of South Cotabato and neighboring provinces including General Santos and Davao. Attempts to market tilapia in Manila, where the price is significantly better than in the local market, encountered problems in the transport of the product (A. Estares, pers. comm.).

Lake Conservation and Management

The local government of Lake Sebu (the municipality) has adopted several measures to protect and conserve its water resources. Reforestation is implemented as part of watershed management. Municipal ordinance No. 01, S. 1994 sets guidelines for the establishment of fish cages in the lake. This ordinance requires a 20-m wide passageway along the lake shore for any type of water vehicle. Construction of cages in this area is prohibited. Beyond the 20-m passageway, a 100-m wide belt offshore is allowed for fish cages. Lastly, 10 m is apportioned for the construction of secondary fence. A 2-m wide passageway is required between farms. The remaining central part of the lake is a free fishing zone.

Fish sanctuaries are established within the lake. Fishing is strictly prohibited in the fish sanctuaries.

The local government also conducts a semi-annual 'Oplan Linis' to clean up floating debris, water hyacinth and other vegetation along the lake shore. In 1996, Lake Sebu was adjudged the cleanest lake, both in the regional and national levels, during a search for the cleanest and greenest inland bodies of water in the Philippines by the Department of Interior and Local Government. The municipality also implemented lake zoning to regulate establishment of fish cages in the lake. This program designated fish cage belts within the lake.

Problems of the Industry

The tilapia industry in Lake Sebu is confronted with several setbacks. Source of good quality and fast-growing strain of Nile tilapia is a problem common to fish farmers in the lake. Longer culture period inspite of intensive feeding is indicative of poor quality stock of tilapia. The declining fish production and the prevalence of physical deformities are signs of deteriorating genetic make-up.

Mass fish kill is considered as the number one problem of the tilapia growers in Lake Sebu. It is locally known as 'kamahong', a T'boli term meaning 'surfacing'. This phenomenon has occurred since the 1960's but not as frequent and devastating as in the last few years. In the past, fish kills occurred only during the rainy months (September - December), but recently, they have occurred within any weather disturbance. Three to four days of rain showers with no appearance of the sun may generate a 'kamahong'. The estimated losses of the 121 operators with 171 fish cages during the November 1996 fish kill amounted to 17 million pesos, mostly harvestable tilapia. Beniga (1996)

suggested that 'kamahong' was caused primarily by dissolved oxygen depletion after recording a 0-0.1 mg/l of oxygen in the water during its onset. Fish cage operators are helpless about 'kamahong'.

Marketing is another problem of the industry. Prices of commercial feeds continue to rise while the price of tilapia in the market has been very stable. Tilapia prices in Cotabato are quite low compared to other regions in the country. Moreover, Lake Buluan, particularly Lutayan, is now producing a large volume of good-size tilapia from fish cages without commercial feeds. There is a strong price competition in the market. The intensively fed tilapia in Lake Sebu can be sold only at a break-even price (to cover the high cost of production) because the unfed tilapia from Lake Buluan brings down the price of the fish. Both lakes are producing comparable volumes of fish daily, and markets in Cotabato and Davao are now flooded with tilapia.

Recommendations

To address the problems and to overcome constraints to development of tilapia industry in Lake Sebu, the following are recommended:

- Hatchery operators in the lowlands must upgrade their stocks through acquisition of genetically improved and fast-growing strain of Nile tilapia;
- Cage operators should be given intensive training in cage farming together with the establishment of demonstration farm as a show case of the technologies;
- The government (local, provincial, regional and national) should assist in establishing potential market for the fish; and
- A limnological assessment of Lake Sebu is strongly recommended to assess the biological, physical and chemical properties of the water.

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