



After Sinarapan: The Planned Small-Scale Fish Cage Industry of Lake Buhi

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This report presents the dramatic turnaround of the fishery in Lake Buhi after the depletion of sinarapan, *Mistichthys luzonensis* (see "Fishery management in Camarines Sur, Philippines: Why sinarapan almost disappeared from Lake Buhi," ICLARM Newsletter, July 1981, p. 3-5).

In the early part of 1979, the Buhi fishing industry was in great distress. The commercial sinarapan fishery had been effectively exhausted, eliminating the

major source of livelihood for approximately 200 subsistence fishermen. Some of the displaced fishermen switched to other fishing gears such as tambong (movable fence-like fish trap) and gill net while still others tried farming to support their families. The price of fish rose by a staggering 80% that year, and on many days a definite fish shortage was felt. It was then that the Bureau of Fisheries and Aquatic Resources (BFAR) decided to test the feasibility of cage culture of tilapia in the lake.

Amazing Growth of the Industry

The first cages were erected in June that same year. Success attended this pilot project. Fishermen soon became fish culturists, encouraged by the BFAR experiment, the success of others and the Mayor of Buhi.

Surveys carried out since then showed an amazing growth in the number and size of fish cage projects.

In August 1980, the fish cage industry was supplying 132 kg/day to the Buhi market. This was 80% of all tilapia and 26% of all fish sold there. As of June 1981, almost 43% of all fish in the Buhi market was from fish cages. This is not to mention the amount of fish taken from cages and brought straight to the dining table, since approximately 20% of the cages were maintained only for family consumption.

Studies in September 1980 showed the proper stocking rate for tilapia in cages with minimal supplemental feeding was 50-70/m³. Under these conditions, the tilapia (*Sarotherodon mossambicus x niloticus*) grew from an average 3.5 g to an average 91 g in 4 months. Those data became the basis for recommendations to cage operators around Lake Buhi.

There were 337 cage owners in Buhi as of June 1981 with an average of 3 units of 20 m² each. More than 170 of the owners were farmer-fishermen. The remainder were a mixture of government employees, businessmen and farmers. The cage size per owner ranged from 300 m² to less than 10 m², with an average of 60 m². The average capital investment per owner was only P450.

For the first 6 months of 1981, tilapia stabilized at P10/kg in Buhi. In the pursuit of higher prices, much greater amounts of fish were being brought out of Buhi to Iriga, Nabua and even Polangui. Based on an August 1980 survey of women vendors going to Iriga, 200 kg/day of tilapia is being taken out of Buhi; i.e., at P10/kg, in one year the cash inflow to Buhi is more than P700,000 (\$79,545), which is equal to the total yearly income of many a Philippine town.

Fish pens at Lake Buhi (above) constitute part of the planned management of the lake's fishery (map, opposite page).

Problems of the Industry

As of June 1981, 92 applications for loans under the Biyayang Dagat Program of the National Government had been filed with the Rural Bank of Baao, Camarines Sur by cage owners seeking to increase the size of their projects. The bank is requiring, quite reasonably, that a marketing system be set up in advance to ensure that the large volume of fish to be produced is distributed to places where it can be sold.

Further growth of the industry is hampered by other problems (here listed in the order of importance): shortage of fingerlings, theft, fish kills, confusion as to the legal status of fish cage operations, lack of organization, coordination of marketing and competition for cage sites.

As of June 1981, more than 35% of the cages were either understocked or had no fish at all. The estimated demand in one year for the current level of operation is 3 million fingerlings. This is more than the total yearly targeted production of 2.2 million fingerlings by the Buhi Freshwater Demonstration Fish Farm run by BFAR and which, as a matter of policy, supplies fingerlings mainly to fish pond operators and rice-fish culturists.

The sulfur upwellings (canuba) are a natural problem. The most severely affected site is the outlet of the lake at Tabao and Buenavista. Canubas most commonly occur after a period of hot, windless weather when a fast, heavy rain or strong winds cause movement of the water at the bottom of the lake. As such, canubas can easily be predicted. And as long as the tilapia are free to come to the surface and gulp air, very few die.

Solutions and Prospects

To prevent theft, cage owners have organized into small-scale cooperative projects, of which 15 are existing, surrounded by large fences and guarded constantly. The local government is working hard to organize operators into small groups to prevent conflicts arising from claims on areas and to reduce the

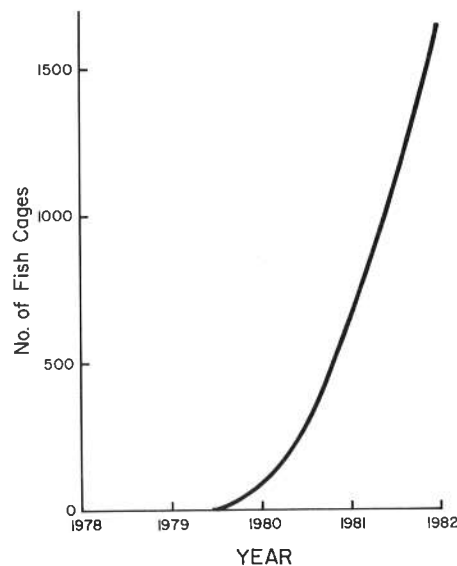
incidence of theft. Maps have been made dividing fish cage areas into numbered plots and made available to local residents.

Buhi town officials feel that fish cages are the hope for the low-income families of Buhi. They wish to discourage big businessmen from leasing large areas for their exclusive use, and are very interested in limiting the size of cage projects to less than 2,000 m² per person.

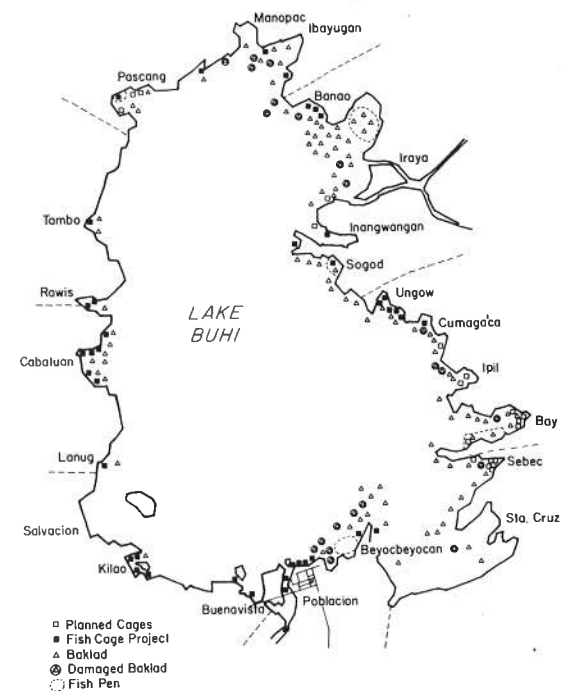
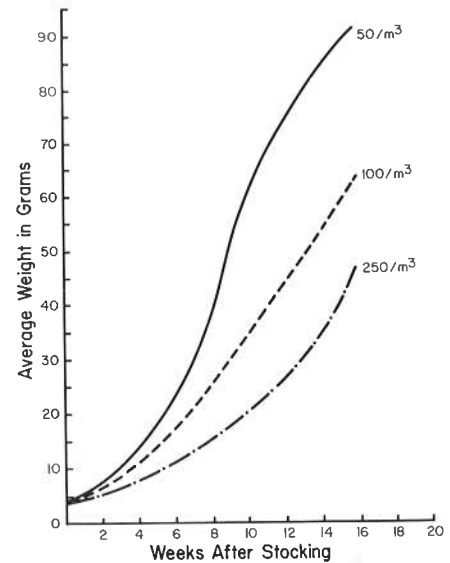
As of June 1981, there were 1,050 cages covering a total area of only about 2 ha. With the lake's size of about 1,800 ha, there is a lot of room for expansion.

The legal status of fish cages in Buhi is very important now because of the start of the National Irrigation Administration (NIA) project at the mouth of the Buhi River, which will directly affect over 100 small operators in barangays Tabao and Peñafrancia.

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From sinarapan of both commercial and tourist appeal (top, opposite page) to tilapia (below, right) of economic importance, Lake Buhi fishery has dramatically been transformed. There are management lessons to be learned here aside from the purely statistical (growth of the fish cage industry, above; growth of tilapia in weeks; data from 3 cages: top of page).



BFAR Regional Office No. 5 is now preparing a Fisheries Administrative Order to cover the licensing of fish cages. This is commendable. In addition, there should be a mutually beneficial arrangement made between the cage operators on one hand and the NIA on the other regarding affected cage projects. There should also be instituted a working partnership between the municipal government of Buhi and BFAR in the regulation of the fledgling fish cage industry of the lake to ensure full and equitable development.◊

