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# Managing Laguna Lake for the Small Fishermen\*

Flor Lacanilao

The conflict of interests between small fishermen and commercial fishpen owners in Laguna Lake has spawned serious ecological, social, economic, and political problems. Fighting over the fishery resources of the lake are the community of poor fisherfolk numbering more than 15,000 families and the group composed of a few hundred rich fishpen operators.

This seems to be an unequal confrontation in terms of the camp size of the protagonists. But the fishpen owners are a potent and very influential bloc. In a report published in the newspapers recently, the Laguna Lake Development Authority (LLDA) identified an elite group of operators owning 10 of the largest fishpen areas on the lake totalling more than 4,000 hectares. The list showed members of prominent families, including politicians and ranking military officers.

The law says that no person or corporation can own more than 50 hectares of fishpen concessions. According to the LLDA, however, influential investors managed to circumvent the regulation by putting up interlocking corporations actually controlled by the same people.

The LLDA report said that close to 14,000 hectares of the illegal fishpens have been dismantled since 1986, and that the demolition of the remaining questioned structures on 4,000 hectares

is now under way. This is undoubtedly a positive regulatory measure to arrest the dominating presence of commercial fishpens in the lake. However, the issues involved have still many facets and implications to be resolved.

Central to these issues is fisheries. Thus, focus should be given to scientific data, management techniques, and other relevant information on the subject.

## *Fisheries in Laguna de Bay*

Proper management of the lake's natural resources should ultimately redound to improved livelihood for the small fishermen. Corollary to this is the maintenance of a water quality acceptable for irrigation and water supply purposes.

The economic plight of more than 15,000 lakeshore families dependent on fishery is mainly attributable to the unregulated proliferation of commercial fishpens. Data show that in 1982 fishpond operators produced 62,000 tons of fish from their total concession area of 31,000 hectares, while the open waters yielded only 19,000 tons for the small fishermen.

Way back in 1961-1964, or during those years when there were no fishpens, the annual catch amounted from 80,000 to 82,000 tons. In terms of production, therefore, the lake yielded virtually the same harvest over time. What the introduction of fishpens did was rob the municipal fishermen of their traditional catch by limiting both the area where they can fish and the

volume of wild species that thrived in the lake.

This discrepancy wherein the small fishermen had to settle for a fourth of their former catch was inevitable because the milkfish in pens must feed on natural food in the lake and so compete with native fishes in the open waters. Thus, the natural stocks became less and less through the years and the fishermen have to put more effort in catching them.

The fishpens have also deprived the shrimps and molluscs in the lake of their food budget. This adversely affected the small-scale industries which use these products and provide livelihood for many lakeshore families. In addition, the fishpens contributed to the deterioration of the lake's water quality and obstructed the navigation channels.

## *Capture Fishery*

Prior to 1970, fisheries in the lake consisted only of open-water fishing. Sometime that year, however, fishpens were introduced and later became the dominant fishery activity.

As earlier mentioned, the annual production of finfishes was 80,000-82,000 tons in 1961-1964. For shrimps and molluscs, it was about 240,000 tons. The bulk of this catch was used for animal feeds, mainly by the duck-raising industry.

There were 23 species of fish caught in Laguna Lake, with the goby (*Biyang-puti*) and perch (*ayungin*) as the dominant species. These fishes, however, have a relatively low market value. Carp

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\* Based on a study (Laguna de Bay: Problems and Options) by Jon Davis, Flor Lacanilao and Alejandro Santiago published by the Haribon Foundation as "White Paper No. 2", April 1986. Dr. Lacanilao is the Chief of the Aquaculture Department of SEAFDEC.

(*karpa*), catfishes (*hito* and *kanduli*), snakehead (*dalag*) and tilapia were also found in the lake in addition to migratory species from Manila Bay which came via the backflow of the once unpolluted Pasig River.

In 1968, a survey showed that some 8,000 full-time and 2,000 part-time fishermen used the lake as a communal fishing ground. They employed 43 different types of fishing gear, the most common of which were the traps (*baklad*), gill nets (*pante*), and push nets (*sakag*).

### Fish Culture

A United Nations-sponsored fishery study in 1968-1970 took note of the low market price of the dominant fish species in Laguna de Bay and recommended the introduction of quality fish for propagation. Following this recommendation, LLDA in 1970 initiated fishpen culture in a 38-hectare pilot project at Looc in Central Bay.

Milkfish (*bangus*) was chosen as the cultured species because of its popularity and good market value. *Bangus* was also an ideal fish for another practical reason. This is the fact that it feeds directly on phytoplankton which was plentiful in the lake.

The pilot project yielded very encouraging results, particularly the finding that fish production can be increased 3.5 times over that in open waters. It proved that *bangus* culture in Laguna Lake was a profitable enterprise that can be sustained purely with the use of the natural food (phytoplankton) present in the lake. This prompted businessmen and entrepreneurs to go into fishpen culture which then spread out rapidly.

By 1982, 31,000 hectares of the lake, or one-third of its total area, have been converted into fishpen sites. This excessive growth of the industry proved counter-productive as the milkfish then took more time to mature because

of the increased competition for food. The four-month rearing period had stretched to 8-15 months. Meanwhile, the catch from the remaining two-thirds of the lake open to the small fishermen dwindled to one-fourth of the 1961-1964 production.

Two misconceptions have to be pointed out with respect to fishpen culture. First, that milkfish feeds on phytoplankton which is not utilized by the native fishes. This is not entirely true. The native species actually depend on the phytoplankton indirectly by feeding on the organisms that consume phytoplankton.

Secondly, to emphasize the increased yield in fishpens compared to open-water fishing is misleading. Water circulates in and out the fishpens, bringing in food and at the same time taking out wastes to the detriment of the open-water fishes. Even then, the fish production data in 1982 placed the catch from the fishpens at 62,000 tons and from the communal fishery at 19,000 tons, or a total yield of 81,000 tons. This was clearly equivalent to the yearly catch in 1961-1964 when there were no fishpens in the lake.

Moreover, the following problems that accompanied the proliferation of fishpens should be considered:

— Aside from the reduced catch that prejudiced over 15,000 families of small fishermen, others engaged in shellfish collection and duck-raising also suffered.

— In 1985, supplemental feeding for cultured fish added about 22 tons of nitrogen into the lake which degraded its water quality.

— Congestion of fishpens obstructed water circulation and favored the growth of water hyacinth which thrives in calm water; such hindered navigation, especially on the part of the fishermen.

— Access to open waters became difficult for the small fishermen, which led to open antagonism between the fisherfolk and the pen

operators that on several occasions resulted in the death of a number of fishermen.

Fish cultured in Laguna de Bay thus requires the development or emphasis on ecologically sound fishpen technology. This technology should ensure the longevity and sustained productivity of the lake ecosystem. It must be compatible with traditional capture fisheries. Unless these conditions are met, the imperatives of ecological stability and social equity compel the alternative of phasing out the fishpens from the lake.

### Physical and Biological Features of the Lake

The characteristic food chain in the lake is made up of phytoplankton, zooplankton, snails, shrimps, and fishes. Phytoplankton, composed of microscopic plants, is the basic component and whose amount determines the level of the lake's food production.

These minute plants multiply only in the presence of light and nutrients such as nitrogen and phosphorus. Under turbid conditions, light cannot penetrate the water and so even with large amount of nutrients, phytoplankton production would be low.

Thus, the production of phytoplankton varies during the year, depending on the weather. When the wind is strong during the months of December to February, turbidity is high. The wind induces the suspension of bottom sediments which limit sunlight penetration (mean depth is 2.5 meters).

From March to May, lower wind velocity decreases turbidity. This promotes light penetration that stimulates phytoplankton growth. The limiting factor is nutrient (nitrogen). Also, when temperature rises at this time of the year and due to lack of rainfall, lake evaporation exceeds inflow, putting the lake level at its lowest by the end of the season. The lake waters may fall below sea level,

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## INTRODUCTION TO . . . (from page 7)

eye to opercular edge; one brown stripe present obliquely on lower part of cheek.

Remarks: Common size 25-30 cm TL; common in market.

In four issues of this series, An Introduction to *Lapu-lapu* (*Epinephelus*) of the Philippines (Kohno, 1986, 1987a and b, and the present paper), a total of 18 species of *lapu-lapu* was described with photographs. Some of those species are important for fisheries and aquaculture activities. Despite the abundance of *lapu-lapu* in Philippine waters, little is known on its fishery biology because of lack of knowledge on species identification. Regarding its aquaculture, on the other hand, the present practice is to culture mixed *lapu-lapu* species. Thus there is no scientific basis on its culture. This situation is also caused by the scarce taxonomic information on *lapu-lapu*. As mentioned earlier (Kohno, 1986), the author attempted to distinguish *lapu-lapu* species by its color pattern. This report is not complete, however, because some species have not been presented here. But, hopefully, the information presented in this series would be useful to fishery/aquaculture scientists and operators. It is also hoped that this series would motivate further development in the fields of fishery and aquaculture of *lapu-lapu*. □

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## MANAGING LAGUNA. (from page 4)

thus permitting the entry of salt-water which further reduces turbidity and causes more phytoplankton multiplication.

The period from June to November is characterized by low wind velocities, except during typhoons. Maximum lake level occurs in September-November and differs from the minimum level by about 1.7 meters.

### Management Techniques

The primary objectives of managing the lake for fisheries rest on both social justice and environmental considerations. The lake must yield adequate products and services that will improve the livelihood of small fishermen and their families. At the same time, the lake's water quality must be protected against pollution so that the fresh water can be safely used for community water supply, irrigation, and other purposes.

### Species Introduction and Seeding

One management technique concerns the practice of introducing species to fill up vacant niches or replace undesirable fishes. For this purpose, the species to be preferred are those that will not breed uncontrollably in the lake, such that it would be easy to prevent their establishment in case they turn out to be harmful species.

Selection of species should be done with great care, including close study of their feeding and breeding habits. The introduction of black bass in Caliraya Lake some years ago is an object lesson. This species is a voracious carnivore that practically wiped out the once abundant native fish population which served as staple food fish for the lakeshore people. Today, the black bass is only important to sportsmen who annually gather at Caliraya Lake for fishing tournaments.

Fishery management would also involve seeding in order to supple-

ment the natural stock of desirable species that do not reproduce fast enough to stabilize regular production. In Laguna Lake, this method would be particularly needed after the excess fishpens are removed. It would restore the local fish population that has been decimated by the proliferation of fishpens.

Continued stocking with native or introduced species would require the establishment of government hatcheries around the lake. Just recently, the LLDA has inaugurated a hatchery and nursery complex in Calauan, Laguna. Research institutions, such as the Southeast Asian Fisheries Development Center (SEAFDEC) Aquaculture Department with its Binangonan Freshwater Station along Laguna de Bay, can also help develop breeding techniques for operation of fish hatcheries.

### Government Regulation

By far, the most crucial system of management is government regulation. In advance countries, strict government control measures on water discharge ensure that water quality in lakes and rivers is always adequate to support fish life.

Other forms of fishery regulation are those related to controlling the type of gear used, closed fishing seasons, and prohibited areas. Large commercial ventures should be banned from fishing in the lakes. These regulations give fishes a favorable environment for completing their reproductive cycle in a sustained manner.

In the watershed areas, pollutive activities should be placed under control. Industrial effluents, municipal and agricultural wastes must be prevented from contaminating the lake waters. Logging activities in the watershed should be stopped or be subjected to very strict control.

Designed to prevent the intrusion of saline and polluted waters from the Pasig River to Laguna

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## AQD researchers win memorial award

SEAFDEC AQD researchers C. Baticados, R. Coloso and R. Fernandez won the best paper award sponsored by the Dr. Elvira Tan Memorial Awards.

The paper titled "Studies on the chronic soft-shell syndrome in the tiger prawn, *P. monodon*" was selected the best paper in the Aquaculture/Inland Fisheries Category.

The paper was cited by evaluators for its overall quality, scientific contribution and economic significance.

The awarding ceremonies was held last July 14 at the Philippine Council for Agriculture and Resources Research and Development (PCARRD) at Los Banos, Laguna.

A cash prize of P5,000 and plaque of distinction was awarded to the authors. □

## MANAGING LAGUNA...

(from page 8)

Lake, the Hydraulic Control Structure constructed at the confluence of the Pasig-Marikina Rivers, as well as the Mangahan Floodway, should be under an appropriate government agency that would further evaluate their relative adverse and beneficial effects.

### Research Needs

The combined impact of the various uses of the lake, such as for fisheries, irrigation, water supply, and transportation, must be examined in detail. Here, government policies must be based not only on scientific facts, but should also consider the socio-economic and political factors. In view of the complex scientific evaluations that the tasks require, computer modeling could prove extremely useful.

### Influencing the Fishermen

An educational campaign should be a continuing aspect of lake management. The fishermen must be taught and informed of the reasons for adopting or implementing the management techniques needed.

As a concerned management expert puts it: "Effective fishery extension is one of the most important aspects of all fisheries management, for in this way the fisherman himself can be encouraged to participate in the rational use of the stocks he exploits for his own as well as for the common good." □



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