

The Sustainable Fisheries Management Program for Lake Mainit

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Lake Mainit is an important shared resource of Agusan Norte and Surigao del Norte, distinguished as the deepest (219.35 meters) and fourth largest (17,060 ha) lake in the Philippines, with a shoreline of 62.1 km long and a watershed area of 87,072 ha. Twenty-eight river tributaries contribute to the water volume of Lake Mainit, which is drained by a single outlet – the 29 km Kalinawan River that flows into Butuan Bay.

A study conducted in 1985 by Galicia & Lopez (2000) showed that Lake Mainit supports a high diversity of aquatic fauna and a thriving freshwater fishery. On the other hand, the lake and river fisheries are rapidly being depleted due to unsustainable or destructive fishing practices, too many fishers, fishing boats and gears, and lack of enforcement of fisheries and environmental policies. Income from fishing is no longer sustainable in many areas, and lakeshore communities fear that rare and endemic fishes in the lake will be lost due to overfishing.

Lake Mainit has rich aquatic resources that can be developed to optimize economic benefits to surrounding communities, however, fisheries management interventions are necessary in order to conserve the lake resources, protect remaining biodiversity and sustain incomes of fishers. The last comprehensive assessment was done 25 years ago (Pauly et al. in 1980-81), and effective planning depends on reliable and updated information to guide decision-making and the formulation of a holistic and integrated framework for sustainable fisheries management.

The “Sustainable Fisheries Management Program for Lake Mainit” is a project implemented by the Mindanao State University at Naawan in three phases over a period of three years that started in July 2007. The long-term goals of the project are to establish a comprehensive fisheries management program to sustain its fishery resources, promote equitable access and utilization, and improve quality of life of lakeshore communities through enhanced economic well-being. Among the specific objectives of the project are to a) updated data on aquatic biodiversity of Lake Mainit, b) generate a comprehensive profile on status of the lake and riverine fisheries, c) provide an updated socio-economic profile of fisherfolk around the lake, and d) identify &

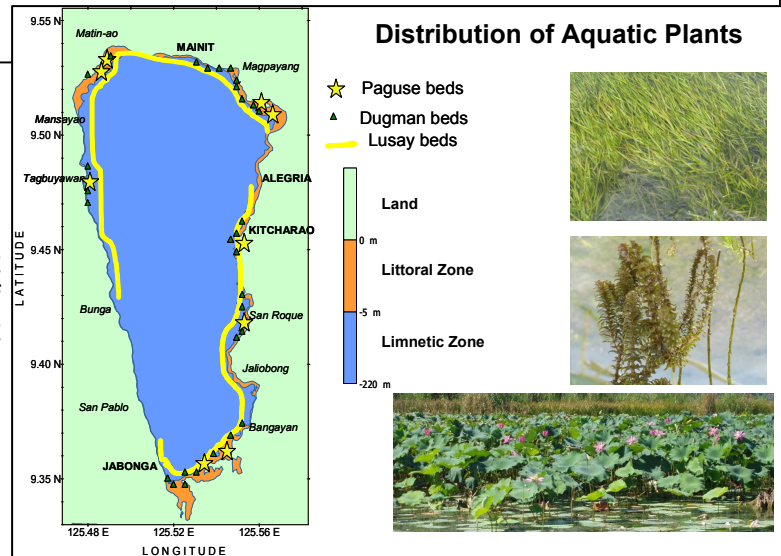


Fig. 1. Distribution of aquatic plants around Lake Mainit.

evaluate existing intervention programs and institutional arrangements prevailing in Lake Mainit.

Phase I (Rapid Resource Assessment), which is funded by the Philippine Council for Aquatic and Marine Research and Development (PCAMRD-DOST) and the Lake Mainit Development Alliance (LMDA), has been completed. Highlights of the results had been presented to the Lake Mainit LGUs at the Inception Report and Validation Workshop last January 22, 2008.

Aquatic Biodiversity and Fisheries

Field and market surveys conducted between August and November 2007 showed that 14 species of aquatic plants, 27 fish, 5 crustaceans, and 10 mollusks were found to occur in Lake Mainit. Very diverse aquatic vegetation occurs in most shallow parts of the lake (Fig. 1), dominated by *lusay*, *dugman* and *paguse*. The floating water lily or hyacinth occurs most abundantly along the river entrance at Jabonga and drifts along Kalinawan River. Two species of goby, the *pijanga* and *bugwan*, are important native species of the lake, and still occurs but in much reduced abundance than around late 1990s (Galicia and Lopez, 2000). The introduced *tilapia* is also abundant in the Lake, together with other common fishes such as *carpa*, *hayuan*, and *luyab*. The most common mollusk are the snails called locally as *Ige*, *kuhol* and *suso*, while the most common crustaceans are the freshwater shrimps *ulang* and *isik*.

Fisheries assessment was conducted through monthly monitoring of fish catch and effort by local enumerators or research partners in the six

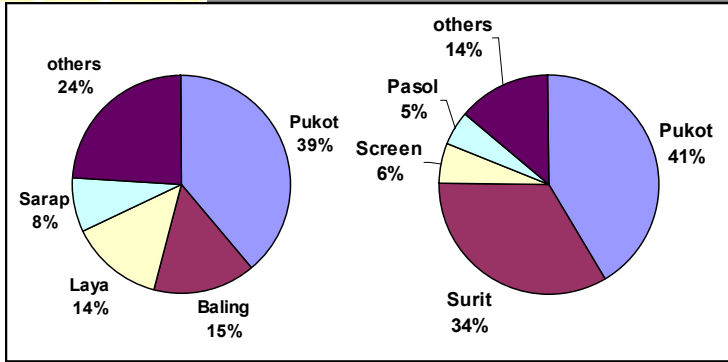


Figure 2. Relative abundance of major fishing gears operated in Lake Mainit and Kalinawan River between August-October 2007.

LGUs. Recorded fish catch from six municipalities (27 landing areas) between August-October 2007 amounted to 53.6 tons. *Pijanga* made up 47% of the total catch from the lake while *Tilapia* comprised 39% of the total fish catch from Kalinawan River. Local research partners noted that a large portion of the *pijanga* catch is exported to other areas, such as Butuan City, which explains why only a small amount is retained and sold in local markets around the lake.

The most productive fishing gear in both the lake and river is the *pukot* (gillnet), while *baling* (beach seine) remains efficient particularly in the municipality of Mainit, Surigao del Norte where this gear still operates (Fig. 2). A type of encircling gillnet locally called *surit* also lands abundant catches in Tubay, Agusan del Norte along Kalinawan River.

Total recorded fish catch for the period (July to October 2007) was highest in Kitcharao where a large number of fishers was also monitored. Average catch (kg) per fisher, however, is highest in Jabonga as a result of fewer fishers, followed by Mainit and Tubay (Fig. 3). It can be noted that the large average catch per fishing effort (CPUE) in Mainit is contributed by catches from *baling*, which is already a banned gear in other municipalities around the lake, while large CPUE in Tubay is composed of large catches of *surit*. These results indicate that highly efficient gears such as *baling* and *surit* can bring about large fish production, however, the long-term impact of these fishing gears on the sustainability of Lake Mainit and Kalinawan River fisheries should be evaluated.

Population Biology of Lake Mainit Fishes

Detailed biological analysis was conducted on only two major fishes in the lake, namely, *pijanga* (*Glossogobius giuris*) and *bugwan* (*Hypseleotris agilis*), which were also studied by Galicia and Lopez (2000). Monthly collection of fish samples (n =100) was made from catches of

pukot and *baling*. All individuals were measured for total length and body weight, and dissected to determine sex and gonadal maturity.

The *bugwan* sampled between August and November had a size range of 55-132 mm, which is smaller than the size range of 40-185mm studied by Galicia and Lopez (2000). Specimens of *pijanga* had a size range 57-242 mm, again smaller than reported size range of 25 to 305 mm by Galicia and Lopez (2000). The present results indicate that both *bugwan* and *pijanga* are generally smaller now than in the 1990s. The female fishes are generally smaller than the male. Several small fishes of *bugwan* were caught in October, while a large number of small *pijanga* were caught in August and October. Many individuals of *bugwan* in October and November samples were either maturing or spawning, suggesting that spawning begins to occur in this period. Several maturing individuals of *pijanga* were found within the period, but very few mature individuals. The presence of several spent specimens from August to November suggests

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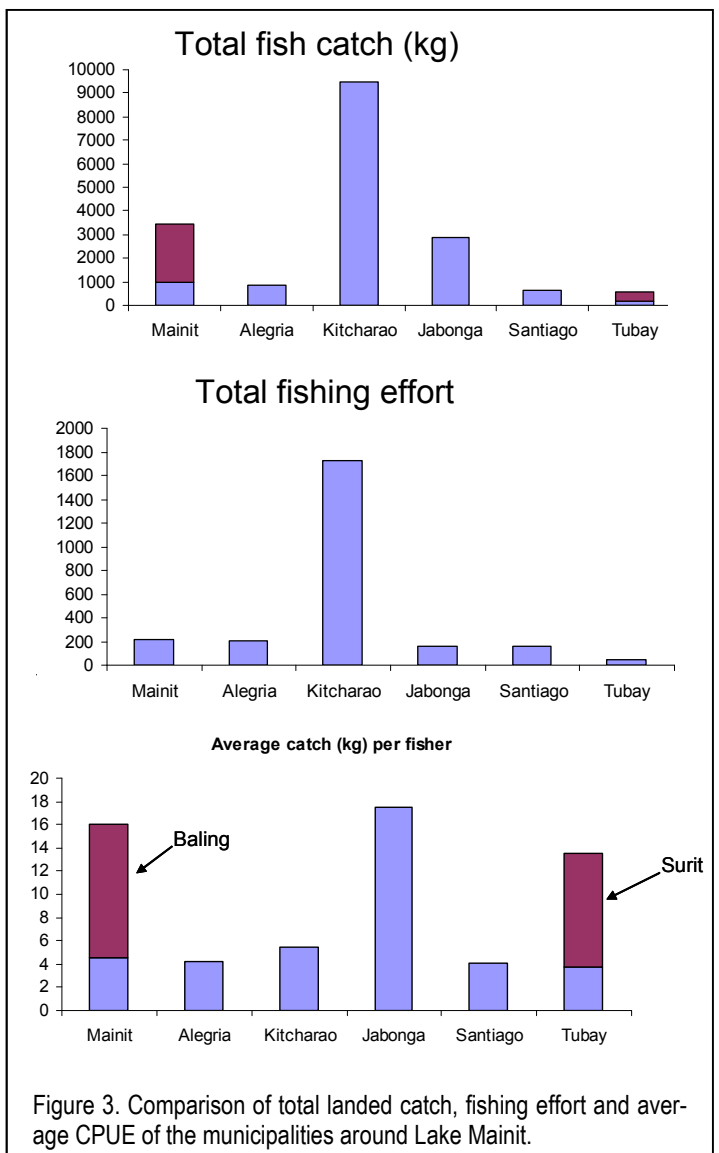


Figure 3. Comparison of total landed catch, fishing effort and average CPUE of the municipalities around Lake Mainit.

that spawning may have occurred earlier than August. Galicia & Lopez's (2000) results showed that spawning in both species occurs throughout the year, but defined peaks were observed. The peak of spawning in *pijanga* occurs between August to January while that of *bugwan* occurs between July-October.

Socio-Economics

A survey of the fishing effort made through focus group discussions (FGD) in 46 coastal barangays across six municipalities around Lake Mainit (Mainit, Alegria, Kitcharao and Jabonga) and along Kalinawan River (Santiago and Tubay) showed that some 4,026 fishers and 2,776 fishing boats are involved in Lake Mainit fisheries. Majority of the fishing boats are non-motorized *bancas* or *banding* (72%) while motorized boats are fewer (28%). Most of the fishers come from Jabonga and Santiago where many of them engage in fishing on a full-time basis, while Alegria has the smallest number of fishers. A total of 36 kinds of fishing gear are being used by fishermen in Lake Mainit and along Kalinawan River, with Mainit and Jabonga having the most diversified fishing activities. The most commonly used gears are various modifications of hook-and-line or *pasol/bingwit*, gillnet (*pukot*), fish traps (*timing*), spear (*pana*) and the modified cast net or *laya*.

Survey of fishing income and costs showed that Lake Mainit fishers earn between a very low P20.00-P90.00 to as high as P1,000.00-4,900.00 per operation, depending on the type of gear and season. The most profitable fishing gears are *baling*, *bungsod*, *laya* and *timing*, while *pukot* and *bantak* seem to be less profitable. Total household expenses on a daily basis (on food, education, clothing, electricity, etc.) of lakeshore communities range between P170 and P559, depending on the nature of livelihood and income level. On the average, lakeshore households in Alegria and Santiago have lower daily expenses than Mainit, Kitcharao, Tubay and Jabonga.

Upcoming Project Activities

The project team has started implementing Phase II – Comprehensive Fisheries Resource Assessment in November 2007 and will continue this until October 2008. Additional funding has been committed by the Department of Agrarian Reform -NMCIREMP program through a Memorandum of Understanding with the LMDA to cover the continuing activities until the project completion in December 2008. 📄