Methodology for the Estimation of Safe Carrying Capacity for Small Scale Aquaculture in Enclosed Lakes and Bays

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Taal Lake is the third largest lake in the Philippines. It has a surface area of 2.43 10^8 m^2 and an average depth of 65 m, reaching up to 180 m at the deepest portion. There are 38 small rivers and streams that serve as inlets and one major outlet, the Pansipit River. The lake is surrounded by 11 municipalities and supporting numerous sustenance fishermen. From 1993 to 1998, there was a dramatic increase in production from 13,778 Mt to 40,253 Mt, respectively. High stocking density and intense feeding, among others, have led to the deterioration of the lake, leading to fish kill events that started in 1997.

The carrying capacity of Taal Lake was modelled using the formula D = (inflow=outflow)/V, wherein D (carrying capacity) is the ratio between flushing rate (inflow=outflow) and V (volume of body of water) (Patrick et al., 2007). The parameters taken in to calculate these are the following: bathymetry, current speed, direction and volume, water turbidity, water quality (i.e. DO, pH, CO_2, NO_2, NH_3, NH_4, H_2S, PO_4, chlorophyll-a), temperature, salinity, and biological and chemical sediment quality. The water quality gives a snapshot of the condition while the sediments can be used as indicators of the true environmental condition as these are developed over a long- time period. Information on production and management practices were also taken.

Calculation of carrying capacity of fish aquacultures alone for Taal Lake indicates that the lake can support at most about 30,000 tons of fish. It will take two years to renew one volume of water to a depth of 10 m, or 20 years to replenish the water of the whole lake (Patrick et al., 2007).

This study has shown that the present aquaculture activities alone in Taal Lake have reached its carrying capacity. To increase its carrying capacity and prevent future fish kills from happening, the project recommends the improvement of food conversion ratio, combining extractive species with fish cultures, minimized input of nutrients from land-based sources, proper disposal of dead

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fishes, aquaculture zoning plan, establish early warning and fish kill forecasting and collaboration of LGUs with other agencies in co-managing the lake.