

**MATHEMATICAL MODELLING OF NILE TILAPIA FISH POPULATION
DYNAMICS WITH RESTOCKING AND HARVESTING IN
“MAELIYA” RESERVOIR**

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Ensuring an adequate fish supply for growing populations is a significant challenge in most of the developing countries. Culture based fisheries is a widely used technique globally to enhance fish production. In Sri Lanka, reservoirs are stocked with fish fingerlings produced in fish-breeding centres managed by the National Aquaculture Development Authority (NAQDA). This research aimed to formulate a mathematical model to evaluate the population dynamics of the Nile tilapia population in the “Maeliya” reservoir, Kurunegala District, Sri Lanka. The study focused on restocking and harvesting Nile tilapia, which are capable of breeding in any natural water body. Gillnets are the primary fishing gear used in this reservoir, with mesh sizes ranging from 4 to 10 inches. For this study, gillnets with mesh sizes smaller than 5 inches were considered, as Nile tilapia are typically caught in gillnets with mesh sizes of 4, 4.5, and 5 inches. The necessary data for this research were obtained from NAQDA, while additional information was gathered through interviews with fishermen. The mathematical model was developed based on six stages of Nile tilapia, including eggs, fingerlings, mature adult fish at the initial stage, and three stages of mature fish caught by gillnets with mesh sizes of 4, 4.5, and 5 inches, respectively. The formulated model was solved using MATLAB, and the predicted values were compared with actual data. Additionally, the yield of Nile tilapia was analysed both with and without restocking fingerlings. The results indicated that restocking fingerlings increases and regulates the harvest.

Keywords: Culture based fisheries, Fish fingerlings, Gillnet, Nile tilapia