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A study on thermal stratification of Victoria Reservoir in Sri Lanka using DYRESM model

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Victoria reservoir is a tropical, oligomictic, water body constructed under the accelerated "Mahaweli project" in 1983 and it underwent a massive growth of *Microcystis aeruginosa* in March 2003 indicating its high sensitivity towards eutrophication & blooming. The objective of the present study is to calibrate & validate Dynamic Reservoir Simulation Model (DYRESM) for Victoria reservoir, to predict the thermal behavior, related to the other biochemical properties of the reservoir.

The DYRESM used in the present study is a one-dimensional numerical model and could be used to predict the distribution of temperature (and related density) in reservoirs in response to meteorological forcing, inflow and outflow. The data required for the calibration of the model includes daily values of air temperature, relative humidity, wind velocity, solar radiation, rainfall, evaporation, inflow quantity, inflow quality and outflow quantity. The collection of water quality data within the reservoir is very expensive and therefore, the ability to predict water quality, which is related to thermal stratification, by the model with the above-mentioned input data, would be very valuable. The temperature profiles obtained by running the model were compared with the observed temperature profiles to determine the parameters of the model.

For the calibration of the model water quality data collected (through Limnology project at Mahaweli reservoirs) for the year 1995 was used. Temperature data were available for 13 locations over the reservoir horizontally & at every 5 to 10 m distance vertically in three locations (at two major inlets and towards the dam). The model could be used in predicting adverse water quality conditions based on its past water quality studies & therefore it could be used in taking suitable precautionary measures in time even through the manipulation of outflows. Model predictions could be used to make decisions on regulation of the water in the reservoir under alarming situations due to severe water quality issues. Fig.1 illustrates some results of the work, which presents the isotherms for

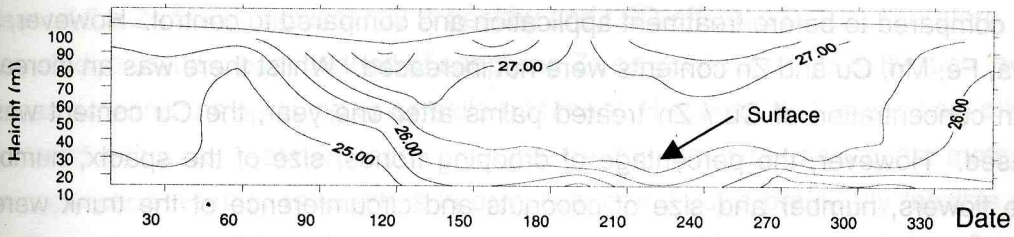

Fig. 1 Isotherms of the Victoria reservoir in 1995.

the Victoria reservoir obtained through the DYRESM model based on the water quality data for the year 1995. It indicates the thermal stratification of the reservoir which is related to the other biochemical properties of the reservoir which could be used in predictions.

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