

## **A study on thermal stratification of Kotmale Reservoir in Sri Lanka**

Stratification is of crucial importance in determining water quality in lakes or reservoirs and important in predicting temperature patterns. Kotmale reservoir is the uppermost reservoir in the upland hydropower reservoirs of Sri Lanka. It acts storage reservoir as well in the satisfaction of irrigation water requirements. Its total storage capacity is about  $172 \times 10^6 \text{m}^3$  and the height of the dam is about 87m. The Kotmale reservoir faced several water quality related problems in the recent past. This model would enable to take precautionary measures in such situations and this is an attempt towards it.

The Dynamic Reservoir Simulation Model (DYRESM) was calibrated and validated for the Kotmale reservoir to predict temperature distribution, which is very closely related to its

chemical and biological properties. It 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 temperature profiles obtained by running the model were compared with the observed temperature profiles to determine the parameters of the model.

It shows that the reservoir is stratified throughout the whole year. The collection of water quality data is very expensive. Therefore, the ability to predict water quality, related to thermal stratification, by the model would be very valuable. If any adverse effects are predicted, precautionary measures could be taken by the manipulation of outflows.