

**FORECASTING MONTHLY PRODUCTION IN MIHINTALE NATIONAL
WATER SUPPLY SCHEME**

R.A.N.S. Madhumali and A. Laheetharan*

*Department of Mathematics and Statistics, Faculty of Science, University of Jaffna, Jaffna, Sri Lanka
kalahee@yahoo.com

Water resources have been one of the key factors in urbanization and the environment. Water scarcity occurs in many parts of the world, including Sri Lanka. Mihintale region is one of the prime tourist spots in Sri Lanka, and the majority of people in many Grama Niladhari (GN) divisions consume tap water. Therefore, a water production forecast is important in deciding the water supply schedule. The volume of water production depends on various factors, such as water demand, total population size, and atmospheric temperature. The objective of this study is to construct the best-fit forecasting model to predict water production in the Mihintale scheme based on the Autoregressive Integrated Moving Average (ARIMA) model. A Regression model with ARIMA errors (ARIMAX) was used to quantify the impact of the number of tap connections on water production in the Mihintale scheme. Model parameters were estimated by the maximum likelihood method. Forecasting accuracy measures, Root Mean Square Error (RMSE), Mean Absolute Error (MAE) and Mean Absolute Percentage Error (MAPE), were used to identify the best model based on the minimum measure of accuracy. The monthly time series data of water production and the number of tap connections have been collected from Mihintale National Water Supply and Drainage Board (NWSDB) for the period from June 2015 to September 2021. Based on the value of RMSE, MAE and MAPE, ARIMA(0, 2, 2) and ARIMAX model with ARIMA(1, 0, 0) error series was selected as the best-fitted model among the ARIMA and ARIMAX models. The forecasted value showed that future water production in the Mihintale scheme is expected to fluctuate in ARIMA and increase in ARIMAX for the next nine months. Finally, the minimum value of RMSE, MAE and MAPE revealed that the ARIMAX model is much better than the ARIMA model.

Keywords: ARIMA model, ARIMAX model, Accuracy measures, Forecasting, Water production