

Statistical Analysis of Water Quality Data of River Yamuna

Ramakar Jha, C. K. Jain and K. K. S. Bhatia

ABSTRACT

The determination of water quality parameters in a river is very important for overall water quality management. The water quality variations in a river may be modelled by the deterministic approach or by the stochastic approach. The former approach has been used for predicting the steady state water quality conditions along a river and to predict the short-term transient state of a water quality parameter. The later approach, which is used in this study, enables the identification of trends and periodic phenomena present in natural data series, their decomposition and subsequent synthesis for data generation and forecasting. In the stochastic approach, it is necessary to probe some of the characteristics viz., non-normal distributions, seasonality, missing values, values below the limit of detection, external interventions and serial correlation, which complicate the analysis of water quality time series along the river.

In the present work, data of twenty-two important water quality variables obtained from sixteen sampling stations of River Yamuna in India have been utilized for trend analysis, cross-correlation, statistical estimations and ARIMA modelling. Monthly data for the period from June 1990 to May 1995 have been utilized for the analysis. Multiplicative auto regressive integrated moving average (ARIMA) model has been fitted to the time series of water quality data. The developed ARIMA model $(1,0,1)*(0,1,0)_{12}$, has been used for forecasting water quality for the year 1996 and the results obtained for different water quality variables have been compared with the observed values. The results obtained are satisfactory and stress the need for future applications.

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