

A Multivariate Statistical Approach for Water Quality Assessment of River Hindon, India

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Abstract : River Hindon is an important river catering the demand of highly populated rural and industrial cluster of western Uttar Pradesh, India. Water quality of river Hindon is deteriorating at an alarming rate due to various industrial, municipal and agricultural activities. The present study aimed at identifying the pollution sources and quantifying the degree to which these sources are responsible for the deteriorating water quality of the river. Various water quality parameters, like pH, temperature, electrical conductivity, total dissolved solids, total hardness, calcium, chloride, nitrate, sulphate, biological oxygen demand, chemical oxygen demand and total alkalinity were assessed. Water quality data obtained from eight study sites for one year has been subjected to the two multivariate techniques, namely, principal component analysis and cluster analysis. Principal component analysis was applied with the aim to find out spatial variability and to identify the sources responsible for the water quality of the river. Three Varifactors were obtained after varimax rotation of initial principal components using principal component analysis. Cluster analysis was carried out to classify sampling stations of certain similarity, which grouped eight different sites into two clusters. The study reveals that the anthropogenic influence (municipal, industrial, waste water and agricultural runoff) was the major source of river water pollution. Thus, this study illustrates the utility of multivariate statistical techniques for analysis and elucidation of multifaceted data sets, recognition of pollution sources/factors and understanding temporal/spatial variations in water quality for effective river water quality management.

Keywords : cluster analysis, multivariate statistical techniques, river Hindon, water quality

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