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## Statistical and Trend Analysis of Surface Water Quality for the Upstream of Karkheh River in Iran

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### Abstract

Karkheh Basin drains an area of about 51 843.22 km<sup>2</sup> and originates from the middle and southwestern parts of the Zagros Mountains in western Iran. Karkheh River ranks as number third in terms of mean discharge amount of Iran after Karun and Dez Rivers. River surface water quality and quantity changes in the upstream of Karkheh basin has been a major concern for water managers. This study is focusing on the upstream areas of Karkheh River basin which involve Gharehsoo and Gamasiab subbasins and some parts of Saimareh Miani subbasin. The climate of the study area is semi-arid and the precipitation decrease from north to south. Trend analyses have been employed to determine whether a significant change has occurred in surface water quality or not. Considering the effects of precipitation and river water quantity on river surface water quality, both sudden and gradual trends over time with and without precipitation and flow adjustment for the effects of exogenous variables have been investigated. Finally the various parametric and non-parametric tests strengths and weaknesses are discussed. The removal process involves modelling, and thus explaining the effect of exogenous variables with regression or LOWESS (LOcally WEighted Scatterplot Smooth) are helpful to reduce the background variability so that any trend “signal” present can be seen. However, if the probability distribution of the surface water quality parameters has changed over the period of record, a trend in the residuals may not necessarily be due to a trend in river discharge and precipitation. In this context, removing the significant role of exogenous variables reflect the real conditions.

**Keywords:** Exogenous variables, Karkheh, Mann-Kendall, regression, surface water quality