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Geochemical and isotopic tracing of salt loads into the Ramsar listed Verlorenvlei estuarine lake, South Africa

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Abstract

δ^2H and $\delta^{18}O$ ratios, major ions, tritium and EC was used to constrain the sources of salt into the Verlorenvlei River and the Verlorenvlei Ramsar listed estuarine lake and wetlands. Each tributary contributes different quantities of salt into the Verlorenvlei River. The Krom Antonies River is characterised by low EC, >300mS/m, in contrast to the Kruismans and Hol Rivers that have high EC, <1500mS/m. The confluence of the Verlorenvlei River and the Hol River has EC levels in the range of 80.7mS/m to 258mS/m and the Bergvallei has intermediate EC values of between 500 mS/m and 800 mS/m. δ^2H and $\delta^{18}O$ values range from -18.0‰ to -1.6‰ and -3.6‰ to -0.6‰ respectively. The Kruismans shows a stronger evaporation signature in comparison to the Hol and both rivers have high EC values. The δ^2H and $\delta^{18}O$ stable isotope shows sources of salt load either as a result of evaporation, mixing water types between rainfall and groundwater while major ions indicate marine (sea aerosol sprays) and dissolution of minerals present in catchment lithologies. Flow rates of the different rivers are being obtained to determine how much salt load each tributary contributes into the Verlorenvlei River.

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Keywords: *Wetlands; Stable isotopes; Shallow groundwater; Surface water; Salinity; Verlorenvlei catchment; South Africa.*

1. Introduction

Increases in salinity of EC > 300mS/m whether as a result of natural or anthropogenic induced processes are a problem in semi-arid. Problems that result to increase of salinity include: a) deterioration of water quality used for domestic and agricultural purposes, b) strain on ecological systems which leads to a decrease in biodiversity of flora and fauna and c) decline in socio-economic activities[1].

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