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Spatio-temporal effects of rainfall on stream/river flow in the Kruger National Park, South Africa

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Abstract

The primary aim of this research project is to scientifically investigate the impact that climate change has on rivers in selected regions of the Kruger National Park (KNP). Rainfall and stream/river flow data are statistically analysed to determine the extent to which rainfall events, and extreme rainfall events, influence flow regimes. The rainfall data obtained for evaluation date as far back as 1911, thus providing a near 100-year record of climate variability and change for the region. Stream/river gauge data date back as far as 1960, thus allowing for the analyses of rainfall impacts on streamflow for over half a century. The rainfall data has shown that in some parts of KNP, total annual rainfall is increasing, however, this increase in total rainfall is due to the increasing severity of rainfall events. The El Niño Southern Oscillation (ENSO) is impacting rainfall variability in northeastern South Africa, and thus rainfall events are more sporadic, with longer drought phases. Data has shown a mostly positive correlation between rainfall events and stream/river flow trends. During El Niño years, the rivers of KNP have lower than average flows, and during years with intense rainfall events, stream/ rivers have an above average flow trend. Some results have however shown a negative correlation between rainfall events and stream/river flow trends. The Literature suggests that this negative correlation is due to additional impacts on stream/river flow such as anthropogenic land use activities (mining, agriculture, forestry). Additional investigation into this impact can be done through future research. The evaluation of climatic parameters in relation to flow regimes in a protected area is a critical evaluation for the purposes of future projected climate and hydrological change in the KNP. Management, decision makers and policy planners could use the information obtained from this research to supplement their current water restoration initiatives, and water provisioning objectives, to better manage for the future.

