

ZAMBIA

**The Use of Remote Sensing and GIS for Drought Assessment: The Case
of Southern Province**

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Water plays a major role in human livelihoods and has significant implications to security. Hydrological extremes – droughts and floods - are a major threat to society and can have extensive effects. With the already increasing pressure on water resources from population growth, economic activities and escalating competition between users, droughts present several challenges to water resource managers.

Drought is universally described as a severe shortage of water. There are four types of drought. These are the meteorological (shortage of rainfall), agricultural or vegetation (shortage of soil moisture), hydrological (shortage of surface and ground water) and the socioeconomic droughts (shortage of goods and/or services due to water scarcity).

Remote sensing (RS) and geographical information systems (GIS) have emerged as essential tools in assessment and analysis of natural resources and hazards (natural and man-made). In this study, multi-temporal images from the MODIS Terra (250m) and dekadal rainfall estimates from TAMSAT were used to evaluate the changes in vegetation due to precipitation variations over the southern province of Zambia (2000 to 2017). Normalized Difference Vegetation Index (NDVI) and Vegetation Condition Index (VCI) were calculated and used to identify the areas prone to drought and to establish a trend of drought occurrence over the study area. Standardized precipitation index was also calculated using precipitation data and interpolated over the province.

Correlation analyses were done between satellite derived indices, rainfall and crop production. A positive correlation ($r = 0.66$) was found between NDVI and rainfall. NDVI was found to be highly correlated to mean annual rainfall of the southern province. Furthermore, mean annual NDVI and VCI were plotted

against time and a trend was established. It was found that the province suffered droughts in 2002, 2005 and 2016. It was evident that the areas lying in the southern parts of the province were drought prone. The western part (Kazungula) were also at risk of drought.