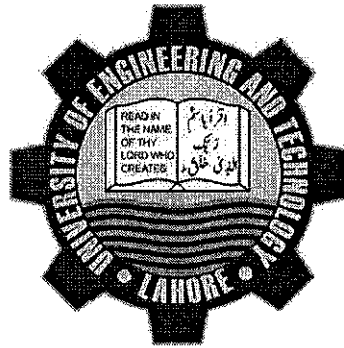


**SPATIAL DISTRIBUTION AND DROUGHT MONITORING IN
POTHWAR REGION USING SATELLITE BASED DROUGHT
INDICES AND GEO-INFORMATICS TECHNIQUES**

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BY

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ABSTRACT

Drought is a devastating natural disaster which is caused by changes in rainfall as it does not occur at the expected time and place. This leads to prolonged changes in vegetation cover as well as in the hydrological cycle especially with reduction in soil moisture, surface runoff and groundwater recharge. Pakistan has been subject to severe droughts responsible for poor agricultural performance especially in the rainfed areas. This study was therefore focused on understanding the temporal and spatial variation of droughts from 1985 to 2019 in the rainfed area of Pothwar Plateau (23160 km²) lying the Punjab province of Pakistan. Pothwar consists of four major districts of the country; Chakwal, Attock, Rawalpindi, and Jhelum. To understand the extent and duration of drought the remotely sensed satellite data, precipitation data and flow data were used. Precipitation maps were developed by using 34-year average rainfall data and was divided in to six zones on the basis of annual rainfall. The drought indices Standardized Precipitation Index (SPI), Stream Flow Index (SDI), and Normalized Difference Vegetation Index (NDVI) were used to estimate the drought and to track its temporal and spatial variation. The SPI and SDI were calculated using the Drin C software while NDVI was estimated using RS and GIS techniques. The SPI variation indicated that majority of droughts (92.3%) during the study period were mild and moderate droughts, whereas 7.7% were categorized as severe droughts. During the study period Chakwal and Attock were highly drought prone areas as compared to Rawalpindi and Jhelum. In Chakwal and Attock there was higher occurrence of severe and extreme droughts when compared with Rawalpindi and Jhelum.

According to SDI, the 12-month hydrological drought assessment indicated severe droughts from 1990-2010 for the Soan river at Chirah bridge and at Dhok Pathan from 1989-2006. NDVI indicated deforestation and barren land has increased in the Pothwar region. Increasing deforestation and urbanization was further complicated by decrease in dense vegetation during 1990-2019 in Pothwar. On the basis of spatial precipitation analysis, it is concluded that 19% of total Pothwar region in Chakwal and Attock districts was most drought prone area of the region while mild drought occurred area in Rawalpindi and Jhelum districts which is 2% of the area.