ASSESSING AGRICULTURAL VULNERABILITY TO DROUGHT IN DRY ZONE OF SRI LANKA – A REMOTE SENSING BASED APPROACH

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Remote sensing (RS) technologies provide a diagnostic tool that can serve as an early warning system to natural hazards in agricultural sector. In this study, remotely sensed satellite imagery data was employed to estimate the spatial and temporal variation of agricultural drought conditions for 2007 to 2019 period over the dry zone of Sri Lanka. Normalized Difference Vegetation Index (NDVI), Leaf Area Index (LAI), Enhanced Vegetation Index (EVI), Evaporative Stress Index (ESI) were the RS based indices used to assess the agricultureal drought. Standardized Precipitation Index (SPI) was used to assess the meteorological drought conditions for 3, 6, and 12 months scale. MOD13Q1 data from Moderate Resolution Imaging Spectroradiometer (MODIS) from 2007 to 2019 was used to calculate the NDVI and EVI while MCD15A2 data was used to calculate LAI. To assess the ESI, SERVIR global data was downloaded. Rainfall data from 19 stations were used to calculate the SPI. Based on the results of LAI in an annual scale, relative higher drought periods were observed in 2011, 2012, 2013, 2014, and 2019 years. Based on ESI in an annual scale 2014 and 2017 years were observed drought conditions. According to the SPI_{12} analysis, droughts were experienced in 2007/2008, 2011/,2012, 2014/2015, and 2016/2017 hydrological years for the Dry Zone of Sri Lanka. NDVI, ESI, LAI calculated for three month time scale showed very poor correlation with SPI_3. However, there were significant positive correlation between NDVI and LAI, EVI and LAI, and NDVI and EVI for three month time scale. Mannar showed frequent agricultural droughts based on the results of annual LAI, 3 months EVI values and SPI values. Further analysis are necessary to assess the suitability of RS based indices to monitor drought in different time scale in the dry zone of Sri Lanka.

Keywords: Agricultural drought, Drought indices, MODIS, SPI