Creating Agricultural Drought Statistics for Developing Countries Using Historic Data from Satellite Images

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Abstract: Greenness indices (e.g. NDVI) from satellite images have been used to demonstrate detection of drought in regional studies from various parts of the world. This paper discusses how a comprehensive drought database at national or continental scale can be easily created using well established formulas like the Vegetation Condition Index (Kogan 1998) and Percent Carrying Capacity Index (Gurusamy, 2005). These methods involve the use of 20 years of available satellite imagery greenness data.

The TRMM satellite data also provides excellent rainfall information based on satellite imagery for the past 10 years. The utility of these satellite data and derived indices as proxies of rainfall data has not been verified systematically.

The paper discusses a study using freely available satellite imagery that provides good spatial and temporal resolution drought statistics to a developing country (India), where rarity of spatially and temporally continuous rainfall data hinders disaster management decision processes.

Drought disaster management involves introduction of "insurance" schemes which rely on historic rainfall data at meaningful spatial resolution for fixing appropriate premiums based on probability of drought proneness of an area. Currently weather stations are located hundreds of kilometres away from each other and provide discontinuous data, whereas free satellite data are available at 1 km, 8 km, and 16 km spatial resolutions at every 10 day interval for more than 10 years. Insurance claims are also made based on the available current rainfall data which can vary significantly within the 100 square kilometre area that a weather station would normally cover. Thus, the availability of free satellite imagery would be a boon to farmers located too far from a trusted weather station data source. Creating drought statistics for developing countries using historic satellite images would help the farmer, insurance agencies and the government to make more meaningful decisions related to drought disaster management.