

Greening and browning analysis in Peninsular India detected by change in Leaf Area Index and its relation to the climatic conditions

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Leaf Area Index (LAI) gives the amount of photosynthetically active foliage underlying a vegetation canopy. The trend in LAI is a good indicator of vegetation greening or browning. This trend statistics is also an important aspect to know the change in amount of carbon sink of the region. Nonparametric statistical trend tests have been widely used by researchers for time series analysis of vegetation indices. This study analyses the LAI trend in Maharashtra state of India to identify the greening clusters and browning hotspots. We use nonparametric Mann-Kendall trend test along with Theil Sen's slope method to find the magnitude of the trend. In this study, the greening and browning are presented in the form Z statistics with 95% significance level over time period of 12 years and the net change in leaf area is found out for the respective clusters. We use Moderate resolution Imaging Spectroradiometer MOD15A2H LAI/FPAR 500m 8 daily composite product to discuss the positive and negative trend using monthly time step. Previous researches have linked the greening in India to land use for agriculture practices. Our results confirm this with 66% of greening and 95% of browning clusters being located in the agricultural zones. The results show that about 5% area of Maharashtra shows greening and about 2% shows browning trend. We further discuss the region wise trend statistics and their possible causes. The browning clusters are observed in the drought prone areas which is a cause of concern considering the agriculture failure related farmer suicides in the region.

Keywords: Trend analysis, Greening and browning, Mann-Kendall test, Leaf Area Index