

## Spatio-temporal analysis of forest fire using GIS and remote sensing technologies, the case of Antalya Kumluca forest fire

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**Abstract:** In recent years considerable increase in the amount and availability of remotely sensed data has enabled the analysis of spatial and temporal changes of the forested areas. In this study spatial and temporal effects of the Antalya Kumluca forest fire evaluated using Geographic Information Systems (GIS) and Remote Sensing (RS) technologies. In the study before the fire event (July 2015) and after the fire event (July 2016) LANDSAT-OLI-TIRS imageries having 30 meter resolution were used. Pre and post event forested areas, surface moisture and post event burned areas were extracted from short wave infrared (SWIR) and near infrared (NIR) bands of LANDSAT-OLI sensors by using Soil Adjusted Vegetation Index (SAVI), Normalized Difference Moisture Index (NDMI) and Normalized Difference Burn Ratio Index (NDBRI) respectively. The differences among pre event and post event NBRI images were used to highlight the burned areas. On the other hand, Land Surface Temperature (LST) of the mentioned years was determined using the thermal infrared (TIR) bands of the TIRS sensors. Pre and post event change on the SAVI, NDMI, NDBRI and LST were quantified using randomly selected 500 points by using Pearson correlation coefficient that were equally spaced and proportionally scaled. According to results of pre and post event Pearson correlation coefficient before the forest fire there is .864 correlations is observed between NDMI and SAVI. However, after the forest fire this correlation decreases to .809. On the other hand, the correlation between NBRI and NDMI before the event is .991 and after the event it decreases the .949. The drastic change is observed between SAVI and LST. Although, before the event SAVI and LST correlation is -.549 this correlation decreases to -.270. The result of the analysis reveals that, changes in the forest cover and land surface moisture after forest fire have profound effect on distribution of the (LST) over the forest area. Overall, optic and thermal remote sensing technology was effective approaches for analyzing spatial and temporal effects of forest fire and evaluating its impacts on LST.

**Keywords:** Soil adjusted vegetation index (SAVI), Normalized difference moisture index (NDMI), Normalized burn ratio index (NDBRI), Land surface temperature (LST)