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Developing a Wildfire danger index based on the satellite-derived parameters

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Wildfires are occurring throughout the world, causing immense damage to forest resources, flora, and fauna. The Fire Danger indices are used as a tool for the decision-makers to issue warnings to the public, based on the level of fire danger classes for implementing mitigation measures to control wildfires. In this study, a Wildfire danger index (WDI) is developed from static and dynamic factors, which are derived from satellite datasets. The Static fire danger Index (SFDI) is generated using MODIS Land cover type (MCD12Q1), Shuttle Radar Topography Mission (SRTM) DEM, and Open Street Map datasets. The Random Forest algorithm is used to generate SFDI from the parameters LULC map, slope map, aspect map, and elevation maps based on the historical MODIS active thermal anomaly product (MCD14). Dynamic Fire Danger Index (DFDI) is developed from the MODIS Terra datasets such as Land Surface Temperature (MOD11A2) and surface reflectance (MOD09A1) datasets. The DFDI is developed from four parameters viz. Land surface temperature, Visible Atmospherically Resistant Index (VARI) and Normalized Multiband Drought Index (NMDI), and Normalized Difference Infrared Index – B6 (NDIIB6). Finally, the wildfire danger index is calculated by integrating SFDI and DFDI and found that the accuracy is more than 80% during the 2018-19 fire season. Therefore, the WDI can be useful for disseminating daily fire danger maps on near real-time basis using the MODIS TERRA Near Real-Time datasets so that the fire officials to take necessary actions to control the spread of wildfires.