Assessment of Temporal Changes in Vegetation Moisture and Chlorophyll Post-fire through Remote Sensing Spectral Indices for Carpenter-1 Fire

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Wildfires in the United States have surged in frequency and intensity over the past decade with notable events such as the 2020 California wildfires that scorched 4.4 million acres, Martin fire that burnt 439,230 acres of wildlands. Wildfires have lasting consequences on the vegetation leading to changes in soil properties and hydrological response in the affected area. The study focused on monitoring post-fire vegetation recovery through remote sensing indices of moisture and chlorophyll in Mount Charleston following Carpenter-1 Wildfire in 2013. The moisture and chlorophyll indicate key characteristics of vegetation and are therefore selected to monitor post-fire vegetation regrowth. The study employed remote sensing indices of Moisture Stress Index (MSI) and Modified Chlorophyll Absorption Ratio Index ($MCARI_2$), to measure the lasting impact of fire-induced disturbances on the ecosystem and its recovery. The spectral index indicate a stressed state of moisture and chlorophyll immediately post-fire. This can be due to shifts in vegetation cover due to fire, particularly a conversion of vegetation to barren or low vegetation class. The spectral indices reveal a remarkable recovery in subsequent years, where vegetation moisture, and chlorophyll levels have increased over the years to reach near pre-fire level, highlighting the ecosystem's resilience and the recovery of vegetation. However, the insights into vegetation community richness and regrowth of cycles vegetation types need to be studied. The study provides comprehensive insights into post-fire vegetation and its regrowth through remote sensing indices. It also underscores the importance of remote sensing dataset applications for continued monitoring of post-fire vegetation and land management strategies in fire prone areas.