URSI - RCRS 2024, ARIES/GEHU, Bhimtal, India, 22 - 25 October, 2024

FOREST FIRES DUE TO BREAKAGE OF TRANSMISSION LINES

Shubhi Tiwari*(1), Naveen Kumar Nakka(1), Unmesh Khati(1), and Abhirup Datta(1)
(1) Department of Astronomy, Astrophysics and Space Engineering, IIT Indore, Madhya Pradesh, India, 453552,
email-mt2302121006@iiti.ac.in

Forest fires are hazardous to the environment. The severity of such fires is quite high as they lead to canopy loss, vegetation loss and pollution. Among different causes of forest fires, one may be due to transmission line breakage; around 3% of forest fires occur due to transmission line breakage.These fires are tougher to control due to the lack of infrastructure in the forest regions, and by the time the aid is reached, major damage has already been done. Such studies help to detect the sensitive zones and build better measures when such accidents occur. The study Weijie Chen el al.2021, uses the Naive Bayes Theorem and remote sensing data to address the same issue in Guangxi province, China, where they have considered 14 wildfire-related factors, which showed that distance to settlements, vegetation type, and distance to roads were the most important factors, while population density, temperature, slope, and GDP. The NBN-based wildfire risk map showed high consistency with the historical fire-spot density and new fire events monitored in 2020, with 45.35% of new fires occurring in the very-high-risk regions. Katherine A. Hess et al.2019, employed a logistic regression model to assess the probability of fire occurrence based on factors like aspect, slope, elevation, temperature, and vegetation type. Slope showed the highest positive coefficient, indicating its strong influence on fire likelihood, while temperature exhibited a negative coefficient, implying an inverse relationship. The model integrated these variables using ArcGIS Pro, producing a fire danger map that was validated through a hold-out method and evaluated using a confusion matrix, achieving 90.6 % overall accuracy.

Similarly we attempt to study the different forest fire occurring zones in the state of Madhya Pradesh with data from MODIS and VIIRS sensors from LANCE FIIRMS, forest canopy data from Global Ecosystem Dynamics Investigation and transmission line data from Open Street Maps, the processing was done on the QGIS. The state has lots of vegetation and has one of the densest forests in the country. As the state faces a lot of rain and extreme climates during summers and rainy seasons, we attempt to study the high-risk fire zones. Intersection analyses were conducted to identify vulnerable points where forest fires, transmission lines, and suitable canopy heights intersected. Rasterization techniques were employed to integrate these layers and visualize critical areas needing ecological management interventions. This approach provided a comprehensive framework for monitoring and managing environmental risks associated with transmission infrastructure while supporting sustainable development.

References

[1] Katherine A. Hess , Cheila Culle Jeanette Cobian-Iñiguez , Jacob S. Ramthun, Victor Lenske, Dawn R. Magness,*, “Satellite-Based Assessment of Grassland Conversion and Related Fire Disturbance in the Kenai Peninsula, Alaska" *Remote Sens. 2019, 11, 283.* **26**,doi:10.3390/rs11030283.

[2] Weijie Chen,You Zhou,Enze Zhou, Zhun Xiang, Wentao Zhou, and Junhan Lu1 “Wildfire Risk Assessment of Transmission-Line Corridors Based on Naïve Bayes Network and Remote Sensing Data”, *Sensors (Basel). 2021 Jan; 21(2): 634.*, **32**, doi:10.3390/s21020634.

[3] Potapov, P., Li, X., Hernandez-Serna, A., Tyukavina, A., Hansen, M. C., Kommareddy, A., Pickens, A., Turubanova, S, & Hofton, M.“Mapping global forest canopy height through integration of GEDI and Landsat data. ”, *Remote Sensing of Environment, 253, 112165*, **32**, doi:10.1016/j.rse.2020.112165