Recognizing Mangrove Dynamics for Assessing Cyclone Impact on Henry Island Using Sentinel Data

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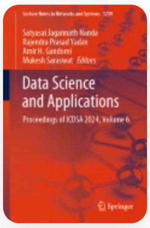

Data Science and Applications

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Abstract

The study employs various vegetation indices, including Normalized Difference Vegetation Index (NDVI), Difference Vegetation Index (DVI), Soil-Adjusted Vegetation Index (SAVI), Simple Ratio (SR), and Normalized Difference Water Index (NDWI).

Utilizing Sentinel imagery, it investigates the impact of Super Cyclones Amphan and Fani on Henry Island in the Sundarbans from 2016 to 2022. Seasonal NDVI variations reveal robust mangrove health, with values ranging from 0.11 to 0.25 pre-cyclone and greater than 0.25 in mangrove regions. Post-cyclone, mangrove health remains stable, while shrubland, cropland, and grassland exhibit declining health. Study findings indicate DVI values exceeding 1200 lack normalization, impacting mangrove health assessment. Pre-cyclone images show denser mangroves compared to other vegetation types, while cyclone periods exhibit overall vegetation density improvement. Post-cyclone imagery suggests a sustained density increase on Henry Island, implying minimal cyclone impact. The study highlights susceptible areas for conservation and catastrophe mitigation by identifying major changes in mangrove patterns. Consistent seasonal changes are revealed by SR and NDVI index analysis, highlighting the significance of continuous environmental monitoring. Indicating dynamic reactions to cyclonic events, cyclones produce noticeable variations in DVI, SR, and SAVI measurements.

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