Forest Degradation Mapping Using Advanced Spatial Techniques

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Abstract

With ever increasing population, the forests in tropical regions have become vulnerable to anthropogenic pressures which is further compounded by the changing climate resulting in enormous degradation and deforestation. Efforts are on to revive the forests and a solution for sustainable management of forests is essential. To ascertain the health of forests, remote sensing techniques are used followed by ground truthing. Interpretation of remote sensing data are often done by manual digitisation. This is tedious and time consuming. IORA has developed cost effective spatial modelling technique that enables quick interpretation of degradation and deforestation which can be applied to interpret satellite imageries at all spatial resolutions.

The model allows spectral un-mixing of forest and non-forest components of vegetation indices obtained from satellite imageries. A regression model has been setup that correlates site specific mapped canopy cover with field measurements. The continuous layer of dense vegetation cover is distinguished with respect to spectral signature of bare soil. The same layer is utilized to estimate the vegetation fraction at pixel level. This product is then stratified into forest and non-forest areas using forest cover stratification maps in sync with country specific definition. This is further validated on ground with respective stakeholders. The vegetation fraction thus developed at pixel level not only distinguishes the forest cover from the non-forest land uses but also enables temporal analysis of deforestation. The classification of the forests and non-forest cover is further improved by visually interpreting the satellite data sets. For dataset consisting of more than one forest type, a calibration model is developed to include the canopy cover for each stratum. Time series analysis of these canopy cover maps thus provide the progressive changes in forest cover and hence information on extent of forest degradation.

This approach has been successfully piloted in the states of Madhya Pradesh and Sikkim in India.

References

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