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Land use and land cover dynamics with special emphasis on shifting cultivation in Eastern Ghats Highlands of India using remote sensing data and GIS

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Abstract Continual, historical, and accurate information about the land use/land cover (LULC) changes of the earth's surface is extremely important for sustainable management of natural resources. In this study, historical topographic sheets, IRS P6 LISS-III, and LANDSAT TM images were used to provide recent and historical LULC conditions of the Eastern Ghats Highlands of east India. The supervised classification results were further improved by employing image enhancement and visual interpretation. Ratio Vegetation Index with fuzzy-based possibilistic c-means classification approach has improved the classification accuracy of the shifting cultivated area. Post-classification comparisons of the classified images indicated that the major change consisted of barren land and forestland changing into agricultural land and scrubland. Between 1931 and 2008, forest cover was decreased from 52.7% to 29.6% of total area. There was an increase in the scrub area from 874 (10.4%) to 1269 km^2 (15.2%), and agricultural land from 978 (11.7%) to 2864 km^2 (34.2%) during the same period. The rate of deforestation was found to be 0.65 km^2 per year for reserve forest and 24.50 km^2 per year for mixed forest. The shifting cultivated area in the district was 308.7 km^2 during 2004, and that has been reduced since then and now is stabilized to 186.4 km^2 area. Among this 186.4 km^2 area, nearly half is covered by abandoned shifting cultivation. The decadal rate of decrease of shifting cultivated area is 0.15% per year. The shifting cultivated areas were mainly distributed at elevations 580–810 and 810–907 m and slopes 20–30 and 30–40%. Southeast and south facing slopes were preferred for shifting cultivation. Based on the identified causes of the change in shifting cultivation, policy recommendations for their better management were made.

Keywords Change detection · Eastern Ghats Highland · Land use · Land cover · Shifting cultivation · Slope and aspect