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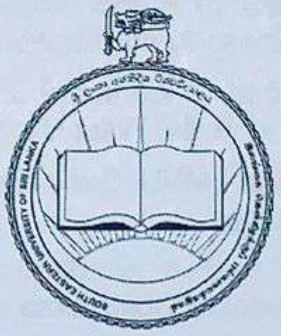

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FOREST COVER CHANGE DETECTION IN MULLAITIVU DISTRICT, SRI LANKA USING LANDSAT MULTISPECTRAL IMAGERY

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ABSTRACT: *The estimation of forest cover and change detection is still a challenging task. Therefore, this study was carried out in a tropical forest, Mullaitivu district of Sri Lanka to assess the forest cover change detection using Landsat multispectral imagery from 1994 to 2022. The objectives of the study were to identify the forest type based on Normalized difference vegetation index (NDVI) and to detect the forest cover change based on supervised and unsupervised classifications. Landsat 8-9 OLI/TIRS C2 L2 (2022) and Landsat 4-5 TM C2 L2 (1994) were used for the change analysis by using ArcGIS Pro version 2.8. The cloud cover of the image was removed using masking and mosaic functions to increase the accuracy of the classification. Different band combination was used for NDVI calculation for Landsat 8 (NIR-5, Red-4 and Blue-3) and Landsat 4-5 (NIR-4, Red-3 and Blue-2) based on the spectral values. Iterative Self-Organized (ISO) Data Analysis Techniques and Support Vector Machine (SVM) learning algorithm were performed for the unsupervised and supervised classifications, respectively. The land use was categorized into four types namely forest, built-up & farmlands, water bodies and bare lands. The accuracy of the Landsat image was validated with Google Earth Pro timelapse images and field observations. Error matrix function was used to derive the Cohen's Kappa statistics with Overall accuracy (OA), Producer Accuracy (PA) and User Accuracy (UA) with 500 sampling points for accuracy assessment. NDVI value was ranged from -0.27 to 0.51 in 1994 and – 0.17 to 0.48 in 2022, and this represented that the forest was under category of dry zone lowland forest with dense vegetation. A trend of land use changes was the same from both supervised and unsupervised classifications. The total forest cover of the district was 58.70 % (157,372.31 ha) in 2022 and 63.33 % (169,798.75 ha) in 1994 with a decline of 4.63 % (12,426.44 ha) over 28 years period. The OA was ranged from 0.89 to 0.9 and K coefficient was ranged from 0.81 and 0.82, and this result indicated that the accuracy level was acceptable. Further study is needed to improve and validate the accuracy of the classifications using high-resolution multi and hyperspectral images with more land use categories.*

Keywords: Forest Cover, Change Detection, Satellite Images, Mullaitivu, Sri Lanka