Assessment of Forest Cover Changes in Somawathiya National Park Using Remote Sensing and Geographic Information System

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Somawathiya National Park is one of the important national park in Sri Lanka. Forest cover of Somawathiya National Park is affected by several climatological and anthropogenic factors. The aim of this study was to analyze the changes in forest cover in this national park using multi-temporal Remote Sensing (RS) data and Geographic Information System (GIS) techniques. For this study, Landsat 7 ETM image of 20th May 2002, 18th May 2007, 18th May 2013 and Landsat 8 (OLI/TIRS) image of 24th July 2017 were used. Supervised classification was performed to produce Land Use and Land Cover (LULC) classes. LULC changes analyzed under four classes that are dense forest, sparse forest, grassland & villus and other lands (Water bodies/Croplands/Built-Up/Bare soil/Sand). Error matrix and Kappa statistics method were introduced to assess the accuracy of the produced LULC maps. Accuracy assessment was performed against the ground truth field samples. If field samples are not available Google Earth imageries were employed. Overall accuracies resulting from supervised classification of 2002, 2007, 2013 and 2017 imageries were 88.42% (Kappa 0.84), 86.51% (Kappa 0.82), 88.89% (Kappa 0.85) and 90.91% (Kappa 0.86), respectively. Thus the classification process in this study shows high classification accuracy and a strong agreement. The results of the analysis revealed that from 2002 to 2007, 2007 to 2013 and 2013 to 2017 the forest covers has decreased by 563 ha, 925 ha and 895 ha, respectively representing 1.49%, 2.46% and 2.37% change. Highest rate of forest cover reduction was recorded from year 2007 to 2013 (185 ha/year - 0.49%) while the least rate was recorded during 2002-2007 period (112.6 ha/year - 0.3%). It emerged that from 2002 to 2017, forest cover has reduced by 2383 ha (158.9 ha/year- 0.42%) which is amounting to 6.33% reduction.

Key words: Forest Cover Changes, Geographical Information Systems (GIS), Land use and Land Cover classes, Remote Sensing (RS), Somawathiya National Park