

Predicting Forest Change in Phu Phan National Park, Thailand Using Multi-Temporal Landsat Satellite Images

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Abstract:

The Royal Forest Department of Thailand has permitted people to use the resources in national parks since 2005. It leads to a decrease in forest areas. This study aims to monitor and predict forest land change in Phu Phan National Park using Landsat 5 TM images in 1998 and 2008, and Sentinel-2 MSI image in 2018. The atmosphere correction was conducted for satellite images. Land use changes were classified by object base image analysis (OBIA), include forest, agriculture, built-up, water and miscellaneous. The land use maps were measured, and then the CA-Markov model was applied to predict the forest change in a year of 2028. The results demonstrate that overall accuracy (OA) of land use maps is 85.6%, 88%, and 89.6% in 1998, 2008 and 2018, respectively. The land use map in 2018 is more accurate than others because the high-resolution image and current data input. Moreover, the use of reference data nowadays has high potential and reality for classification. During 1998 to 2008, forest and built-up extended 45.35% and 5.07%, respectively. Meanwhile, miscellaneous, agriculture, and water decreased by 41.38%, 21.92%, and 3.45%. During 2008 to 2018, agriculture, miscellaneous, and built-up slightly increased by 21.92%, 14.75%, and 12.26%, respectively while forest and water decreased by 48.82% and 2.24%, respectively. The predicted forest change in 2028 is a decrease by 10.49% due to land use change to miscellaneous, agriculture, built-up, and water area, as forest is likely to be trespassed for built-up and agriculture areas as a result of local population growth. The results of the study can be useful for planning and managing the national park in the future.