

Deforestation detection in Kinabalu Area, Sabah, Malaysia by using multi-sensor remote sensing approach

Abstract

This paper examines use of multi-sensor remote sensing approach for deforestation detection in the tropics. Multi-sensor satellite data of Landsat-MSS of 1973 and Landsat-TM of 1991 and 1996 were employed. Accuracy of image-to-image registration was below 1 pixel. Relative radiometric normalization of Landsat-MSS 1973 and Landsat-TM 1991 to Landsat-TM 1996 as the reference image was carried out to remove the unwanted variabilities between all the satellite images. Image differencing algorithm with Normalized Difference Vegetation Index (NDVI) was examined for deforestation detection. The performance of the NDVI image differencing algorithm for deforestation detection between 1973 and 1996 was investigated at three test sites covered with reliable ground truths. The accuracy of detection was satisfactory that the algorithm was used in deforestation detection of the whole study area in two change periods i.e. I: 1973-1991 and II: 1991-1996. Although false deforestation pixels in period I were also detected, it can easily be rectified using a land use map of 1984. In total, 2,445ha of forest, which is almost 1% of the study area, were cleared from 1973-1996 and most of them were deforested in period I (2,090ha). This study concludes that the multi-sensor approach is a useful solution for deforestation detection because of better temporal coverage. It can also provide more satellite data for the application and thus lessen data acquisition problem due to cloud cover which is a consistent problem for the tropics.