

## Rapid Assessment of Land Surface Conditions in Insular Southeast Asia with MODIS Reflectance Composites: An Example using 2004 Imagery

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Land surface conditions are changing rapidly in Southeast Asia as forests are cleared for plantations and as frequent wildfires burn vegetation in different parts of the region. Frequent wildfires, which are responsible for the regional haze problem, may produce denuded surfaces as vegetation fuels are consumed after multiple fire episodes. Complete removal of vegetative cover may exacerbate flooding in urban areas and increase soil erosion and sediment yield in coastal areas. To evaluate current land-surface conditions, we processed a set of satellite images derived from the Moderate Resolution Imaging Spectrometer (MODIS) gridded to 500 m resolution. 32-day reflectance composites from MODIS bands 1-7 were obtained from the University of Maryland (<http://glcf.umiaccs.umd.edu/index.shtml>) for the period June-August 2004. These data were composited further to create 96-day composite images, which were classified into five land cover types: dense forest, other vegetation, bare/urban, water, and cloud using a neural network classifier. Elevation data from the Shuttle Radar Topography Mission (SRTM) were used to stratify the forest class into Lowland/plantation forest ( $\leq 400$  m ASL), Upland forest (400-1000 m ASL), and Montane forest ( $\geq 1000$  m ASL) (Figure 1). The accuracy of the classified image was assessed using 15 SPOT-5 false colour composite images obtained as quick looks. An error matrix indicated 83 percent accuracy overall; although the accuracy increased to 91 percent if only large validation polygons ( $> 5,000$  ha) are considered. The forest/plantation area in Figure 1 is 118.97 million ha (approximately 55 percent of the land surface) compared with non-forest (96.96 million ha). We analyzed bare/urban class using the SRTM data to reveal that many bare/urban areas were found on relatively steep slopes (mean = 10.44 %, SD = 38.44). We then overlaid a set of fire observations derived from MODIS thermal anomaly data for 2000-2004 which showed that 62 percent of fires occurred in areas classified as non-forest in 2004. We conclude that wildfires are likely important in the production of bare surfaces, which likely increase runoff throughout the region.

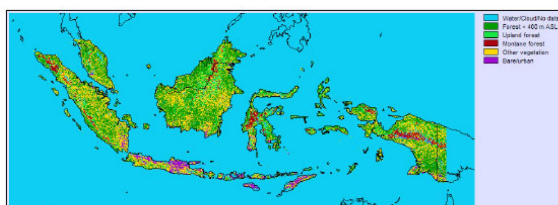


Figure 1: Classified land cover in insular Southeast Asia derived from MODIS reflectance composites from June-August 2004.