

500M SPATIAL RESOLUTION LAND COVER MAP IN INSULAR SOUTHEAST ASIA

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1. INTRODUCTION

In this paper we present the methodology and accuracy assessment of a new 500m spatial resolution land cover map in insular Southeast Asia. The map was produced using Moderate Resolution Imaging Spectroradiometer (MODIS) images (acquired 1st Jan-2nd Jul 2007), elevation information and peatland maps. The map covers the Malaysian Peninsula and the major islands of Sumatra, Java and Borneo, in addition to numerous smaller islands. The classification scheme of 12 classes reflects the special characteristics of land cover in insular Southeast Asia.

2. MATERIALS AND METHODS

Terra MODIS L2G (version 5) Daily Surface Reflectance Product (MOD09GA) was used in this study. The map covers the area of the MODIS sinusoidal grid blocks h27v08, h28v08, h28v09, h29v08 and h29v09. Altogether 250 images were used, representing the 50 most cloud free images for each grid block during the data collection period. For each grid block, an average composite was built using the mean value of all valid observations for any particular point.

In addition, Shuttle Radar Topography Mission (SRTM) 90m version 3 digital elevation information and existing peatland maps were used in the classification. The classification was started with an unsupervised ISODATA clustering into 100 clusters using bands 1 (0.64 μ m), 2 (0.86 μ m), 4 (0.56 μ m), 6 (1.64 μ m) and 7 (2.14 μ m). The clusters were grouped into five classes (water, forest, plantation/secondary forest, mosaic and open) using visual interpretation. The five main classes were subsequently split further using the auxiliary data and/or manual delineation, forming 12 land cover classes that took into account the special characteristics of this region, most notably peat swamp forests, elevation zones in humid tropical forests and small-holder dominated mosaic areas.

For accuracy assessment, 20 high resolution Satellite Pour l'Observation de la Terre (SPOT 4 and 5) scenes were acquired during the first half of 2007 (23rd Feb-30th Jun). Stratified random sampling was used to select a total of 1000 sample pixels on the final land cover map on areas covered by the reference high resolution SPOT scenes. Each 500x500m sample pixel was visually evaluated on the SPOT scenes and allocated to one of the classes.

3. LAND COVER MAP

Figure 1 presents land cover distribution in the western part of insular Southeast Asia. The figure covers nearly full extent of the map. The accuracy assessment revealed that there are only five classes in the map with user's accuracies less than 80%. The clearest confusion between classes occurred between various secondary/plantation forest, mosaic and open land classes. This is hardly surprising since these types of classes typically form a continuum from open agricultural areas to secondary/plantation forests and usually intermingle leading to misclassifications along the edges and ecotones. The overall accuracy of the map is 81.5% with kappa coefficient 0.77.

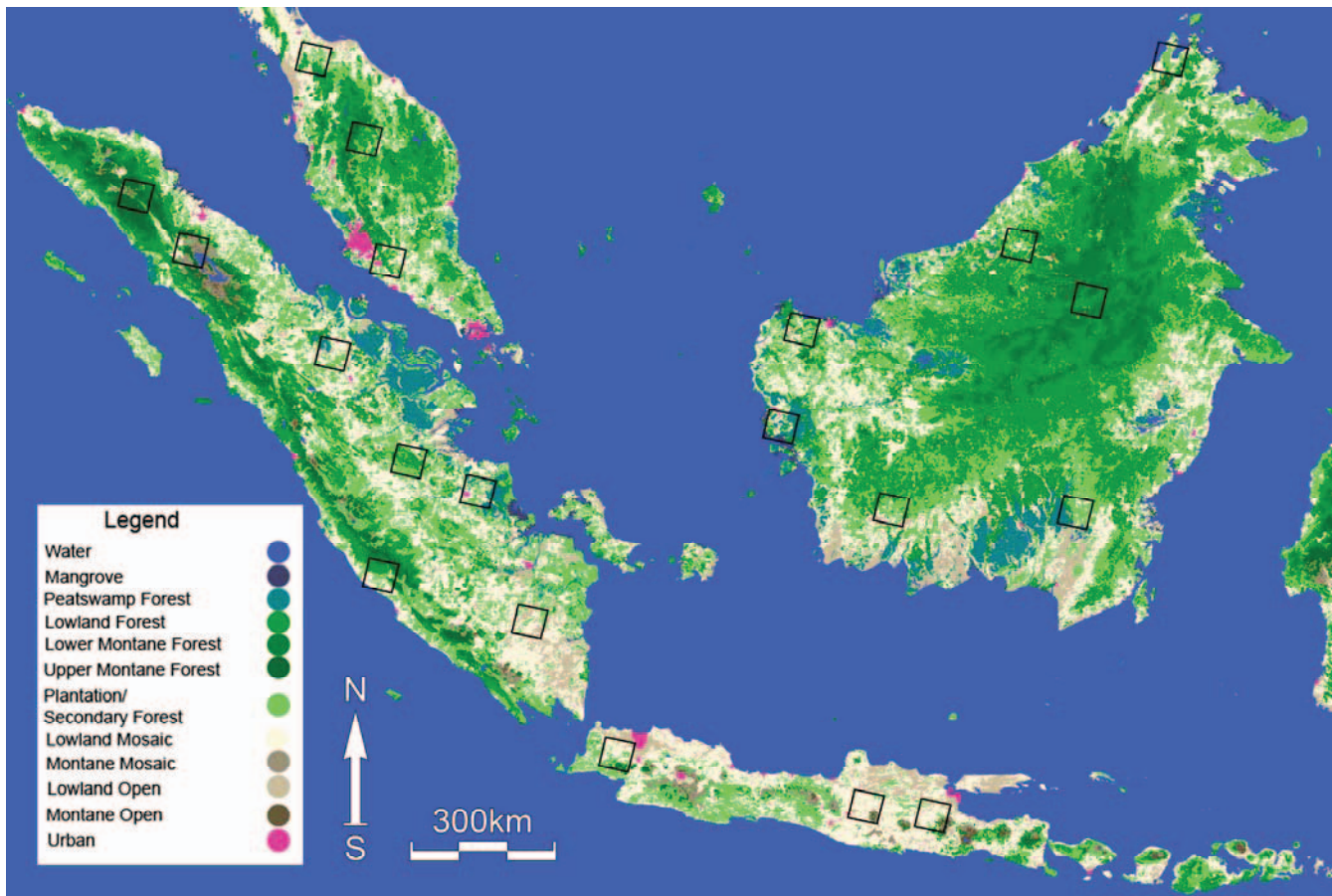


Figure 1. Example of the land cover map. Black squares signify the locations of the reference SPOT scenes.

4. CONCLUSION

In this paper we present a new regional land cover map for the western part of insular Southeast Asia. With an improved 500m spatial resolution and classification scheme especially designed for insular Southeast Asia, it provides new information on the current status of land cover in this region experiencing rapid land cover changes. The map is published in the hope that it will prove useful for a wide range of researchers who need up-to-date land cover information in insular Southeast Asia.