

# **Estimation of Rubber Tree Plantation Areas In Western Mindanao, Philippines using Landsat Imagery and Physical Data**

Bryan Clark B. Hernandez<sup>1,a</sup>, Sheryl Rose C. Reyes<sup>1,b</sup> and Dr. Ariel C. Blanco<sup>1,c</sup>

<sup>1</sup>*Training Center for Applied Geodesy and Photogrammetry,  
Department of Geodetic Engineering, University of the Philippines-Diliman, Quezon City,  
Philippines,*

*Email: [bryanclark07@gmail.com](mailto:bryanclark07@gmail.com)<sup>a</sup>, [sheryl0724@yahoo.com](mailto:sheryl0724@yahoo.com)<sup>b</sup>, [ayeh75@yahoo.com](mailto:ayeh75@yahoo.com)<sup>c</sup>*

The natural rubber production in the Philippines remains to be a viable agro-industrial crop but dismal production output in the past years threatens sustainability of the industry. Mindanao island, in the southern Philippines, is a favourable location for growing rubber trees due to its evenly distributed rainfall of 1,800 mm/yr and suitable mean monthly temperature of 23°C – 33°C. Almost all of the rubber plantations are found in the island. More than 40% of this is grown and produced in Western Mindanao, also known as the Zamboanga Peninsula. As senility in many rubber tree plantations in this region is almost reached, it is important that spatial information of the age and extent of the current rubber tree stands is estimated and assessed to integrate into land use planning and strategic decision-support systems. The study aims to develop a mapping and monitoring methodology for rubber trees in Western Mindanao estimating the ages, growth stages and size of the plantation areas using Landsat imagery, integrating into available climate and soil information as reference for further suitability analysis. Acquired Landsat imagery covering Path/Row 114/55 during the period of 1990, 2000 and 2013 were pre-processed for calibration, atmospheric correction using FLAASH, cloud masking and gap-filled (for 2013 image). Six bands and other indices including Tasseled Cap (Brightness, Greenness and Wetness), Wetness-Brightness Difference Index (WBDI), Normalized Difference Vegetation Index (NDVI) and the Normalized Difference Structure Index (NDSI) were layer stacked for further image classification. Two methods of classification were done on the images: Unsupervised classification by ISODATA method and Decision Tree Classifier using the Regions of Interests (ROI) collected during the field work. The result yielded differentiation of the young (<6 years) and mature rubber (>6 years) tree stands. Soil, annual mean rainfall and temperature data were overlain into the thematic map to provide temporal visualizations of rubber tree growth in the region considering these external factors. This rapid assessment of rubber tree plantations using freely available Landsat images is a beneficial tool for local government units in the region to analyze the physical and political factors and incorporate them into their planning and development framework.

Keywords: Rubber Plantation, Western Mindanao, Philippines, Landsat