Name	Counterpart	Title
Mohd. Zuhdi, Zuhratus Saleh	**Z02**	Building hyperspectral spectral signature of tropical lowland vegetation: Identification of vegetation state and condition using Hyperspectral Imagery

Background and Objectives

This study is addressing the use of hyperspectral imageries collected by CRC in 2020 and the ground survey to relate the hyperspectral reflectance of image and the vegetation variability (Nidamanuri & Zbell, 2011). Therefore, the goal is to observe how vegetation variability i. e.: species, stage of age, environmental condition and diversity influences the spectral pattern of the images, and to identify the spectral reflectance of tropical lowland vegetation (Papes *et al.*, 2013) in order to expand the library of spectral signature which is currently still lacking.

Method

The study was conducted from July to November 2021. Field data collection was conducted in areas covered by existing hyperspectral imagery, namely smallholder plantation areas in Batang Hari Regency and inside the REKI forests concession, Jambi Province of Indonesia (Fig. 1).

The equipment used for this study included: Emlid DGPS rover, motor cycle, digital camera, tally sheet, 16 GB RAM i7 Laptop, 1 TB external SSD, ArcGIS and Envi software (Marhaento & Mada, 2015). The main material was the available hyperspectral imagery data acquired from an aircraft from January to February 2020 using the HySpex VNIR 1600 sensor (Amigo *et al.*, 2015). The bandwidth is 3.26 nm, consisting of 186 bands and ranging from 400 nm to 1000 nm.

The study started with observation of existing hyperspectral data, identification of coverage area and comparison of land use maps and accessibility maps. During the field survey, some activities were performed; 1) Measurement of position with DGPS rover with averaging method. 2) Species identification with the help of a taxonomist, 3) Recording the status of species, including age, height, crown diameter and health, 4) Recording environmental condition, including topography, drainage (moisture), density and shading. Each individual of known vegetation in the image is then delineated to create a zone boundary of statistical averaging of its reflectance value.

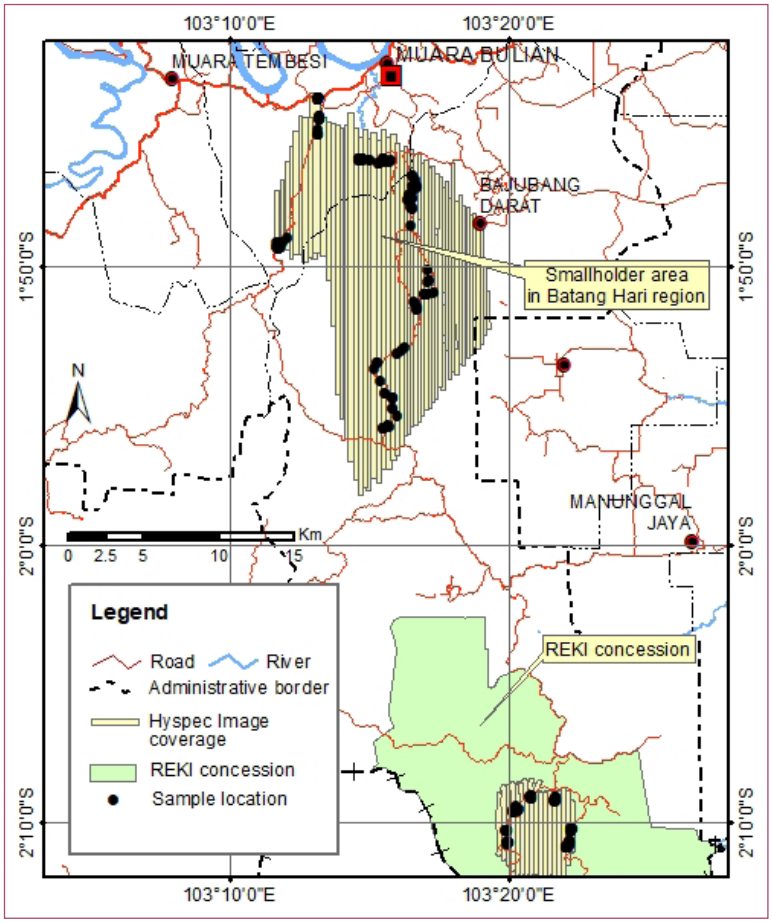


Figure 1. Research area in Batang Hari region and REKI forest concession

Results

This study has produced the collection of vegetation data of 350 points over the whole study area. Of these, 200 points are located in smallholder plantations consisting primarily of crop vegetations. The remaining 150 points are located in the REKI forest, which consist entirely of forest vegetation. They comprise a total of 188 species, 81 of which are forest vegetations, the rest are plantation crops. Example of the data collection is presented in figure 2.

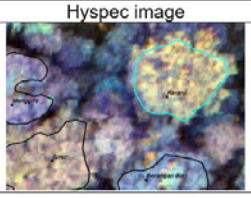
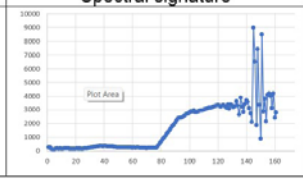
No	Hyspec image	Photo	Location:	Name:	Spectral signature	Dimension	Conditions
275			REKI 103° 22' 9.5" E 2° 10' 49.2" S	Local : Keranji Scientific: (*Dialium indum*)		Height : 34 m Diameter : 195 cm Crown width: 10 m, 8 m	Healthy, mature, growing in flat to undulating area

Figure 2. Example of collected vegetation from hyperspectral data.

References

Amigo, M., Babamoradi, H., & Elcoroaristizabal, S. (2015). Analytica Chimica Acta Hyperspectral image analysis . A tutorial.

Marhaento, H., & Mada, U. G. (2015). Tutorial ENVI 4.1. untuk Terapan Kehutanan Tingkat Dasar. (March).

Nidamanuri, R. R., & Zbell, B. (2011). Transferring spectral libraries of canopy reflectance for crop classification using hyperspectral remote sensing data. Biosystems Engineering, 110(3), 231–246.

Papes, M., Tupayachi, R., Martinez, P., Peterson, A. T., Asner, G. P., & Powell, G. V. N. (2013). Seasonal variation in spectral signatures of five genera of rainforest trees. IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, 6(2), 339–350.