

# Monitoring rice cropping intensity and their dynamics changes in regional scale of Java Island, Indonesia

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**Abstract:** Information on paddy-rice cropping intensity over wide areas is essential to support a sustainable agriculture and food security program since it should be related to an estimation of land productivity, supporting decisions about water supply and agricultural development planning. In tropical region of Java, monitoring of paddy-rice field continuously by using remote sensing technology will provide information related to some sequential land cover patterns that exist in the field, such as (1) paddy-barren land-secondary crop-barren land, (2) paddy-barren land-inundated-paddy-barren land-secondary crop and (3) paddy-barren land, secondary crop-barren land-inundated-paddy, where the sequences are repeated year after year following the seasons. On these sequences, the temporal covers, which are vegetation (paddy), soil (barren land) and water (inundated), will be reflected by the variation of the vegetation attributes, either the vegetation index (VI) or leaf area index (LAI). This study will investigate temporal vegetation dynamics of long-term paddy field considering seasonal events and climatic variability in Java Island. Then, we will generate a rice cropping intensity map and analyze their dynamics changes using those temporal vegetation dynamics.

Recently, most of available agricultural maps of Java are determined by applying single-date satellite imagery, which was necessarily coincident with temporarily cover types, either barren land or inundated (water). The approach in this project is different from the previous, since we consider a variability of temporal vegetation in paddy fields. The characterization of vegetation dynamics due to monitoring its seasonal changes continuously would provide sufficient information of the specific use in the paddy fields, including the intensity of rice cropping.

We will explore 250 m multi-temporal MODIS EVI 16-day composite data from 2000 to 2011 (more than 500 images) to characterize the vegetation dynamics of the paddy-rice fields in Java. Although an issue about the availability of sufficient quality of data sets had been arising out of the time-series analysis of MODIS, but we will use the filtered dataset by wavelet function in order to identify and reduce the overall noise so as not to lose useful information from the time series data (Setiawan, et al. 2011).

A distribution map of the specific use in paddy field of Java as a means of paddy fields with single cropping, double cropping and triple cropping system will be provided, including an analysis on their dynamics changes. Characterizing the long-term vegetation dynamics of paddy field provides information about the characteristics and trend of change in the paddy fields, either caused by natural factor (climate variability) or human activities (land conversion).

**Keywords:** Rice cropping intensity, dynamics change, MODIS, Java