Rice Area Determination Using Landsat-Based Indices and Land Surface Temperature Values

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Abstract : In this study, it was aimed to determine a route for identification of rice cultivation areas within Thrace and Marmara regions of Turkey using remote sensing and GIS. Landsat 8 (OLI-TIRS) imageries acquired in production season of 2013 with 181/32 Path/Row number were used. Four different seasonal images were generated utilizing original bands and different transformation techniques. All images were classified individually using supervised classification techniques and Land Use Land Cover Maps (LULC) were generated with 8 classes. Areas (ha, %) of each classes were calculated. In addition, district-based rice distribution maps were developed and results of these maps were compared with Turkish Statistical Institute (TurkSTAT; TSI)’s actual rice cultivation area records. Accuracy assessments were conducted, and most accurate map was selected depending on accuracy assessment and coherency with TSI results. Additionally, rice areas on over 4° slope values were considered as mis-classified pixels and they eliminated using slope map and GIS tools. Finally, randomized rice zones were selected to obtain maximum-minimum value ranges of each date (May, June, July, August, September images separately) NDVI, LSWI, and LST images to test whether they may be used for rice area determination via raster calculator tool of ArcGIS. The most accurate classification for rice determination was obtained from seasonal LSWI LULC map, and considering TSI data and accuracy assessment results and mis-classified pixels were eliminated from this map. According to results, 83151.5 ha of rice areas exist within study area. However, this result is higher than TSI records with an area of 12702.3 ha. Use of maximum-minimum range of rice area NDVI, LSWI, and LST was tested in Meric district. It was seen that using the value ranges obtained from July imagery, gave the closest results to TSI records, and the difference was only 206.4 ha. This difference is normal due to relatively low resolution of images. Thus, employment of images with higher spectral, spatial, temporal and radiometric resolutions may provide more reliable results.

Keywords : landsat 8 (OLI-TIRS), LST, LSWI, LULC, NDVI, rice

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