

Using Time Series NDVI to Model Land Cover Change: A Case Study in the Berg River Catchment Area, Western Cape, South Africa

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Abstract : This study investigates the use of MODIS NDVI to identify agricultural land cover change areas on an annual time step (2007 - 2012) and characterize the trend in the study area. An ISODATA classification was performed on the MODIS imagery to select only the agricultural class producing 3 class groups namely: agriculture, agriculture/semi-natural, and semi-natural. NDVI signatures were created for the time series to identify areas dominated by cereals and vineyards with the aid of ancillary, pictometry and field sample data. The NDVI signature curve and training samples aided in creating a decision tree model in WEKA 3.6.9. From the training samples two classification models were built in WEKA using decision tree classifier (J48) algorithm; Model 1 included ISODATA classification and Model 2 without, both having accuracies of 90.7% and 88.3% respectively. The two models were used to classify the whole study area, thus producing two land cover maps with Model 1 and 2 having classification accuracies of 77% and 80% respectively. Model 2 was used to create change detection maps for all the other years. Subtle changes and areas of consistency (unchanged) were observed in the agricultural classes and crop practices over the years as predicted by the land cover classification. 41% of the catchment comprises of cereals with 35% possibly following a crop rotation system. Vineyard largely remained constant over the years, with some conversion to vineyard (1%) from other land cover classes. Some of the changes might be as a result of misclassification and crop rotation system.

Keywords : change detection, land cover, modis, NDVI

Conference Title : ICRSETE 2015 : International Conference on Remote Sensing, Environment and Transportation Engineering

Conference Location : Montreal, Canada

Conference Dates : May 11-12, 2015