ABSTRACT

The Landsat system has contributed significantly to the understanding of the Earth observation for over forty years. Since May 2013, data from Landsat 8 has been available online for download, with substantial differences from its predecessors, having an extended number of spectral bands and narrower bandwidths. The objectives of this research were majorly to carry out a cross comparison analysis between vegetation indices derived from Landsat 7 Enhanced Thematic Mapper Plus (ETM+) and Landsat 8 Operational Land Imager (OLI) and also performed statistical analysis on the results derived from the vegetation indices. Also, this research carried out a change detection on four land cover classes present within the study area, as well as projected the land cover for year 2030. The methods applied in this research include, carrying out image classification on the Landsat imageries acquired between 1984 – 2016 to ascertain the changes in the land cover types, calculated the mean values of differenced vegetation indices derived from the four land covers between Landsat 7 ETM+ and Landsat 8 OLI. Statistical analysis involving regression and correlation analysis were also carried out on the vegetation indices derived between the two sensors, as well as scatter plot diagrams with linear regression equation and coefficients of determination (R2). The results showed no noticeable differences between Landsat 7 and Landsat 8 sensors, which demonstrates high similarities. This was observed because Global Environmental Monitoring Index (GEMI), Improved Modified Triangular Vegetation Index 2 (MTVI2), Normalized Burn Ratio (NBR), Normalized Difference Vegetation Index (NDVI), Modified Normalized Difference Water Index (MNDWI), Leaf Area Index (LAI) and Land Surface Water Index (LSWI) had smaller standard deviations. However, Renormalized Difference Vegetation Index (RDVI), Anthocyanin Reflectance Index 1 (ARI1) and Anthocyanin Reflectance Index 2 (ARI2) performed relatively poorly because their standard deviations were high. The

correlation analysis of the vegetation indices that both sensors had a very high linear correlation coefficient with R2 greater than 0.99. It was concluded from this research that Landsat 7 ETM+ and Landsat 8 OLI can be used as complimentary data.

Keywords: Landsat 7, Landsat 8, Vegetation Indices, Normalized Difference Vegetation Index (NDVI), Land Cover Change