Comparative Study of Pixel–Based and Object–Based Image Classifications in Land Cover and Land Use Mapping of Aba Main Township, Nigeria, for Environmental Sustainability.

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SUMMARY

This study is a comparative study of the pixel-based and the object-based image classification techniques on land cover and land use mapping of Aba main township, Nigeria, using high resolution satellite imagery Aba Main Township acquired in 2007 and 2012 for the study. A standard classification scheme was adopted based on the USGS classification. For the pixel-based image analysis, the supervised image classification was performed using the maximum likelihood classifier in ILWIS software while the object-based classification was done using eCognition software. Accuracy assessments of the classifications in pixel-based was carried out using standard error matrix generated from the cross tables and kappa statistics generated for comparison in the confusion matrix tables. The object-based approach involved the segmentation of image data into objects at multiple scale levels. Objects were assigned class rules using spectral signatures, shape and contextual relationships. The overall analysis and the results of the comparative study showed that the object-based classification techniques gave higher and better accurate results (including higher producer and user accuracy) for most of the land cover classes in the study area than those achieved by pixel-based classification technique. This however, does not suggest that the pixel- based method should be thrown away. There is still room for further research on the efficacy or otherwise of the pixel-based classification and also the overall acceptability of the object-based method of classification as the optimal method for satellite image classification for land use and land cover mapping in an urban environment. The limitation of the pixel-based method is in its relative advantage of working best only with High Resolution Multispectral Satellite Imageries like IKONOS, QUICKBIRD, CARTOSAT, etc., and its poor performance with medium to low resolution imageries like LANDSAT, Nigeria Sat-1, etc. Finally, a landuse and land cover maps of Aba Main Township for 2007 and 2012 were produced in ArcGIS 10.0 to show level of changes and development in the town over the period of study. This will facilitate efficient resources inventory, planning and environmental sustainability.

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