

A Single Feature Probability-Object Based Image Analysis for Assessing Urban Landcover Change: A Case Study of Muscat Governorate in Oman

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Abstract : The study of the growth of built-up areas and settlement expansion is a major exercise that city managers seek to undertake to establish previous and current developmental trends. This is to ensure that there is an equal match of settlement expansion needs to the appropriate levels of services and infrastructure required. This research aims at demonstrating the potential of satellite image processing technique, harnessing the utility of single feature probability-object based image analysis technique in assessing the urban growth dynamics of the Muscat Governorate in Oman for the period 1990, 2002 and 2013. This need is fueled by the continuous expansion of the Muscat Governorate beyond predicted levels of infrastructural provision. Landsat Images of the years 1990, 2002 and 2013 were downloaded and preprocessed to forestall appropriate radiometric and geometric standards. A novel approach of probability filtering of the target feature segment was implemented to derive the spatial extent of the final Built-Up Area of the Muscat governorate for the three years period. This however proved to be a useful technique as high accuracy assessment results of 55%, 70%, and 71% were recorded for the Urban Landcover of 1990, 2002 and 2013 respectively. Furthermore, the Normalized Differential Built - Up Index for the various images were derived and used to consolidate the results of the SFP-OBIA through a linear regression model and visual comparison. The result obtained showed various hotspots where urbanization have sporadically taken place. Specifically, settlement in the districts (Wilayat) of AL-Amarat, Muscat, and Qurayyat experienced tremendous change between 1990 and 2002, while the districts (Wilayat) of AL-Seeb, Bawshar, and Muttrah experienced more sporadic changes between 2002 and 2013.

Keywords : urban growth, single feature probability, object based image analysis, landcover change

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