Suggested topic: 3 Remote Sensing Applications - urban monitoring

Monitoring of urban sprawl from historic maps and satellite imagery: A case study of Auckland, New Zealand, 1842-2014

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As the largest city in New Zealand, Auckland has experienced phenomenal sprawling since its initial settlement more than a century ago. Uncontrollable urban sprawling has not only encroached on the adjacent natural vegetation, but also imposes challenges on urban transport and infrastructure planning. The purpose of this study is to trace the continuing expansion of the city via analysis of historic land cover maps and recent satellite imagery in ArcGIS, and to demonstrate the potential for further housing in-filling to meet the demand for residential land. Analysis of such data in ERDAS Imagine reveals that the urban area of the city has expanded by 1710 fold, or at a rate of 332 ha per annum during 1842-2012. The pace of growth was 132 ha per annum during the first century of its settlement (1842-1945), but jumped to 526 ha per annum during 1975-2012. This explosive growth is driven partly by the drastic expansion in the metropolitan population from a few thousands in 1861 to over half a million in 1966, and to 1.4 million in 2013. Unsupervised classification and vegetation indexing maps derived from a Landsat 8 image recorded on 30 April 2014 both confirm that actual urban built-up area stands at around 23,000-26,000 ha, less than half of the metropolitan area of 56,480 ha. This low proportion suggests that there is still plenty of room for more houses to be built through infilling within the current metropolitan bound. The high house price in Auckland due to insufficient supply of residential land can be tackled by filling the remaining green space through modifying the current planning regulations.