USE OF A MEDIUM RESOLUTION SATELLITE IMAGERY FOR POPULATION ESTIMATION IN NIGERIA

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ABSTRACT

The need to have reliable population figures in Nigeria, despite various attempts, has not been successful. the problems include lack of regular census, lack of reliable result, non-enumeration of some settlements due to poor accessibilities, non-acceptance of the results by different stake holders and lack of population data for periods between one census and another. This study is carriedout to device an alternative mean of providing reliable population figures for the country, which will be generally accepted and obtained at regular interval. The study was carried out with band 2, 3, &4 of Landsat ETM+ image. Other remote sensing data required for more effective analysis could not be obtained. Based on some reasons, Abuja, the Federal Capital Territory of Nigeria was chosen as the case study. The period between the recent censuses in the country (1991 and 2006) was chosen as the time frame. Two main approaches were employed in the study namely; Developed Area Correlation (DAC) and the Pixel Correlation Method (PCM). In the DAC method, modified Ordinary Least Squares (MOLS) and modified Geographically Weighted Regression (MGWR) approaches were applied using the areal extent of built up areas of 1991 and 2006, and the population figures of 1991 as the explanatory variables. Two predictions were made and used interchangeably as the dependent variables. One on statistical computation called geometric projection, while the other is based on the GIS called assumed growth. Crowding indices were determined and used in two places. The first usage is as weights for the MGWR approach of DAC. Secondly, as the ancillary data in the estimation of the population using PCM approach. In the PCM approach, supervised and unsupervised classifications were experimented but the supervised classification result was used to determine pixels of built up areas. The results of the three approaches were compared with the census and the predicted figures.

ABSTRAK

Kerajaan Nigeria telah melaksanakan pelbagai cara untuk mendapatkan jumlah populasi penduduk ynag meyakinkan untuk negara tersebut. Malangnya, usaha tersebut sentiasa menemui kegagalan akibat beberapa faktor termasuklah tiada bancian secara tetapa atau berkala, keputusan bancian yang meragukan, terdapat beberapa kawasan yang sukar untuk diakses sekaligus menyukarkan pengumpulan data, keputusan bancian yang bercanggah diantara bancian-bancian yang telah dijalankan lalu menimbulkan keraguan pada data populasi ynag telah diperolehi. Kajian ini dijalankan untuk menyediakan cara alternatif yang boleh digunapakai bagi mendapatkan jumlah populasi yang lebih meyakinkan. Kajian ini menggunakan perisian *Landsat ETM+ Image, band 2, 3 & 4*. Wilayah Persekutuan Nigeria, Abuja, telah dipilih sebagai kajian kes dengan tempoh bancian diantara 1991 hingga 2006. Terdapat dua pendekatan yang digunakan untuk menjalankan kajian ini iaitu *Developed Area Correlation (DAC)* dan *Pixel Correlation Method (PCM)*. Bagi *DAC*, penggunaan *Modified Ordinary Least Squares (MOLS)* dan *Modified Geographically Weighted Regression (MGWR)* telah diaplikasikan menggunakan kawasan dengan keluasan yang sama pada tahun 1991-2006, dengan jumlah populasi pada tahun 1991 sebagai *explanatory variables*. Dua ramalan telah dibuat dan sekaligus digunakan sebagai *dependant variables*, iaitu unjuran geometrik dan jangkaan pertumbuhan. Petunjuk kesesakan digunakan di dua tempat yang telah dikenalpasti sebelumnya. Petunjuk pertama bertindak sebagai beban kepada pendekatan *MGWR*. Petunjuk kedua bertindak sebagai data tambahan dalam menganggarkan populasi menggunakan *PCM*. Bagi penggunaan *PCM,* klasifikasi yang diselia dan tidak diselia telah diuji dan keputusan daripada ujian tersebut menunjukkan klasifikasi yang diselia boleh digunakan bagi mengenalpasti piksel bagi kawasan yang telah dicadangkan. Keputusan bagi ketiga-tiga pendekatan kemudian dibandingkan dengan bancian yang telah dilaksanakan sebelum ini dan jumlah populasi yang dianggarkan.