Mexico City Land Cover Change from 1985 to 2016

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Introduction

- Mexico City is the capital and the most populous city of Mexico. In 2005 its whole metropolitan zone registered 19.2 million inhabitants. The city has expanded over three different entities: the Federal District where it was founded originally, the State of Mexico (which now contains over 50% of the city’s population), and a portion of the State of Hidalgo that recently has been incorporated into the metropolitan zone. As of 2016, the population of Mexico City is estimated to be 8.9 million, while the entire metropolitan area is estimated to be 21.1 million, making it the most populous metropolitan area in the Western Hemisphere. It is located in the Valley of Mexico, at an altitude of 2,240 meters (7,350 feet). We analyzed land cover trends over the last three decades within certain areas of the metropolitan area.

- For our primary analysis, we focus on two specific sections of the greater metropolitan area which have experienced drastic growth during our study period. We are expanding upon the spatial and temporal extents of similar research that observed urbanization rates in Urban Mexico City between 1973 and 2000. That research concluded that the urbanized area surrounding the southwest part of Mexico City has expanded at the rate of 36.2% during the 1980s.

- The government in Mexico City has implemented measures to limit urban growth and maintain natural resources in certain areas designated as Preservation Zones (Suelos de Conservación, SC). The existence of the SC categorization dates to the beginning of the 1980s, when the Urban Development Plan for the Federal District developed a zoning that divided the territory into two main zones: urban and non-urban areas. However, growth continues in the SC areas despite regulations, due to a lack of effective planning norms and an increase in the living standards of the poor. This analysis can be used to evaluate the effectiveness of those policies.

Data and Methods

- Images used for analysis were acquired during the winter months in the years of 1985, 1994, 2000, 2010 (Landsat 5 TM), and 2016 (Landsat 8 OLI).
- Band display combinations of RGB 7-4-2, 7-5-3, and 3-2-1 (true color) were primarily used to select training sites.
- Training site regions were chosen simultaneously, with all of the images as necessary for each image to be used.
- As a supervised maximum likelihood classification was utilized, and accuracy assessments were performed using training and assessment sites collected by separate parties. Producer and user accuracies for all classifications were between 90% and 100%.
- Seven classes were created during classification. These were later combined and simplified into four classes for change detection and display purposes: Two urban classes and three vegetation classes were combined into one class each.

Conclusions & Results

- Mexico City has undergone vast land cover changes over time, and preservation laws have likely had a positive effect on development in protected areas. The most rapid growth did not occur within the preservation zones, but instead in Toluca.
- From 1985 – 2016, for the Tlalnepantla-Izcalli subset area, water bodies increased in area by 13.5 km², vegetation increased in area by 36.6 km², barren soils decreased in area by 583.2 km², and urban area increased by 160.2 km².
- From 1985 – 2016, for the Toluca subset area, water bodies increased in area by 2.9 km², vegetation increased in area by 31.8 km², barren soils decreased in area by 529.9 km², and urban area increased by 495.3 km².
- From 1985 – 2016, for the greater Mexico City study area (pictured right), water increased in area by 45.6 km², vegetation increased in area by 479.9 km², barren soils decreased in area by 2,253.6 km², and urban area increased by 1,732.8 km².

References

1. www.populationreview.com
4. Landsat Image, USGS Earth Explorer: LC08_L1TP_026046
5. Tlalnepantla-Izcalli subset areas overlay.