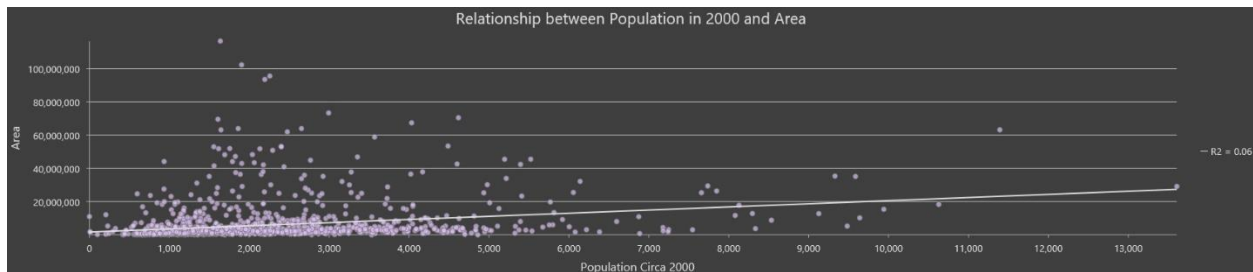


Atlanta Urban Change

Kooper Howerter

1. Although admittedly pretty small, there is a slight positive relationship between population in 2000 and the area of impervious surfaces in our Atlanta study area. I would not call it linear however as there are many outlier points with low population but large areas of impervious surfaces. I think this is likely because in the urban core and regions close to the center of the city, there is not a huge population, but it is almost entirely impervious surfaces (businesses, parking, roads, attractions, etc.).



2. (Using polygons to points method).

	Urban Core	Inner Zone	Outer Zone	Outer Periphery
2000 Population	564476	1000883	528555	255089
2010 Population	551438	1085609	693664	357243
Percent Change	2.31% Decrease	8.47% Increase	31.24% Increase	40.05% Increase

The closer zones to the center of Atlanta (Urban Core and Inner Zone) have very small growth compared to the more distant zones, even a slight decrease in population for the Urban Core. The outer zone and outer periphery, however, have tremendous growth percentages. I believe the difference is because in zones very close to the middle of the city, almost all of the available space has already been used up for housing, business, etc so in order to keep expanding the city, areas in further rings are rapidly being urbanized as seen in the population growth.

NDVI Differencing Between 2000 and 2011

Count

Value

Normal Dist.

Threshold of 0.2 used so areas of large NDVI change are represented by 1.0 and areas with little or no change are 0.

The histogram shows the distribution of NDVI differencing values. The x-axis represents the 'Value' from 0 to 1, and the y-axis represents the 'Count' from 0 to 8,000,000. A normal distribution curve is overlaid on the histogram. A vertical line at 0.3 indicates the threshold used for binning.

4. Each different threshold chosen changes the 'sensitivity' of the NDVI change analysis. For example, the low threshold of 0.1 will display losses of NDVI that are much smaller than a higher threshold, as we can see when comparing it to the 0.3 threshold map. The higher the threshold, the more drastic the NDVI loss must be to show up in our display.

NDVI Differencing in the Atlanta Area 2000-2011

Legend:

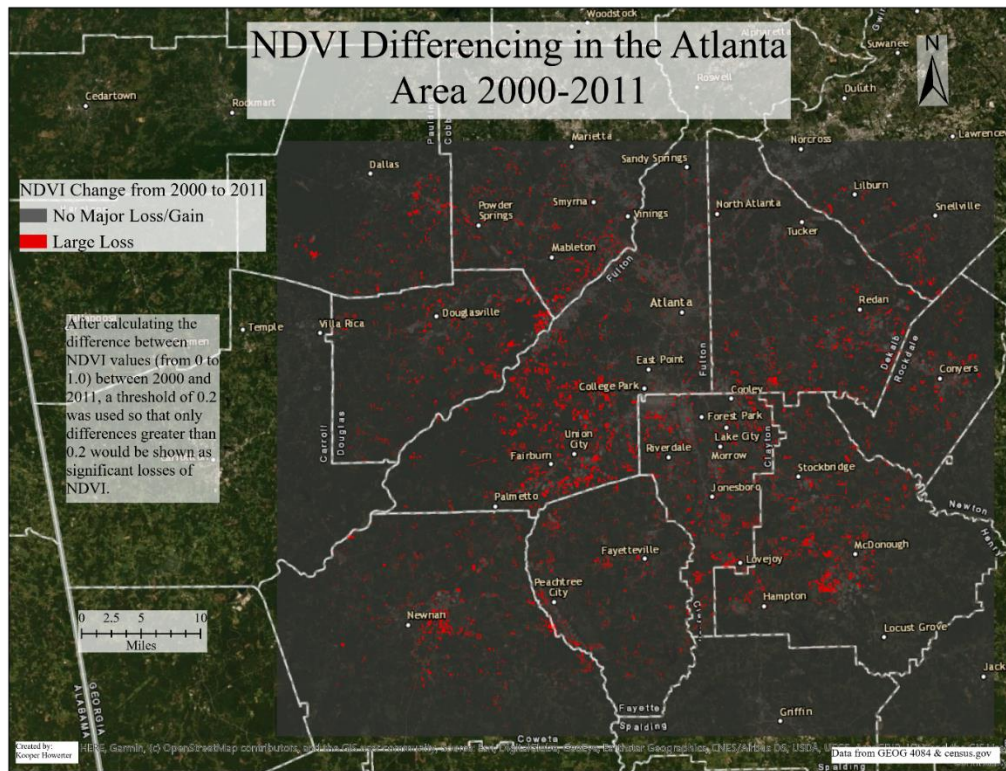
- No Major Loss/Gain
- Large Loss

Scale: 0 2.5 5 10 Miles

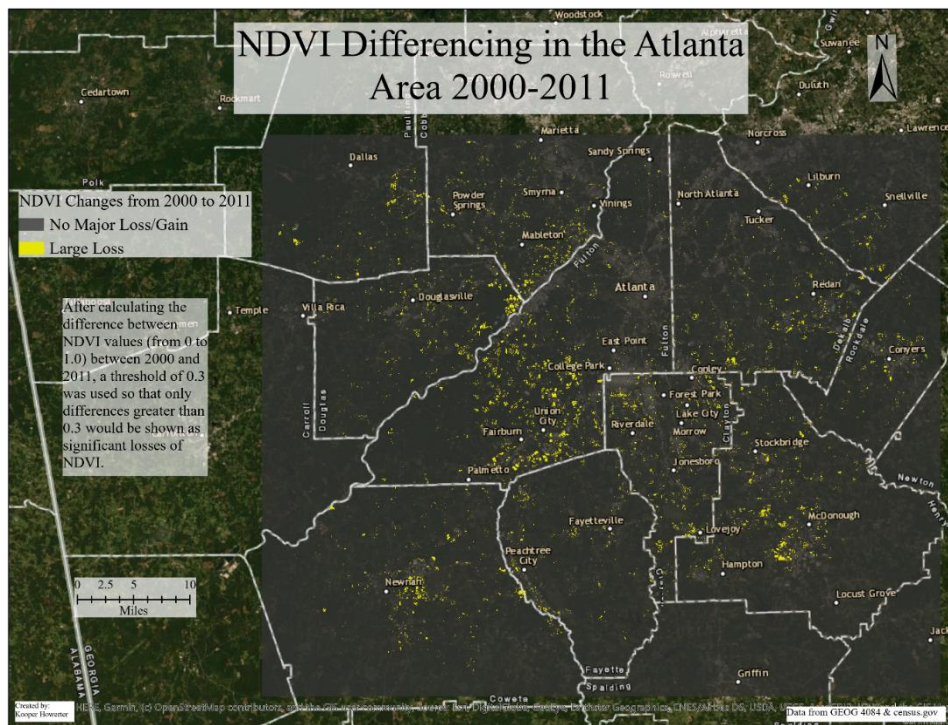
After calculating the difference between the NDVI values (from 0 to 1.0) between 2000 and 2011, a threshold of 0.1 was used so that only differences greater than 0.1 would be shown as significant losses of NDVI.

Data from GEOG 4084 & census.gov

0.2 Threshold



0.3 Threshold



5. The 0.2 threshold map was chosen to best display and represent areas of NDVI loss/urban growth in the Atlanta area. I feel as though it is a balanced threshold that does not include very minute changes in NDVI, but also is not so high that areas of moderate change are left out. When we look at the other thresholds used, the 0.1 map displays very small areas all throughout the area, making it harder to pinpoint major areas to focus on. On the other hand, the 0.3 threshold map is pushing what I would consider too sensitive in regard to displaying urbanization and may leave out spots of moderate change. When we use the 0.2 map and compare it to the Landsat images provided we can see that the spots highlighted align with the major differences between 2000 and 2011 imagery.

6.

	Urban Core	Inner Zone	Outer Zone	Outer Periphery
Increased Urban Build-Up Km ²	10.25	66.75	76.67	45.91

Summary:

After analyzing the study area around Atlanta, you can see how between 2000 and 2011, the area has had a surge in both population and urbanization. First, looking at the relationship between population and area of impervious surfaces, you can see a minor positive correlation. However, many parts of our study area have lots of impervious surfaces, but smaller populations.

Looking at the population change in the four zones of the area was very revealing, as we see huge increases in the outer zone and outer periphery. On the other hand, the two closest zones have very little population growth, or even loss, likely because they are the most expensive to build on and most urbanized areas already, with little room for growth.

By using NDVI differencing, the areas where vegetation was lost between 2000 and 2011 can be displayed and used to highlight areas of major urbanization. The trend seen in population growth holds true with our differencing analysis. We see major areas of urbanization in the outer zones of the area as the city continues to grow and expand outward, with less drastic changes in inner rings, where it already about as urbanized as it can be. If you wanted to visualize areas of potential concern for too much vegetation loss of urbanization, these differenced images highlight the major areas of change.

Lastly, we calculated the total area of urban build up in each zone, which also sticks to the same trend as before: the closest area to the city hasn't changed very much, but as you push outward from the center of the city, massive growth is seen. The inner zone, outer zone, and outer periphery all have drastic changes in area of urbanization.

As Atlanta continues to grow, the city continues to push outward into the further zones for expansion. While between 2000 and 2011 the Urban Core has not changed much, the Inner Zone, Outer Zone, and Outer Periphery have all seen growth in population, more urban area, and loss of vegetation.