

Most Desirable Place to Live: North Carolina and Washington

URP 4273 Final Project

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Background

The purpose of this project was to determine a desirable place to live in the states of North Carolina and Washington. When determining where to live, individuals and families need to weigh the costs and benefits of their location options. In the United States, migration around the country allows for different job opportunities to be redistributed geographically in response to changing demographics and economic conditions. The Geographic Information System (GIS) software we used helps display all of this data in a nice spatial format. The unique method of organizing information based on location lets us visualize, analyze, and interpret data easily and effectively. GIS is quickly becoming essential to optimizing daily movements and is key to making better decisions about locations. For this project, we were tasked to use ArcGIS ArcMap to help determine a best place to live in the United States. Focusing on factors that include education, transportation, quality of life, and economic conditions, we were able to use spatial analysis methods to be able to summarize the geospatial data into meaningful information that we used in our decision making process.

Objectives

In order to determine the best place to live in each respective state, we set out to employ major analytical factors into such a subjective decision. We decided that four main criteria were worth looking into objectively in making this decision. They were, economic conditions, transportation, quality of life, and education. These four criteria were the foundation of several analytical measures and indicators that provided data for us to consider. With the information that the data lead us to, we were able to single out a few cities that outperformed under the respected criteria. The cities that performed the best were referred to as the "winning cities", and proved to be the best areas to move to.

Criteria

The following are our criteria that we found to be most important to our search:

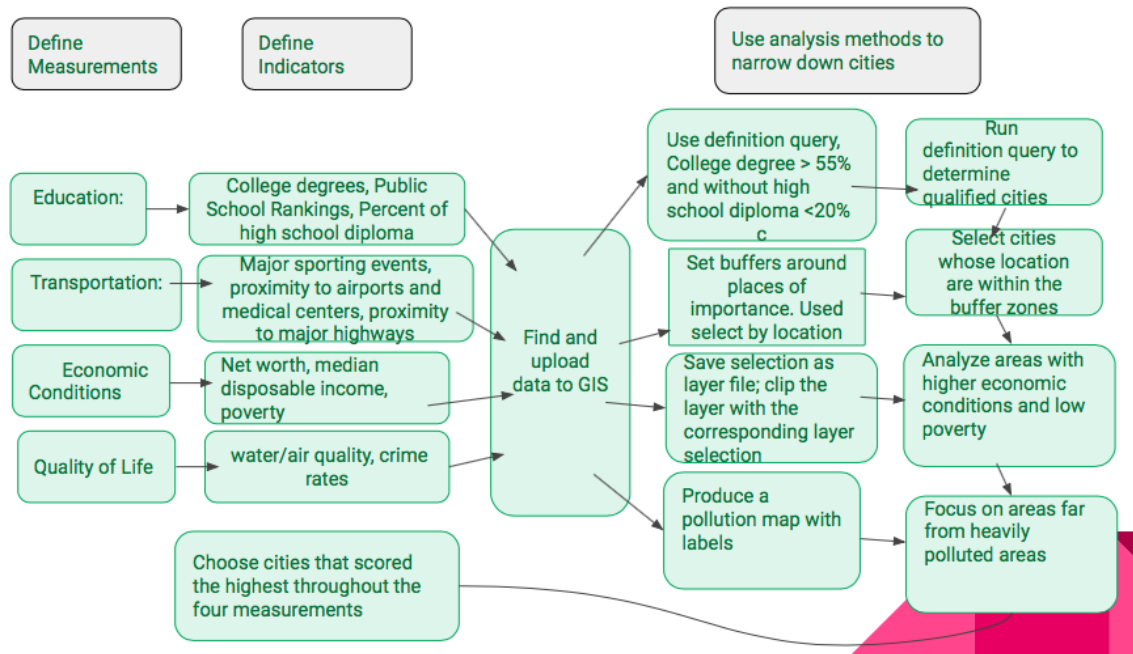
1. Education - Amber Clark
 - a. College degrees
 - b. Public school rankings
 - c. Percent of high school diploma

2. Transportation - Jose Mandry
 - a. Amount of sporting events/major entertainment hubs
 - b. Proximity to Airports and Medical Centers
 - c. Distance to major highways

3. Quality of Life - Jennifer Franklin
 - a. Water/Air Quality

- b. Crime Rates
- 4. Economic Conditions - Kimberly Buccaccio
 - a. Poverty
 - b. Median Disposable Income
 - c. Net Worth

Methodology



The methodology for creating each set of maps for the various measures was different for everyone. The processes ranged from clipping, to selecting by location, to selecting by attributes, and much more. We divided up the measures and each took control of that certain area per state. For example, one person worked on economic conditions while one person worked on Transportation, and so on. We then came together to compare results at the end.

For the economic conditions, we decided to evaluate net worth, median disposable income, and poverty in the states of Washington and North Carolina. We were lucky enough to be provided with the data in shapefiles already, which resulted in the data tables being easily imported into the program. From there, we started by making selections for each indicator in each state. For example, we first selected every county in North Carolina from the data table with the information for Net Worth. From there, we created a layer from this specific selection so that the map would reflect only the information for North Carolina. After this step, we clipped it so that the map would permanently only reflect the information for North Carolina. Once this information was clipped, we were able to go to the properties to look at the quantities that we wanted to evaluate. From there, we were able to select the gradient and increments of Net Worth that we wanted to show. We decided to show 5 different increments within the gradients on each map for the economic conditions.

This process was very similar for the rest of the economic conditions as well: poverty and median disposable income. The only difference was that two of these factors were reflected by zip code and one was reflected by county. All of the information was readily available for us to work with, and both states had an equal amount of data. For poverty, we were able to select every county for the specific state we wanted to work with. From there, we created another layer from this specific selection, and then clipped it with the original layer. The original layer is what must be clipped first, and then the second step is selecting the respective "layer selection". From there, we were able to go to the properties and select the data we wanted to show in the gradient. We kept the increments the same at 5 categories per economic condition. Within these 5 categories, we were able to see which zip codes and counties were most acceptable to live in based on our needs of the poverty percentage, median disposable income value, and net worth value.

For the education measurement, we wanted to ensure that the city contained other people who were educated in a similar manner to us. The data indicators we picked: percent of people with high school diplomas and percent of people with college degrees were found in the shapefiles provided by our professor, which made it easy to upload the files into ArcMap. Our original plan was to find a city that had 75% of people holding a college degree, and 90% with a high school education. In each state, we performed a selection using select by attribute. The first step taken was to select the layer that was being worked with. For example, our first selection was for College Grads. We wrote the first selection statement, "PCTCollegeDegree > .7", and then applied. This selection brought back zero search results and eliminated all zip codes in both Washington and North Carolina. After realizing the indicator was too high, we went to google determine a normal amount of college graduates in a particular area. The average percent college graduates in a city in the United States is 45.6%, according to a New York Times Article. We decided to lower the standard to 55% of the population holding a college degree, which presented much better results. After revising the indicator to at least 55% , about 75% of the results were eliminated in North Carolina, and around 80% of the results were eliminated in Washington.

The same selection method was used for percent with high school diploma. Our original thought was to find a city with 90% of the population graduated from high school. The data provided lists the percent of that particular zip code *without* high school diplomas. So for this selection, the selection statement was "PCTHighSchool < .10". After this selection, every zip code was eliminated. After a few times of trial and error, we came up with "PCTHighSchool < .20 And "PCTCollegeDegree > .55".

The next measure we needed to evaluate was transportation. While looking into cities with the best available transportation, we defined transportation to be ease of access to roadways, hospitals, and entertainment hubs. We collected data to show medical centers, airports, and major sporting venues across both states over the already present roadways and cities included in the map. After this data was fully transferred to the ArcMap data file, we included it in the table of contents and made layers for each collection. After these layer files were created, we chose to use buffers to help visualize cities with accessible amenities. The buffer region assigned to medical centers was 3 miles, for airports it was 2 miles, and 12 miles for major sporting venues because they are more spread out and draw in crowds from larger areas. A cities transportation rating was based on its location, either in or outside of these buffers. Additional rating would go to cities that were within half a mile to a major roadway because of the amenities that come with relative ease of access living near a main road.

Quality of life was another important measure to look into. In Washington it was relatively easy to find information about water quality and many other environmental

parameters. This included information about air quality and overall atmospheric conditions. This is important to note as a part of our methods, because when we went to look at atmospheric data for North Carolina, the webpage was empty. That being said, information about crime rate between the different counties was readily available when considering North Carolina. On the other hand, this information was hard to find for Washington. This resulted in the different areas being sorted out by city when looking at Washington. The crime rate data was used as an umbrella parameter for North Carolina as we looked at cities within the relatively safe counties.

Results and Discussion

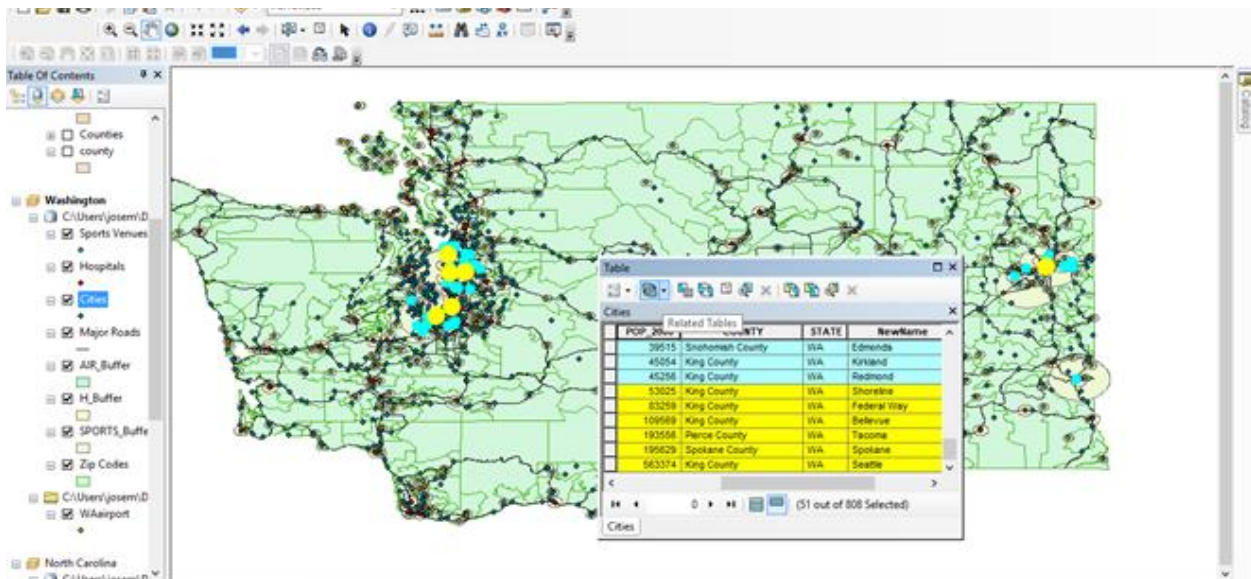


Figure 1: Map of Washington's "winning cities" in transportation

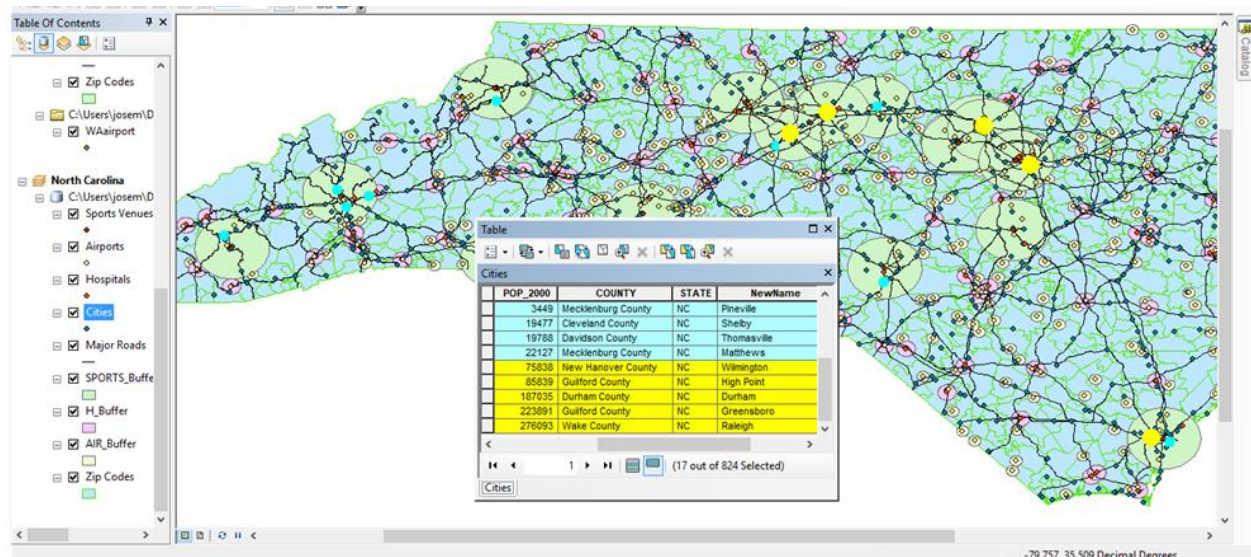


Figure 2: Map of North Carolina's "winning cities" in transportation

The above images represent the results of an overlay of buffers done in both states, Washington and North Carolina. The buffered regions surround medical centers, major entertainment hubs, and airports. Where the medical center (3 mile buffer) and entertainment hubs (12 mile buffer) intersect we determined to be optimal living areas. To add to this, we eliminated the regions that were surrounded by the buffer area around airports (2 miles), because of the noise pollution and low standard of living in those areas. Distance from major highways were a further way to eliminate cities. Only cities within the range of 0 to 0.5 miles from a major roadways were considered. A major road nearby ensures easy access to places to shop, eat, and buy groceries. Also to make sure that a city has developed adequately, we only considered cities with a population of 50,000 or greater.

The trend in this data heavily favored cities with a high population because they have an abundance of concentrated amenities and roadways. The yellow-highlighted cities shown in figure 1 are Seattle, Spokane, Tacoma, Bellevue, Federal Way, and Shoreline. All of these cities, except Spokane, are located within a 20 mile radius around Seattle which is regarded as Washington's most popular city. In North Carolina (figure 2), the cities are more evenly spread throughout the state but the trend still leads to areas surrounding major cities. The yellow-highlighted cities in the image of North Carolina are as follows: Raleigh, Greensboro, Durham, High Point, and Willingham. Like Washington, many of them are close by the state's biggest city, Raleigh. They are, however, more spread out. The dense area of highly populated cities in Washington is a reflection of the polar opposite lifestyles that the state provides. The urban areas are located practically together in the same area but the rest of the state is predominantly rural and spread out.

Under economic conditions, we thought that poverty, median disposable income, and net worth were important indicators to research. We thought that a poverty level above 12% would be acceptable; a median disposable income level above \$40,000 was acceptable; and finally that a net worth level of \$35,000 would be acceptable. These requirements helped determine the most desirable place to live in each state.

For the education measurement, after selecting all the zip codes that had under 20% of the population without a high school diploma and at least 55% of the population with a high school diploma, we were left with 15 zip codes that fit the criteria from North Carolina, as well as 9 zip codes in Washington. The zip codes remaining in North Carolina were dispersed, but the majority left were around Raleigh, North Carolina. We also noticed that many of the cities that met our education requirements in Washington state were near Seattle and Spokane. We thought that these two requirements would ensure that we were surrounded by people with similar education backgrounds to us and similar workstyles and we took this information into consideration in our final conclusion.

According to the quality of life measure, the results showed that crime rates were higher in the denser areas, and more sporadic in the rural areas. For the air and water quality, the rivers along the coast proved to be a clean resource for the residents of North Carolina. For Washington the water was cleaner in the areas further away from the cities and dense areas.

Conclusion

By using GIS we were able to identify that the best cities in North Carolina included: Cary, Charlotte, and Chapel Hill. Cary was determined to fit all criteria for education requirements, quality of life requirements, transportation requirements, and economic conditions in the areas. The best cities in Washington included: Seattle, Federal Way, and

Bellevue. Federal way was also found to fit all of our criteria for a most desirable place to live in Washington State.

References

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