



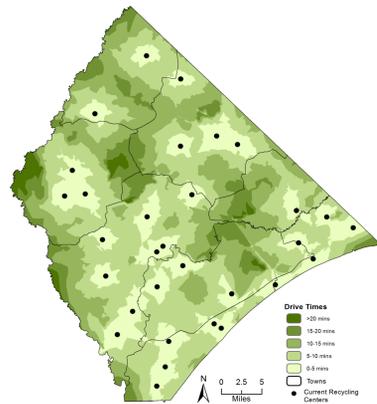
Drop It Like It's Hot

Identifying Suitable Drop-Off Recycling Sites in Horry County, South Carolina



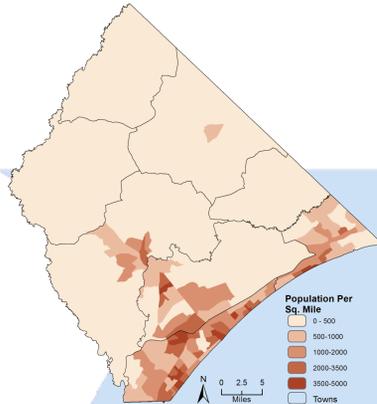
Drive Times From Current Recycling Centers

Drive times to current recycling centers were considered to determine the locations where new sites are most needed. Highest suitability was defined as locations that were >20 minutes away from a recycling center. Service areas were created with the Network Analyst tool on data acquired from the Horry County Department of Health and Environmental Control. The results were reclassified and combined with other layers using Raster Calculator.



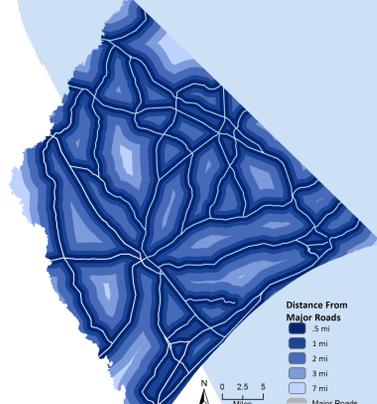
Population Density

Population density was important in this analysis because a higher population means the high potential for waste production. Highest suitability was defined as population density >3500 persons per square mile. Population data acquired from The U.S. Census bureau and were normalized by area, reclassified and combined with other layers using Raster Calculator.



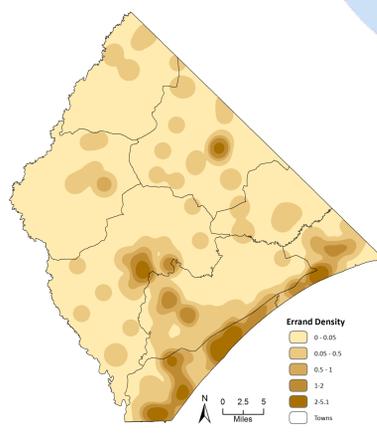
Distance From Main Roads

Distance from main roads was considered due to the importance of site accessibility. Highest suitability was defined as locations <0.5 miles from a main road. Euclidean distance was run on data acquired from the Horry County GIS Hub. The results were reclassified and combined with other layers using Raster Calculator.



Density of Common Errands

Common errand sites include grocery stores, banks and pharmacies. These were considered in this analysis because people often combine recycling trips with other errands. Highest suitability was defined by natural breaks. Kernel Density was run on data acquired from Reference USA. The results were reclassified and combined with other layers using Raster Calculator.



Why Recycle?

With the growing American population, waste generation is at an all time high. According to the Environmental Protection Agency (EPA), as of 2014, 258 million tons of municipal solid waste were generated yearly in the United States and only 34.6% of that was recycled or composted. With many landfills currently reaching capacity, this problem is becoming increasingly dire.



Waste material in landfills also poses a substantial threat to animals and the environment. Pollutants leach into groundwater and contaminate ecosystems. Plastics make their way into the environment, accumulate toxins and are consumed by wildlife. This has become an especially serious problem in ocean ecosystems. Regular recycling can divert waste away from landfills and save energy and resources required for the production of novel materials.

Drop-Off Recycling

Many municipal bodies choose to adopt drop-off recycling over curbside pickup because it is more cost effective to implement. In a drop-off recycling system the cost of transport is shifted from the city to the citizen. While this system is great for local governments, there is a convenience tradeoff for recyclers. Considering policy convenience in an important factor in predicting recycling rates, it must be considered when choosing drop-off locations. In Horry County, there are two types of drop-off recycling centers. The first type is a convenience center, which are often an open space with large collection bins. The second type is the processing facility, which is a large building where the recyclables are sorted and prepared for transportation to factories that use the materials.



Horry County Recycling

Horry County, South Carolina has an above average recycling rate for the American South. This is due to the concerted effort of local governments and businesses. In fiscal year 2016, Horry County recycled 30.28% of total municipal solid waste. Though this is above the state average of 25.41%, there is still room for improvement. Horry County contains the city of Myrtle Beach, a highly populated city on the Atlantic coast. Due to the dangers of ocean pollution, high recycling rates are crucial for environmental health. The purpose of this analysis was to identify suitable sites for additional drop-off recycling centers in order to help Horry County reach their ever increasing goals.

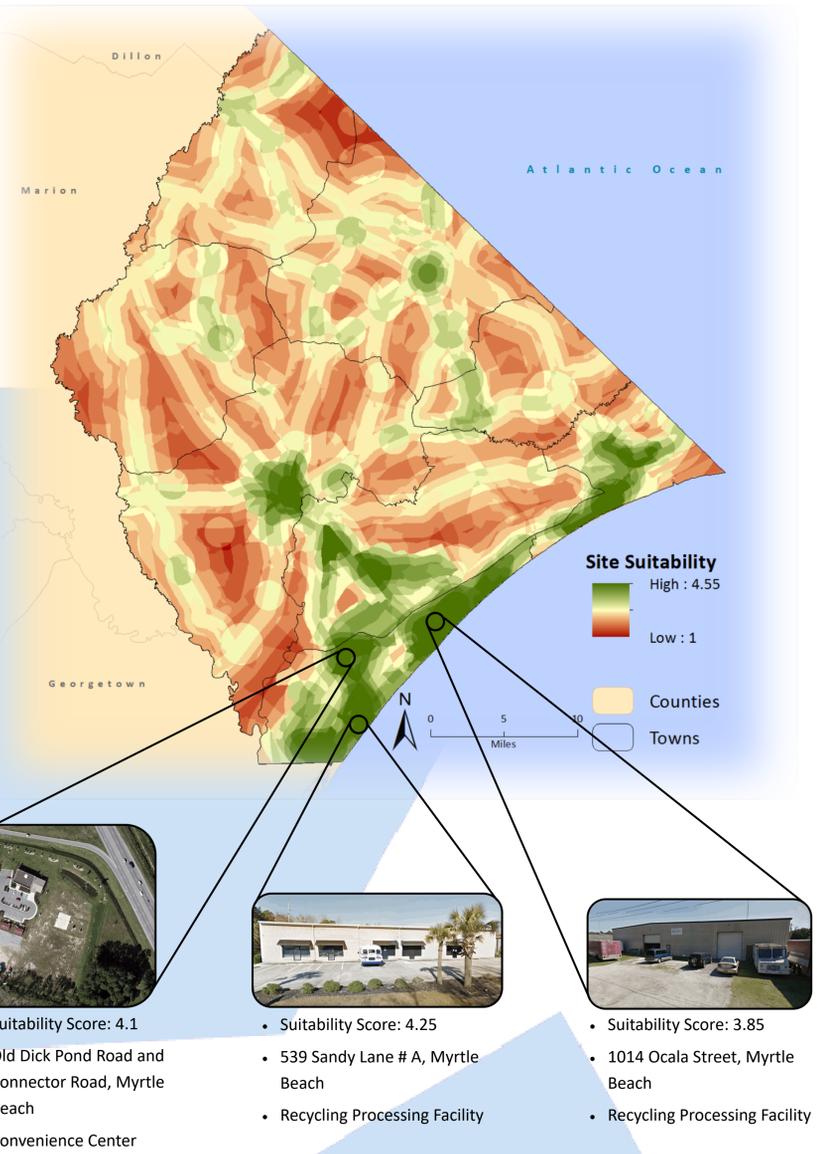


Methods

In order to ascertain the location of future drop-off recycling sites, a suitability analysis was performed. This analysis considered factors that identified Horry County's ability to serve as many citizens as possible by looking at Population Density and Drive Times From Current Recycling Centers. The other significant component of this analysis was site convenience, which is why Distance From Main Roads and Density of Common Errands were considered as well.

All layers were reclassified on a scale of 1 to 5, where 1 represented lowest suitability and 5 represented highest suitability. All layers received relevant weights in the Raster Calculator tool. Population and Density of Common Errands were weighted equally at 30% due to the importance of serving the most citizens and significance of grouping recycling trips with running other errands, respectively. Distance from main roads was next at 25% and finally, Drive Times From Current Recycling Centers was weighted at 15%.

Factors	1 Extreme Low Suitability	2 Low Suitability	3 Average Suitability	4 High Suitability	5 Extreme High Suitability
Population Density	0-500	500-1000	1000-2000	2000-3500	3500-5000
Errand Density	2-5.1	1-2	0.5-0.1	0.05-0.5	0-0.05
Drive Times From Current Recycling Centers	>20 minutes	15-20	10-15	5-10	0-5
Distance From Main Roads	3-7 Miles	2-3 Miles	1-2 Miles	0.5-1 Miles	0-0.5 Miles



Three Most Suitable Sites

Drop-off Recycling sites are generally either large, industrial sized buildings for on site waste processing or paved open space areas where many containers are located. They can be anywhere between 10 and 40 yards long. The final suitability map was used to identify suitable structures or spaces. Zonal Statistics as a Table was used on building structures that were within suitable zoning codes in order to identify the most appropriate sites. The highest rating assigned to a building was 4.25. Buildings rated above 3.8 were considered for final suitability.

Conclusions and Limitations

If these locations were to become drop-off recycling sites it would mean greater access to recycling facilities for the most populated region of Horry County. The increased convenience of these site locations should be reflected in higher recycling rates. One limitation of this analysis was the high amount of existing recycling centers. This is why the Distance From Current Recycling Centers layer was given a low weight of 15%. The next step for each municipal government would be to identify the availability or ownership of each site. Then they could determine the cost/feasibility of acquiring them.

Acknowledgements

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GIS for Conservation Medicine
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Projection: NAD_1983_2011_StatePlane_South_Carolina_FIPS_3900
Data Sources: US Census Bureau, Horry County GIS, Reference USA, Department of Environmental Health and Control
Photo Sources: <http://www.waste360.com/>, <http://clipart-library.com/>

