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GEOG 373
Final Project
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Best Location for Tiny House Communities in the Mankato Area

Tiny homes have a smaller impact on the environment than traditional homes. Tiny homes could help solve some of the problems we have today such as, homelessness, debt, and negative environmental impacts that traditional houses pose. The problem is, many cities do not allow people to build or place tiny homes in specific areas. Zoning laws work against the use of tiny homes in many cities making it difficult for tiny home dwellers to find a plot of land to locate their home.

The typical tiny house ranges from 100 to 400 square feet, unlike a traditional home that averages 2,600 square feet. Tiny homes can be built on a foundation or on a trailer. In our project we want to analyze the best location for tiny house communities within three counties in southern Minnesota. The tiny house communities that we want to find space for are geared towards tiny homes on wheels, allowing the residents to move their homes when needed.

The counties we are focusing on include Blue Earth, Nicollet, and Le Sueur counties. Our criteria includes building 250 meters away from environmental hazards such as factory pollution, proposed impaired waters, and potentially contaminated sites. Also, 500 meters away from noise pollution (railways, airways, etc.). Furthermore, we have included a 5 meter buffer to the road network to prevent building on them. The community will be built 100 meters away from wetlands, rivers, and lakes; along with making sure the community is built upon flatland, or less than a five degree slope. We also want to prevent building on developed land, so we chose to build only on vacant, private land. Finally, it will be built in open areas with limited to no tree cover. Our results will give us suitable locations for tiny homes, or sustainable communities;

much of which don't seem to be popular in our local area. This would give the ability to propose such an idea to the city government to visualize the possibility and location of such a project.

Data Collection

All of our GIS data came from the internet. We used a total of four sources which included MNDOT's GIS Data, gisdata.mn.gov, data.gov and the Pollution Control Agency. The data we used were a NLCD (National Land Cover Data) for the state of Minnesota, a statewide DEM, statewide county borders, shapefiles of state parks and trails, statewide highways, railroads, and airports, and finally we downloaded road networks by county (Blue Earth, Nicollet, and Le Sueur). Water features, developed land, and tree coverage, were extracted from NLCD. All of this data was relevant to our project as it used as criteria for our map. All the data except our DEM (turned to slope) was used as a criteria to either build away from, or to not build on; depending on the feature. This data plays the key role in the use of GIS. With this data we are able to spatially represent, and analyze the best locations to build a tiny home community based off the criteria we have gathered.

Methods and Analysis

The tools we used Clip, Intersect, Extract by Raster, Slope, Reclassify, Buffer, Merge, Erase, Extract by Attribute, and Raster to Polygon.
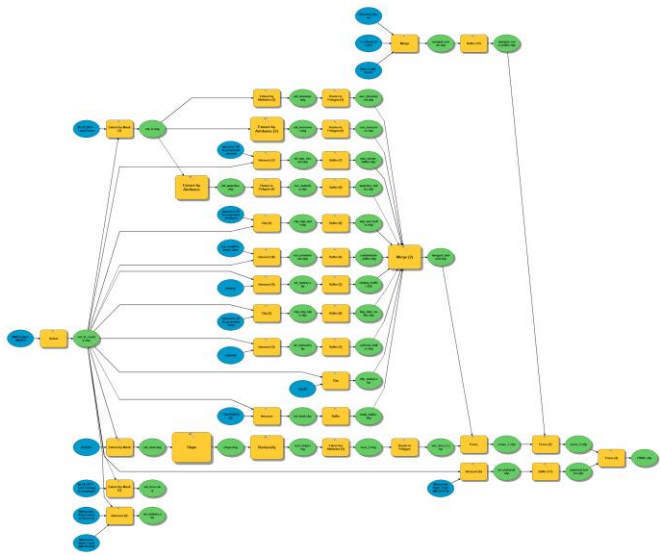
Before we cut down our data, we extracted by attribute the data that we wanted for the NLCD raster. The NLCD included shrubs, cultivated lands, and other data that was unnecessary for our project. The data we ended up extracting included water features (lakes, rivers, ponds, etc.), developed lands (included various types: high, medium, low), and also tree coverage.

Since most of our data was statewide, excluding road data, we had to cut it down to our three county area. To start this out we selected, using the select tool, the three counties from the statewide county shapefile. From there, we were able to start cutting it down to this area. We used extract by mask to cut down our raster data, and used clip and intersect to cut down our vector data. Intersect was used for our line shapefiles, while clip was used for our polygon shapefiles. We also had to convert our DEM data to slope. To do this, we used the slope tool, and then reclassified it to 0-5 degrees, and 5-max slope. From there we were able to extract by attribute, and take out the 0-5 degree slope, our suitable slope. The final step we took was vectorizing it with the raster to polygon tool.

Now that all the data is within our three county area, we can begin to apply our criteria buffers. We used the buffer tool, setting it to the appropriate distance, and we dissolved 'ALL' on all of our operations. The only layers we didn't buffer were the public lands (state parks,

trails), developed land, tree coverage, and our slope. We also merged together the three county road data we had for ease of use.

The final step we did was merge all the areas we didn't want to build on, calling it "merge_no_build". From there we erased it from the only layer we wanted to build on, which was slopes less than 5 degrees. In our actual model we forgot to merge together state parks and the road buffer with the rest, so did a couple extra erase functions. With these done, we had a Final layer, showing the suitable areas to build upon.

Results and Discussion

In our final map, it was shown that there is an abundance of suitable land in the Mankato area. We believe the best location in the area would be south of the Mankato near Monks Avenue. By locating it right outside of the Mankato township, and near Minnesota State University Mankato (MNSU), the convenience and accessibility makes it a prime location for future residents of the community. With this being located outside of town, the selected area provides privacy and a quiet setting.

By locating it near the MNSU campus, it will give students interested in tiny homes the opportunity to live in the community while attending the university. It also gives lower living options for students dealing with high tuition and renting costs, this location would be ideal for a tiny home community. According to "Tiny House Cost? Detailed Budgets, Itemized Lists & Photos Examples", tiny houses ranges from $10,000 to $50,000. Not only is it a cheaper price in the long term, it also reduces the Mankato area's carbon footprint. Other advantages of our tiny house community would be the mobility, low maintenance, cost efficiency, and reduction in energy.
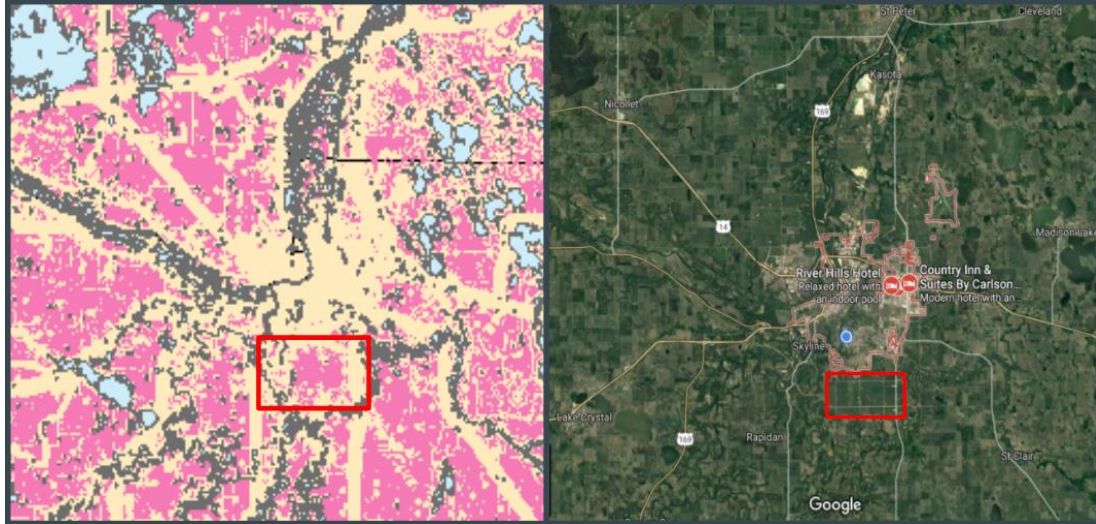
In the same way, Blue Earth county and Nicollet county provide enough acreage to build the community. With building away from water features, this also provides a more solid foundation to build the community upon. There is also not much public land found in these counties. In contrast, Le Sueur county does not provide much suitable land due to the excess amount of noise and environmental pollution. Moreover, Le Sueur county has more land with a greater slope than 5 degrees. With having a slope greater than this, it would be a safety hazard to our residents. Furthermore, we may encounter the issue of farmers possibly not wanting to sell their land. We would need people willing to transition from a traditional home setting to having utilities set up to an eco friendly community. In the same way, tiny house communities are more commonly found in the southern United States where the weather is more favorable. Occupants in the Mankato area may not find a tiny house to be that favorable during the winter.

Conclusion

Tiny homes are a more sustainable alternative to traditional homes. They take up less space, don't require many resources, and can be made from salvaged materials. Tiny homes

could help solve some of the complications that modern society faces today. The problem is, many cities do not allow people to build or place tiny homes in specific areas. In this project, based off our variables, we were able to find suitable locations for these communities. Using GIS we were able to create visual maps that are easy to read, and see the suitable locations. For example, our proposed area, south of MNSU, shows a possible location. From our final map one can can see their are many other possible locations that meet our criteria.

What we have learned as a group was the difficulties in retrieving data, as well as compiling a list of variables, and the distances assigned. It was difficult to download data, as well as find usable and current data. A lot of the data was on online maps, rather than downloadable datasets. Towards the end we were able to find sites like data.gov and gisdata.mn.gov which had an abundance of usable data. We also realized there are many more variables that go into such a project; but we felt for the need of this project we satisfied the requirements. Finally, when assigning distances to the variables we didn't have the strongest level of expertise to use accurate buffers.

In order to strengthen our existing project, we could add more variables, research more about the topic, and add more information about the selected area for the tiny house community. Another factor would be to include information about Mankato's city ordinances and zoning laws, they would be useful to know if we were to create a tiny house village in the area.

Works Cited

"Tiny House Cost? Detailed Budgets, Itemized Lists & Photos Examples." *Tiny House Giant Journey*, 6 Oct. 2017, https://tinyhousegiantjourney.com/2016/03/15/tiny-house-cost/.

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