Renewable Energy Facility Siting Project

COLLEGE OF NATURAL RESOURCES AND ENVIRONMENT
GEOGRAPHY
VIRGINIA TECH

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INTRODUCTION

The American public has become increasingly concerned about climate change. These concerns over the environment and the desire to decrease energy reliance on other countries have resulted in America's pursuit of renewable forms of energy (Pew Research Center, 2016).

One barrier to implementing renewable energy facility siting projects is public resistance as many people consider renewable energy infrastructure unsightly and intrusive. Some people also feel these projects impinge on their rights to the views to which they are accustomed. However, once the construction begins, community members tend to increase their support for the renewable energy site (Pew Research Center, 2016).

This project aims to address public concern about renewable energy facilities by creating an interactive web application hosted on ArcGIS Online. The web application allows the public to type in their address and view how the renewable energy facility siting project impacts the views near their homes. Our hope is that this web application can help the public understand the actual effects on their views, and perhaps in some cases, convince the public that renewable energy is not as unsightly as they might think, allowing developers to overcome this initial barrier.

STUDY AREA – CATAWBA, VA

DATA

- Virginia Geographic Information Network (VGIN) LiDAR data
- VGIN Land Cover data
- VGIN Orthophotography
- VGIN Building Footprints
- National Agriculture Imagery Program (NAIP) imagery

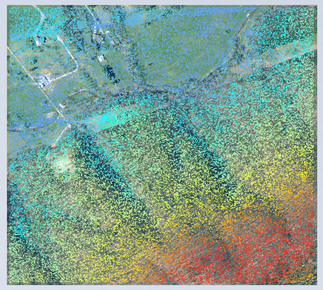
RESEARCH GOAL

- Automate the geoprocessing tools used to extract individual trees from non-forested areas using VGIN LiDAR data

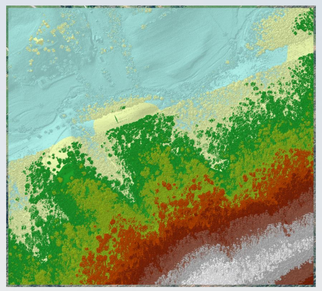
METHODOLOGY

Manual geoprocessing steps in ArcGIS Pro -

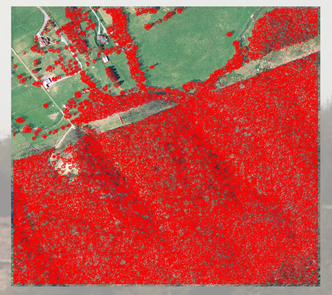
1. Create LAS dataset of first return points



2. Convert LAS dataset to a TIN dataset using the Maximum Z Thinning Method

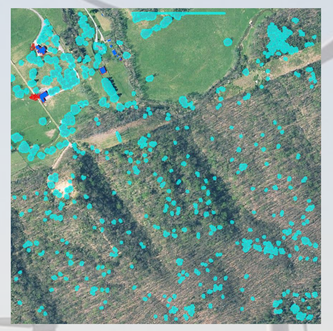


3. Convert TIN dataset to TIN triangles, and select triangles that have slope degrees greater than or equal to 70



4. Dissolve Step 3's output, and select triangles that have shape areas greater than or equal to 50 ft²
5. Select triangles that have shape areas less than or equal to 5000 ft²

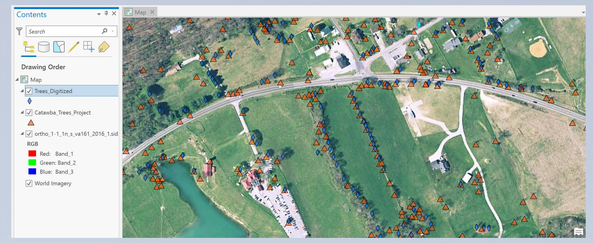
6. Select triangles that are farther than a three foot radius from building footprints



7. Convert triangles to points

RESULTS

- Geoprocessing output appeared to be more accurate in areas where trees were less dense
- In areas where trees were less dense, the geoprocessing steps closely resembled a digitized dataset of 125 trees



NEXT STEPS

- Automate the geoprocessing tools in Model Builder instead of Python to workaround a bug in the LAS Dataset to TIN tool's ArcPy command
- Determine the model's accuracy by comparing the model's output to a digitized tree dataset
- Compare the LiDAR tree extraction method to a raster-based approach
- Create a fully functional web application of the Catawba site

ACKNOWLEDGEMENTS

- This project was supported by Virginia Tech's Sustainable Renewable Energy Siting Project (SRES)
- Special thanks to Dr. Bill Carstensen and Diana Simpson for their guidance and support

REFERENCE

Pew Research Center. (2016, October 6). Public opinion on renewables and other energy sources. Retrieved April 23, 2019, from https://www.pewresearch.org/science/2016/10/04/public-opinion-on-renewables-and-other-energy-sources/