Zion National Park Vegetation Data Analysis

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*Abstract*—Geospatial data regarding vegetation in Zion National Park in Utah, USA, was analyzed by vegetation type, height of vegetation, recently burnt or not, ecology, and type of vegetation. Land coverage by shrubs and grass was found to be highly correlated, trees cover more area than shrubs and grass, woodlands cover most of the park, vegetation height is very variable, and the burnt area is now dominated by shrubs, along with some grasses.

# Overall Description

The data set used was found on the data.world website, and it is titled “Geospatial data for the Vegetation Mapping Inventory Project of Zion National Park.” It was uploaded by the US government. As mentioned above, the variables in the data set include vegetation type, vegetation land coverage, vegetation height, burnt area, and more. The data is geospatial and categorized into 1074 polygon units. The polygons are derived by constructs set forth from the National Vegetation Classification (NVC) system. Simply, polygons were determined by vegetation; larger polygons typically include multiple plants of the same classification. The data set was nicely organized. Multiple variables, including vegetation height and percentages of each vegetation type, were already standardized and broken down into categories. These enumeration units were able to be clearly displayed on Tableau. This data is certainly important for maintenance of the park and tracking the different vegetation populations. The National Park Service would want to ensure that no vegetation population is shrinking over time. Furthermore, there are likely many studies that take place on the effects of temperature, elevation, precipitation, and other factors on the different types of vegetation in the park. Note: black or grey space in the figures is a result of the high number of polygons in the data set.

# Figures

## Location of Zion National Park

Map

Description automatically generated

## Physiography of Zion National Park

A map of the world

Description automatically generated with medium confidence

## Ecology of Zion National Park

A picture containing text

Description automatically generated

## Grass vs. Shrub vs. Tree Land Coverage in Zion National Park

A picture containing map

Description automatically generated

Map

Description automatically generated

Map

Description automatically generated

## Vegetation Height in Zion National Park

Map

Description automatically generated

## Burnt Area in Zion National Park

## Map Description automatically generated

# Conclusions from Figures

There are several main conclusions I take away from these figures. First, Figure A simply gives some context showing the location of Zion National Park, the park analyzed here. In Figures B and C, we can see the physiography as well as the ecology of the park. At this point, the main takeaways are simply that the landscape is variable and woodlands appear to cover a majority of the park map in both.

With the figures in D and E, we start to see some overlap between our different visualizations. Figure D shows us the percentage of each type of vegetation per each polygon unit on the map. Trees unsurprisingly make up a high percentage of the vegetation in woodland areas, and the distributions of shrub and grasses are overall quite similar. Figure E introduces a choropleth map showing heights of the vegetation in each area. Interestingly, some of the woodland areas where trees are the dominant vegetation are actually not very tall. Many of these areas fall in the 2-5 meters category, while others fall in the 5-10 meters category, and a smaller number into the taller categories. This helps to illustrate a considerable variability in the vegetation height throughout the park. The other observation that was clear was the high correlation between the distribution of shrubs and grasses. They often are found in the same areas at similar percentages.

Figure F brings us to some data that I’m sure is critical to conservation and maintenance groups for the park. There was a recent fire in the park which burnt down the vegetation in certain areas. It would be important to know which types of vegetation were in these areas, especially if certain species are limited in number or only grow in certain areas. Furthermore, knowing which species are present around the burnt areas, as well as the biology of those species, would allow park staff to predict which plant species will be able to spread and start growing where the fire took place. One of the first things I notice is the burnt areas all show vegetation heights in Figure E of 0-2 meters. This makes sense and is a nice confirmation that these maps align properly. The figures in D show us that shrubs, and some grasses, make up the vast majority of the vegetation in these areas. This also makes sense as these types of vegetation can typically grow much faster than trees.

# Other Comments and Conclusions

My first time using a data set to generate choropleth maps was really great. It is really neat to see the capabilities of this technique and all the different patterns and connections one can find. I’m sure there are also statistical tests one can use to determine correlation between choropleths; that would also be very interesting to learn about. It actually was rather difficult for me at first to find a geospatial data set that had a number of variables and would work for this assignment, but I’m happy with what I ultimately was able to find. I love nature and national parks, and I come from a biology background. Zion is also on the top of my list of places to go in the US.

As I was looking for a data set for this project, I made sure that whatever I found had pre-defined polygon units, standardized data, and clear enumeration units. This data set definitely checked all those boxes. I also made sure that the colors used in the choropleth maps utilized distinct colors that were easily distinguishable for the audience. Furthermore, I made sure not to generate choropleths using variables with too many different categories, as this would be too difficult to comprehend, especially given the large number of polygon units in this data set. I considered changing the color scheme to use a color gradient of a single color in some of the choropleths, but given the appearance of grey area due to all the borders from the polygon units, I decided that more distinct colors would better show the differences between the areas.

As I mentioned above, woodlands make up a majority of the park, there is high correlation between grass and shrub distribution, shrubs make up a majority of the new vegetation in the burnt area, and vegetation height is very variable. I think these are all important takeaways, especially the observations involved with the burnt area. Fires can have a significant impact on the vegetation and the entire ecosystem, and I’m sure the whole process has been closely watched by Zion National Park staff. Ensuring the preservation of plant species along with allowing natural processes like fire to take place are likely two important goals. This data set, and updated data sets of the burnt area, will certainly be critical for their study and research throughout the process.