Raster Analysis of Sacramento County

Link to Git Hub Repository: https://github.com/akunna1/PLAN\_390\_H7.git

I opened the two images i.e. sacramento\_landsat\_red.tif and sacramento\_landsat\_near\_infared.tif in ArcGIS Pro and used the ‘Composite Bands’ tool found under Data Management Tools to create a single raster dataset from the red and near infrared bands. The output was a multispectral image.

Red: Band\_1

Green: Band\_2

Blue: Band\_2

Then, I went to the Imagery Tab, clicked on arrow under Indices, and then on NDVI. After, that I chose a color scale. Figure 1 shows the NVDI values of the multispectral image.

I used tidycensus package to retrieve income information for Sacramento County, California, from the 2019 5-year ACS, and I calculated the percentage of all households that made less than $35,000 per year in each tract using R. I also got the spatial data for tracts from the Census Bureau’s TIGER/Line website, which I joined with Census data from tidycensus. Figure 2 shows the proportion of households making less than $35,000 in each tract in Sacramento County.

On ArcGIS Pro, I used the ‘Zonal Statistics’ tool (found under Spatial Analyst Tools) to calculate the statistics on cell values of my NDVI raster within the zones defined by my Sacramento County tract level shapefile, and it produced a raster image. Figure 3 shows the Zonal statistics of the NDVI for Sacramento County. Mean was the statistics type. I used the ‘Zonal Statistics by Table’ tool to get a table of values and exported the table to R and joined it to my table containing the household income data for Sacramento County. After joining the tables, I transferred the new table into Excel to make the scatter plot, showing the relationship between the average NDVI and the percent of low-income households. Figure 4 shows the Average Level-Tract NDVI versus the portion of low-income households in Sacramento County. An R2 value above 0.7 would shows a high level of correlation, whereas a measure below 0.4 shows a low correlation. There is low correlation between the Average Level-Tract NDVI and the portion of low-income households, considering the R2 value being 0.1605, which means that is unlikely that the Average Level-Tract NDVI is a dependent variable of the portion of low-income households or vice versa.

Further Analysis:

I used tidycensus package to retrieve the rent information for Sacramento County, California, from the 2019 5-year ACS, and I calculated the percentage of all households that are asked to pay less than $1000 as rent in each tract using R. Again, I also got the spatial data for tracts from the Census Bureau’s TIGER/Line website, which I joined with Census data from tidycensus. Figure 5 shows the proportion of households that are asked to pay less than $1000 as rent in each tract in Sacramento County.

I joined my ‘Zonal Statistics by Table’ table to the table containing the households paying less than $1000 in rent data for Sacramento County. After joining the tables, I transferred the new table into Excel to make the scatter plot showing the relationship between the average NDVI and the percent of households paying less than $1000 in rent. Figure 6 shows the Average Level-Tract NDVI versus the portion of low rent paying households in Sacramento County. There is low correlation between the Average Level-Tract NDVI and the portion of low rent paying households in Sacramento County, considering the R2 value being 0.0177, which means that is unlikely that the Average Level-Tract NDVI is a dependent variable of the portion of low rent paying households and vice versa.

Figures

**Figure 1.** NDVI of Sacramento Multispectral Landsat Image.

A map of the world

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**Figure 2.** The proportion of households making less than $35,000 in each tract in Sacramento County

Chart

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**Figure 3.** Zonal statistics of the NDVI for Sacramento County

Map

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**Figure 4.** Average Level-Tract NDVI vs. the portion of low-income households in Sacramento County, CA

**Figure 5.** The proportion of households asked to pay less than $1,000 rent in each tract in Sacramento County

Chart

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**Figure 6.** Average Level-Tract NDVI vs. the portion of low-rent paying households in Sacramento County, CA