LAB 8: Spatial Operations II (Raster and Surface Analysis)

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Question 1

OPPORTUNITIES

Discrete Layers

• **Streets** (Buffer 200 ft)
Having reasonable access to main streets, especially in emergency situations, is important; so I buffered 200 feet from the streets as the maximum distance the classroom can be located for reasonable access. This layer has a Weight Factor of +1.

Continuous Layers

• **Solar Radiation**
Solar radiation is constantly present but too much solar radiation is not a good thing. That is why I mapped solar radiation to see which areas fell into the lower range of radiation exposure. This layer has a Weight Factor ranging from +1 (average exposure) to +5 (very low exposure).

• **Aspect**
South-facing slopes are generally warmer than north-facing slopes, which is why I mapped aspect to find the slopes that face south, southeast, and southwest. This layer has a Weight Factor ranging from +1 (north-facing) to +4 (south-facing).

• **Elevation**
While air quality may be the same at different elevation, air is more dispersed at higher altitudes than at lower altitudes. For that reason I prefer the classroom to be located at lower elevations. This layer has a Weight Factor ranging from +1 (higher altitudes) to +5 (lowest altitudes).

CONTRAINTS

Continuous Layers

• **Slope** (Degree)
The classroom should not be built on steep slopes because not only is it difficult to build on steeper slopes but it is also more dangerous. This layer has a Weight Factor ranging from -1 (least constraint) to -5 (most constraint).

Discrete Layers

• **Houses** (Buffer 200 ft)
I do not want to build the classroom where there are already existing houses so I buffered areas of 200 feet around houses and buildings. This layer has a Weight Factor of -1.

• **Rate of Fire Spread** (Greater than 150 feet/min)
To touch base again on the issue of safety, areas where rate of fire spread greater than 150 feet/min are more dangerous to build upon—since the classroom will contain many people, it needs to be located in an area where people will have enough time to evacuate in the case that there is a fire. This layer has a Weight Factor of -2.

• **Faults** (Buffer 500 ft)
Building on fault lines is generally a bad idea due to how earthquake-prone the Claremont Canyon is. For the safety of the students, I want the classroom to be as far from the fault lines as possible. This layer has a Weight Factor of -3.

Question 2

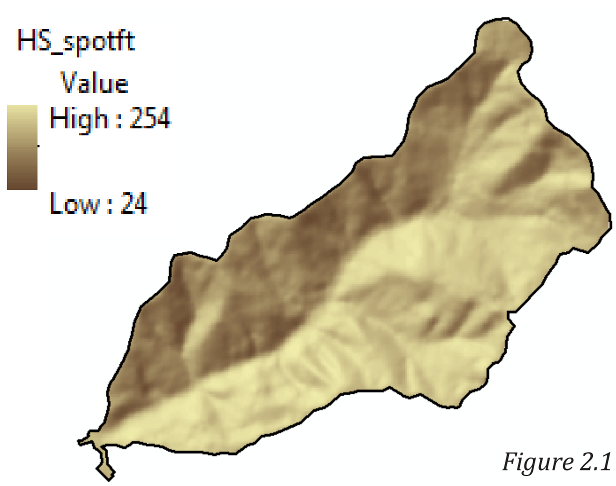


Figure 2.1

HILLSHADE *(Figure 2.1)*

This layer is not classified but rather stretched and rasterized from the elevation data. The purpose of this layer is to serve as a backdrop for the other layers to allow an understanding of elevation, aspect, and solar radiation data in relation to the Canyon's topography.

NOTE:
The following four layers are all classified under Natural Breaks (Jenks) by 5 classes (except for Aspect, which is classified by 4 classes).

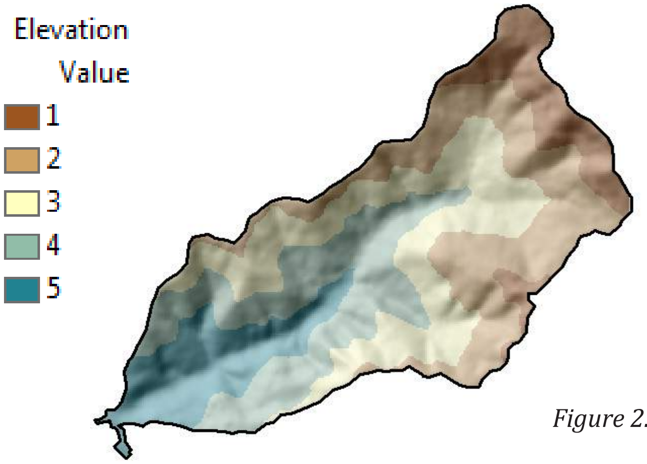


Figure 2.2

ELEVATION *(Figure 2.2)*

Altitude in the Claremont Canyon ranges from 342 feet to 1,742 feet with an average of 1,044 feet. Although these altitudes are not drastically high, there is still a preference for lower altitudes. In order to visualize where altitudes in the Canyon are the lowest, I rasterized the 'spots_ft' layer to create elevation. The lowest levels are denoted in blues while the highest are denoted in brown while the Hillshade layer in the background.

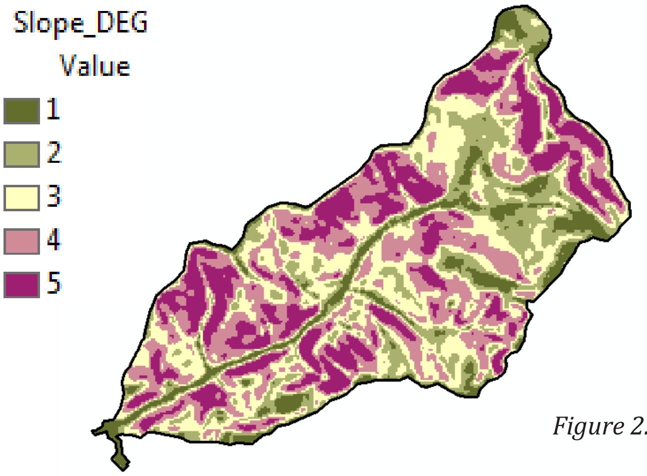


Figure 2.3

SLOPE *(Figure 2.3)*

Slope levels above 'nearly level' (0-3%) and 'gently sloping' (3-8%) range from moderate to dangerous and fall into the category of constraints. This 0-8% translate to 0-28 degrees on the map. I calculated slope using the raster layer of Elevation. Initially I chose to create the new slope layer by using 'Percent_Rise' in the output measurement so as to not have to translate from degree to percent but the 'Percent_Rise' map did not come across as aesthetically clear as the 'Degree' map.

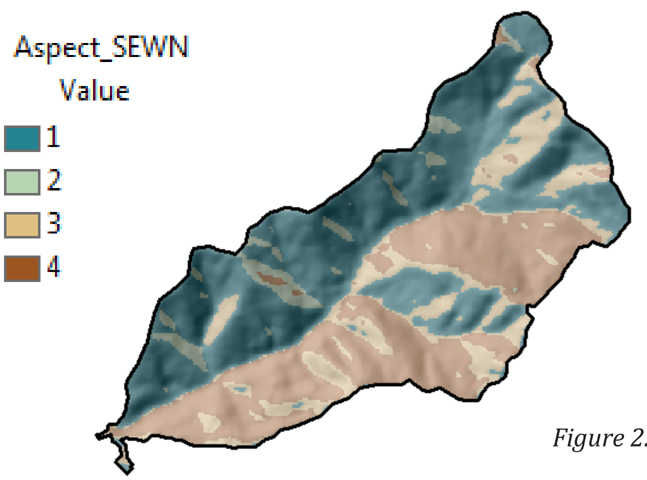


Figure 2.4

ASPECT *(Figure 2.4)*

In order to visualize the orientation of the slopes, I used the surface tool 'aspect' to distinguish between the different directions using the rasterized layer of elevation. Initially the new layer resulted in 10 classes differentiating between North, NE, NW, East, West, South, SE, SW, and flat areas. I reclassified the layer by removing the data for flat areas and grouping the orientations as follows: +1=North, NE, NW, +2=West, +3=East, and +4=South, SE, SW.

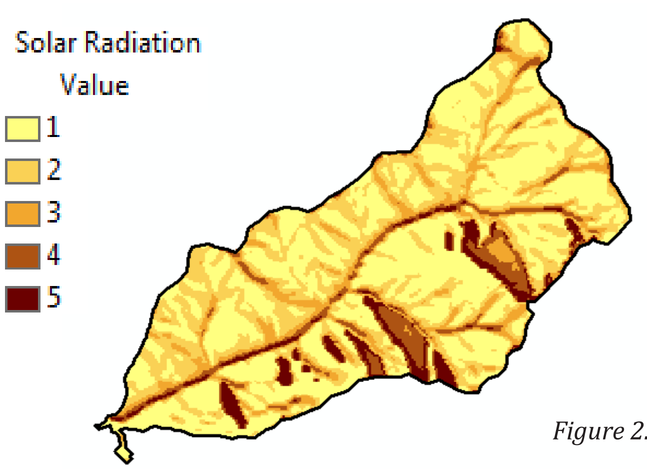
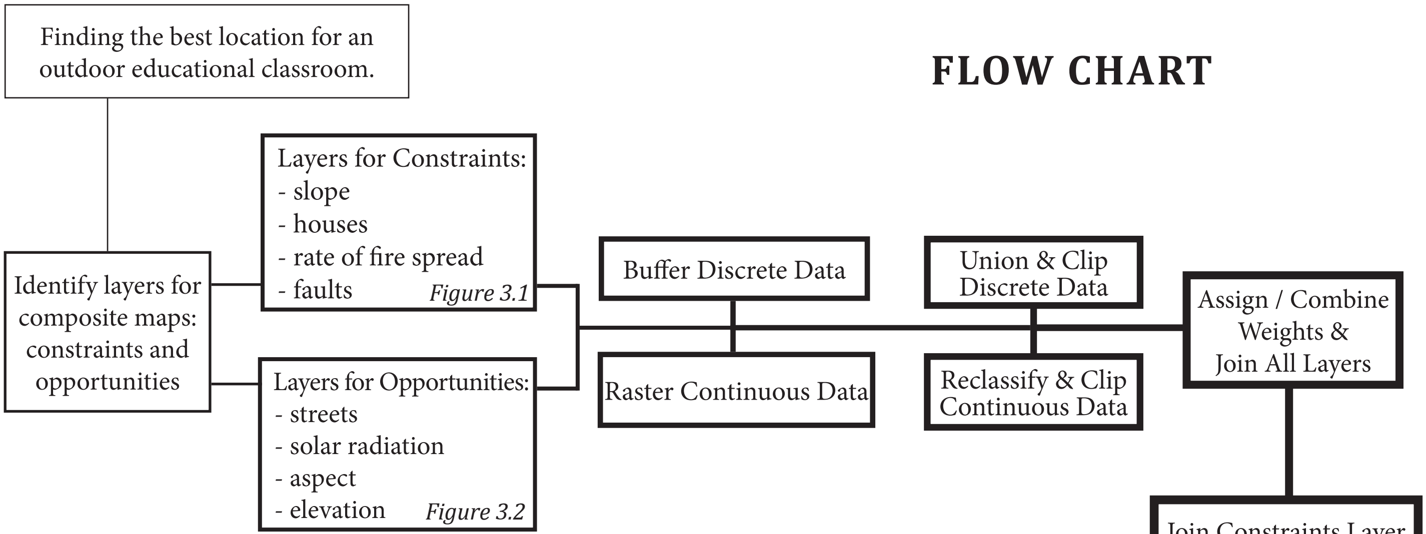


Figure 2.5

SOLAR RADIATION *(Figure 2.5)*

While the coloring of this map may be counter-intuitive (light-colored areas receive the most radiation and dark-colored areas receive the least radiation) it is very effective in discriminating the ratio of area exposure—the darker spots are fewer but really stand out on the map. I also created this layer using the elevation data as the input for the tool 'Area Solar Radiation.'



FLOW CHART

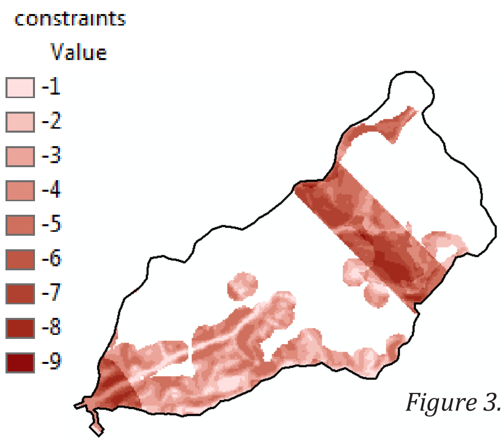


Figure 3.1

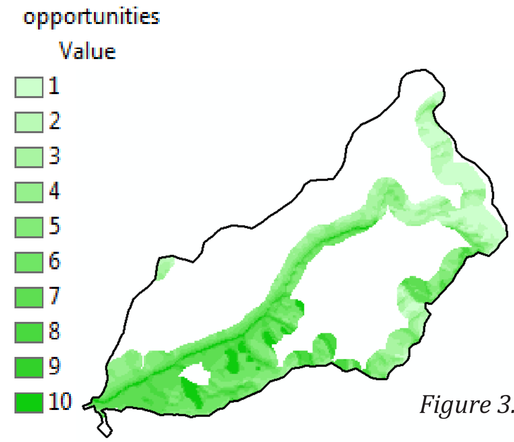


Figure 3.2

Question 3

(Figure 3.3)

I would definitely not build my classroom in the areas that are very steep and are near the fault lines. Due to the limited amount of available locations to build, I would consider condemning the existing houses to make room for my classroom. The existing houses are located where they are for a specific reason: they are already in the best locations in the canyon (i.e. safest and most accessible areas).

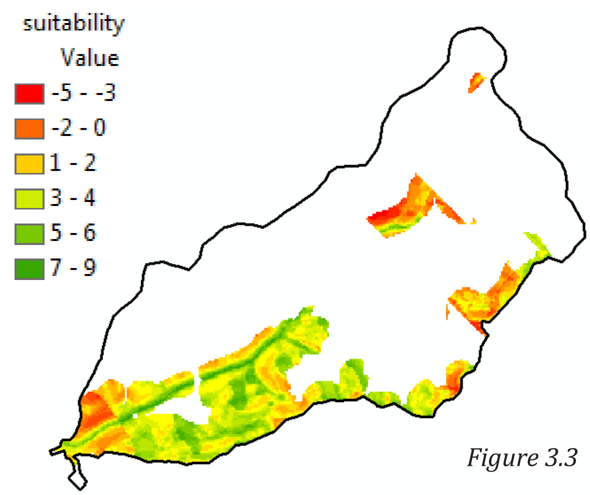


Figure 3.3

PROCESS/DIFFICULTIES

I really want to map pH-levels, permeability levels, or tree canopy to include in the composite opportunities map but the 'soils' layer did not provide enough polygons of varied data to do this. There are a very limited amount of 'soils' polygons to provide a diverse set of data—the polygons cover large amounts of land and generalize/simplify the data to the point where I do not believe is representative of accurate data.

I discovered that I needed to clip discrete data before unionizing and rasterzing them to prevent the data from extending past the Claremont Canyon boundary. As for continuous data, I need to select the box 'Use Input Features for Clipping Geometry' so that the raster data is clipped based on the perimeter of the polygon shape of 'cc_bnd.'