

Assignment Sheet for Lab 8: Modeling with Map Algebra

Directions:

- 1) Create a folder on the desktop of your lab computer called "Lab8."
- 2) From Canvas, download the zipped file called "Lab8Data.zip" to your new Lab8 folder.
- 3) After it's downloaded, right-click on the file and "Extract All..." . Make sure it is going into your Lab8 folder!
- 4) Within Canvas, access the textbook (Instant Access – Vital Source) and find **Module 20**.
- 5) Begin ArcGIS Pro and name your project **Lab8**.
- 6) Proceed through the software instructional steps for Module 20

Question 1. What do the values 1 and 0 in the flatland grid represent?

A value of 1 is when the slope is less than 10 degrees and a 0 is when it is more than 10 degrees.

Question 2. When you are working on the 2nd criterion (must contain forests or wetlands), what would the output grid result be if you used AND instead of OR in the algebra equation? Why?

The output grid will show the area that satisfies both conditions. However, there is no case in which the data will fit all conditions so the map will show that everything is 0.

Question 3. Write down the operation needed to find the suitable sites using the five final output grids and appropriate logical operators.

"%Flatland%" & "%Forestwet%" & "%awayhighs%" & "%nearstreams%" & "%nearlakes%"



Question 4. How many grid cells are considered suitable sites for the ecological preserve? How many **hectares** would that be? (1 hectare = 100 m x 100 m).

1265095 grid cells are considered suitable sites for ecological preserve. This would be 126.50 hectares.

NEW INSTRUCTIONS

- 1) The textbook author described in the Module Scenario (page 465) that the purpose of the chapter was to "search for the most suitable locations in the county for building an ecological preserve," and he provided the four criteria for that preserve (the land being flat, the land being far away from highways, near lakes or streams, being forest or wetlands).
- 2) Carefully read through the Closing Time section of the chapter (pages 484-485), to understand how you could create a "weighted" version of the model (instead of all of the criteria being equal, which is the case in the original simple model).
- 3) In the MapAlg model, add the **Weighted Sum** tool (from Spatial Analyst > Overlay) to the model.
 - a. "Connect" the five **binary (0,1) versions of the five different criteria** directly to the Weighted Sum tool (use the versions BEFORE you would have done the final Raster

- Calculator to create Final Sites).
- Double-click the Weighted Sum tool to open it in the model.
 - Decide what “weights” you want to assign to each of the 5 variables. Whatever numbers you choose as weights will be multiplied to the “0” and “1” values of your input rasters. Use integers (see screenshot below). The resulting grid will have values that range from 0 to whatever is the total sum of your weighted integers. For this class exercise, keep your weights to a range of 1-5 values (a 5 would be weighted 5 times more than a 1).
 - The numbers below are EXAMPLES; do not use the same numbers as my example!
 - Name the output “WeightedFinal”
 - Right-click on the “Weighted Sum” tool in the model and “Run” it.

Weighted Sum

Parameters Environments Properties

Input rasters

Raster	Field	Weight
forestwet	Value	5
flatland	Value	3
nearlakes	Value	1
awayhighs	Value	5
nearstreams	Value	1

+ Add another

Output raster: WeightedFinal

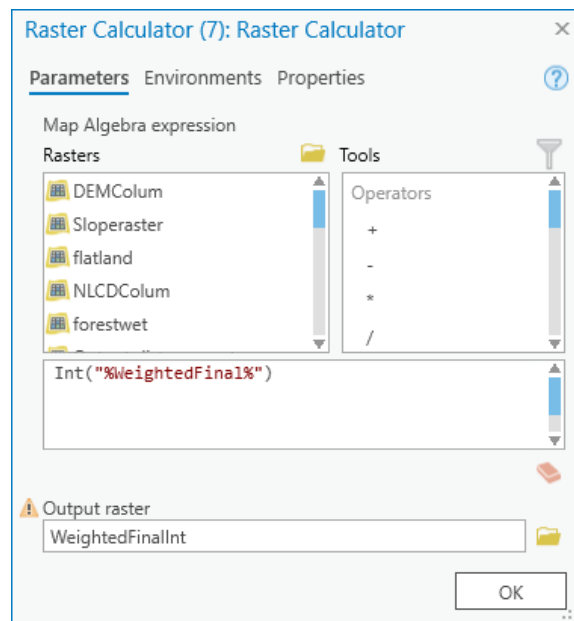
OK

Question 5. Complete the table below to show how you decided to weight your input variables.

Raster Layer	Weight
Awayhighs	5

Flatland	1
Forestwet	3
Nearlakes	2
Nearstreams	3

- 4) The result ("WeightedFinal") is a raster grid with floating point values containing decimal places, so we are unable to open its attribute table. Use Raster Calculator to convert the raster to one with integers (whole numbers).
- Add Raster Calculator to the Model.
 - Choose "**Int**" under the Math group, and then put in the "%WeightedFinal%" model raster within its parentheses.
 - Name the output raster "**WeightedFinalInt**"
 - Run the tool.



- 5) Now that you have integers for your final raster, you can open its attribute table to help you answer the final question.

Question 6. Everyone will have slightly different values and counts, based on what weights they applied. Regardless, consider your final values and calculate **how much land (in hectares)** has been determined to be in the "most suitable" classes, and what proportion of your total county did that include. Provide the answer for the top values (try using either the top 2 -3 values or around the top 25% of your values, depending on how many classes you created).

268045 grid cells (26.8045 hectares) have been deemed as "most suitable" which only included 8% of the county. If we use the top three values or 23% of the county, then there are 1,125,992 grid cells (112.5992 hectares).

End of lab. If you need to complete after your lab session, save it as a Project Package and upload to your ArcGIS Online space.