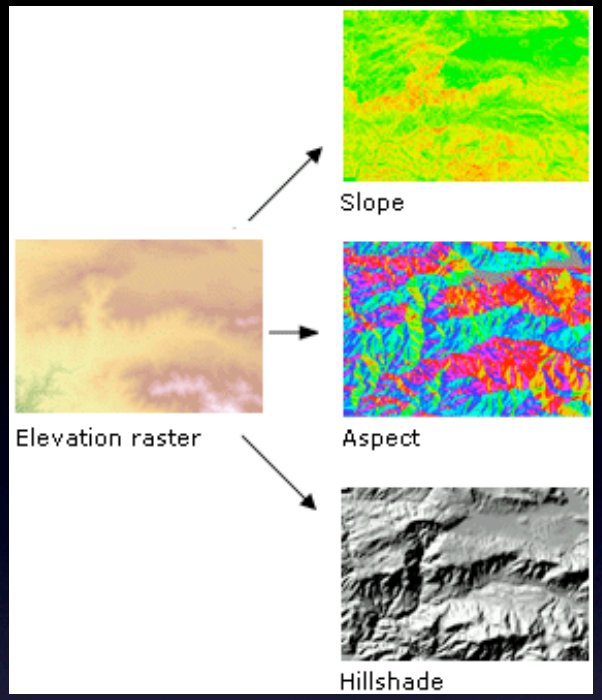
Geol 588
-
GIS for Geoscientists II

Lecture 2,

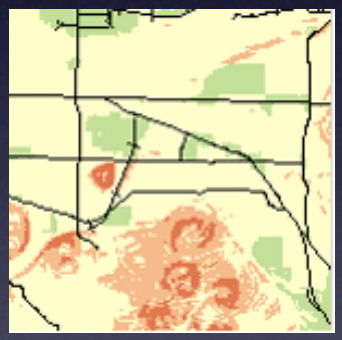
Today

- Raster concepts (intro)
- Pause
- go through first part of MGIS Ch. 15 tutorial (prep for first graded exercise)

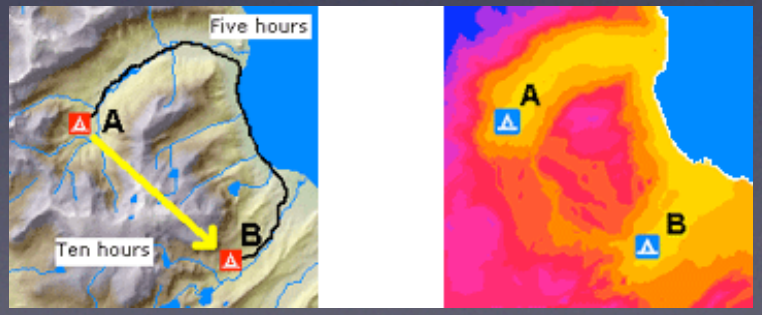
Examples of Raster GIS tasks



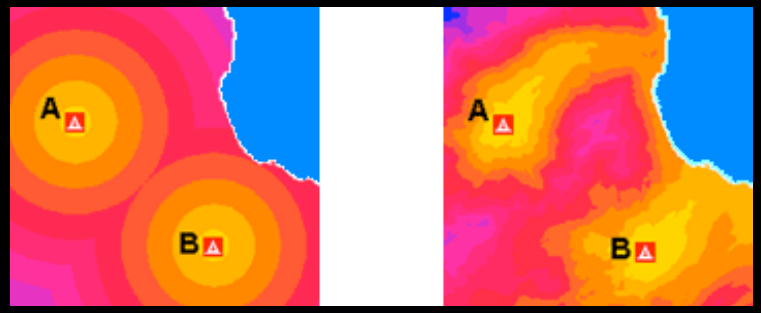
- Derive new information
- Visualize/analyze properties

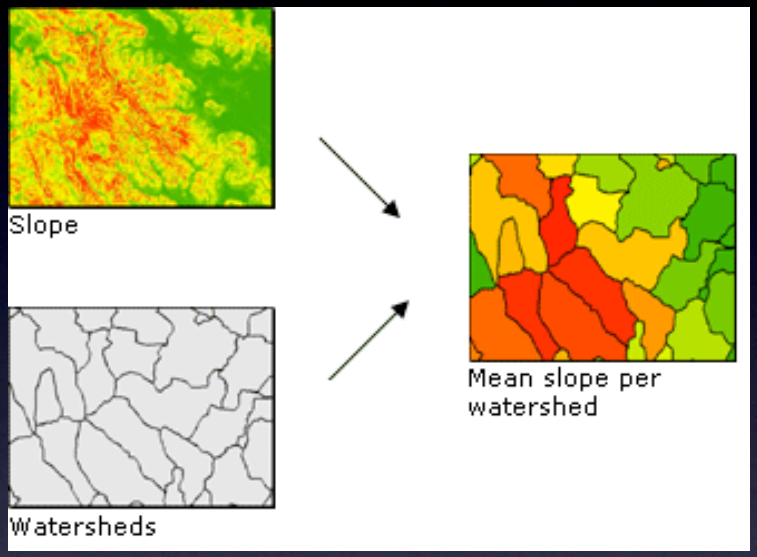


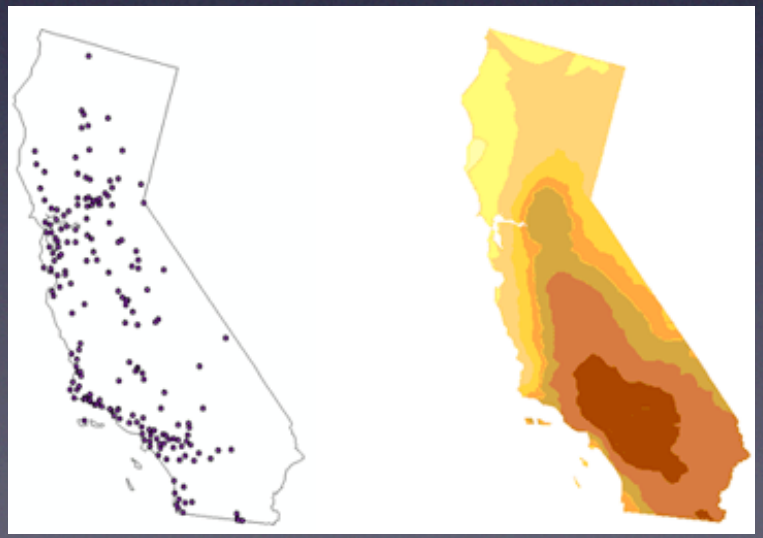
- Find area most suitable for an objective
- Suitability analysis



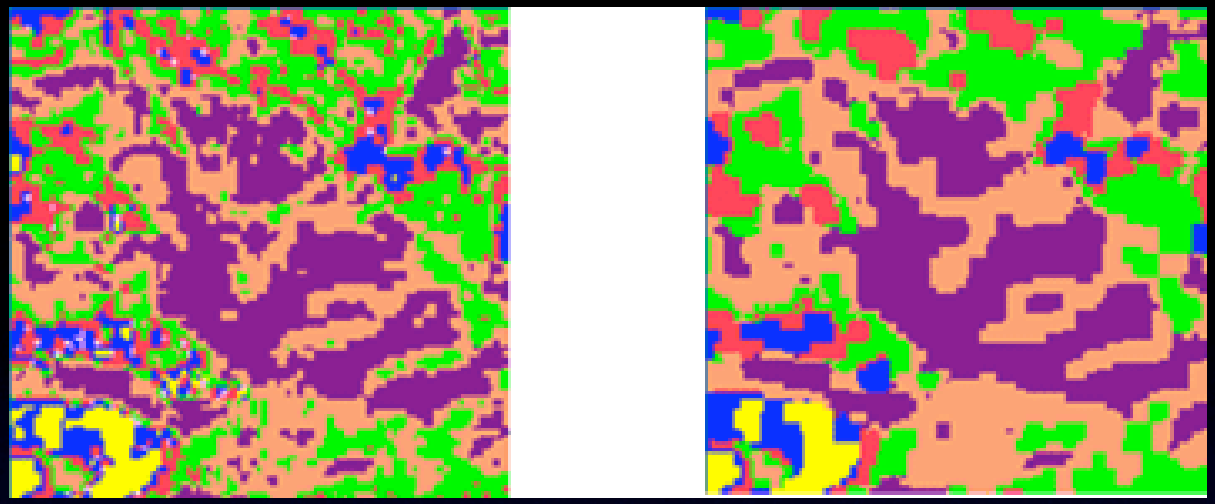
- Identify the best path between locations







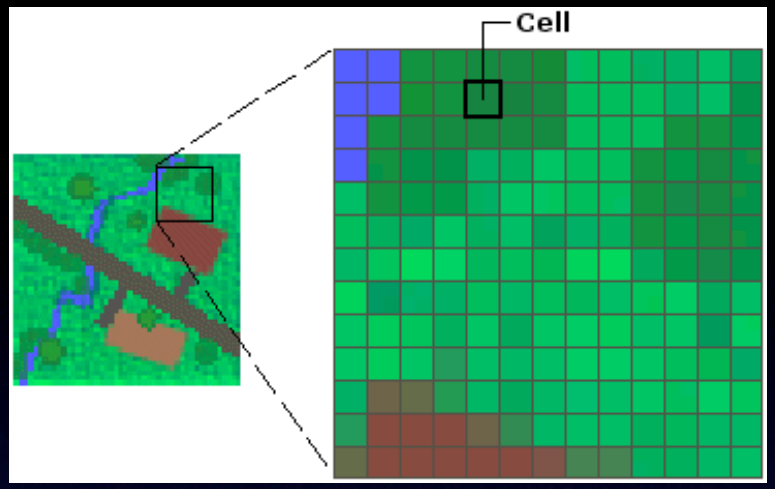
- Perform distance and cost-of-travel analyses
- Perform statistical analysis for predetermined zones
- Interpolate data values for a study area based on samples

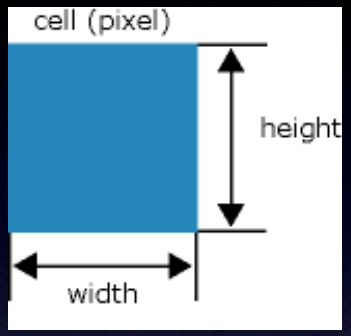


- Clean up a variety of data for further analysis
- Generalization (“image processing”)

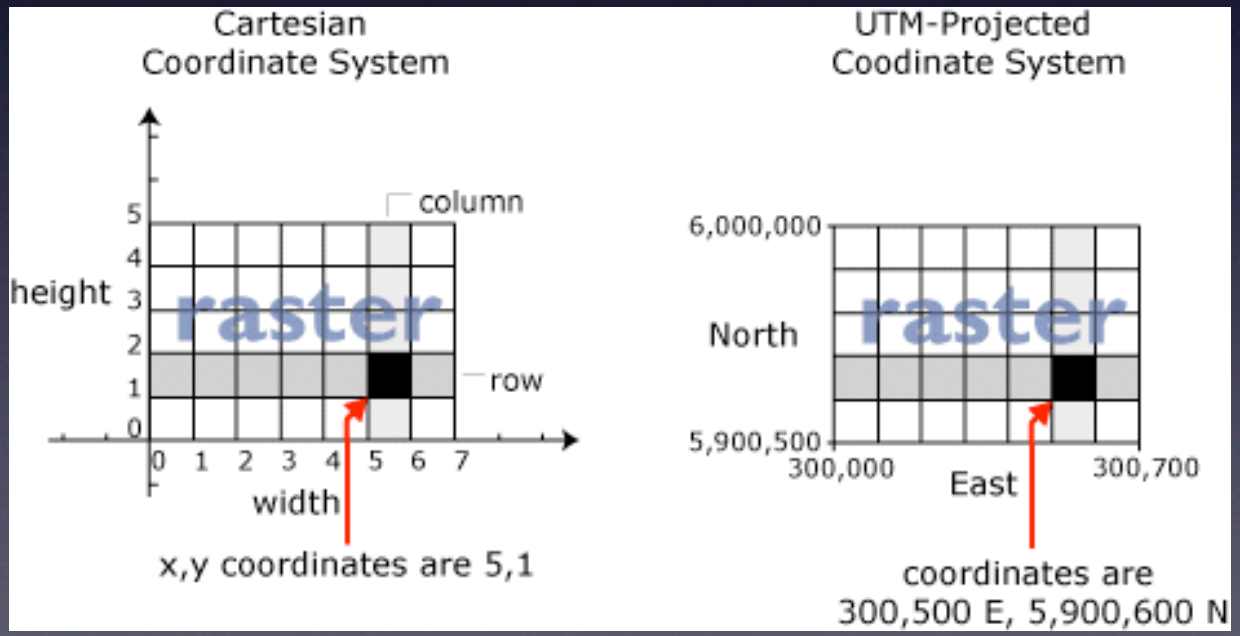
- Has anybody used any of these fucntions?

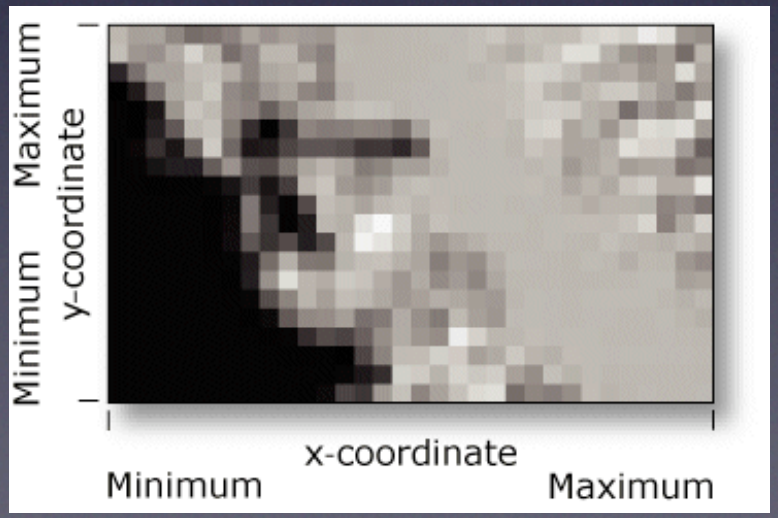
Inside a raster

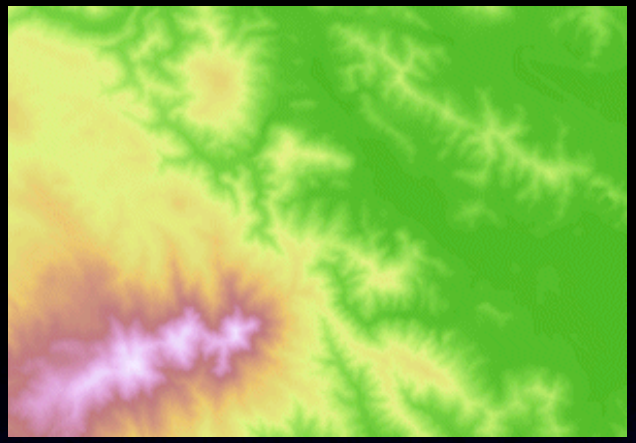


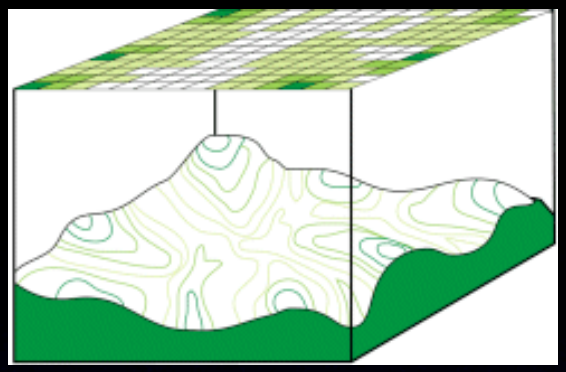


- cells (pixels) in rows (vertical) and columns (horizontal)
- 2D matrix, 2D array
- cell: width, height
- resolution
- indexed via Cartesian coords and georeferenced (UTM)
- Extend (real world)
- (Let's draw both views)

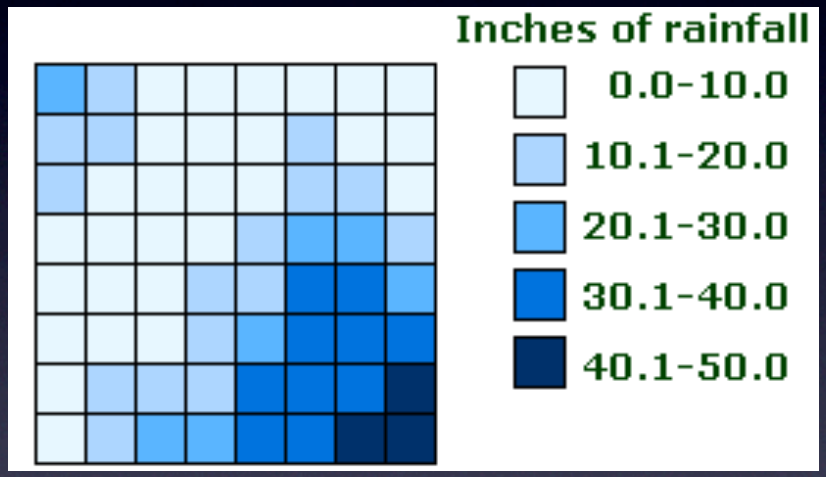






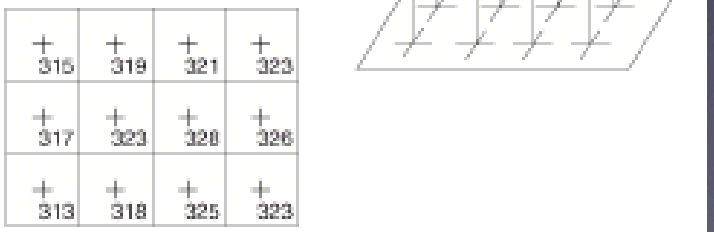


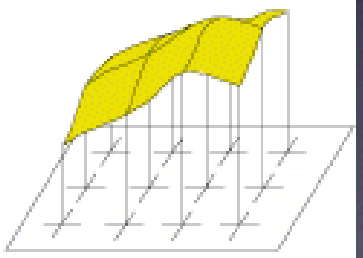
- Surface (elevation)
- Continuous Data
- no clear boundary
- each cell:
- real Inumber, floating point value
- at center of cell

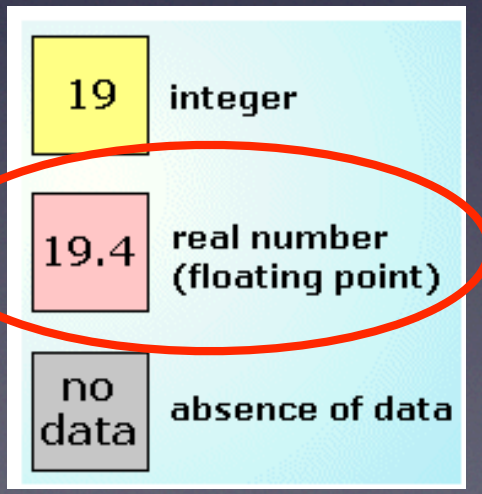


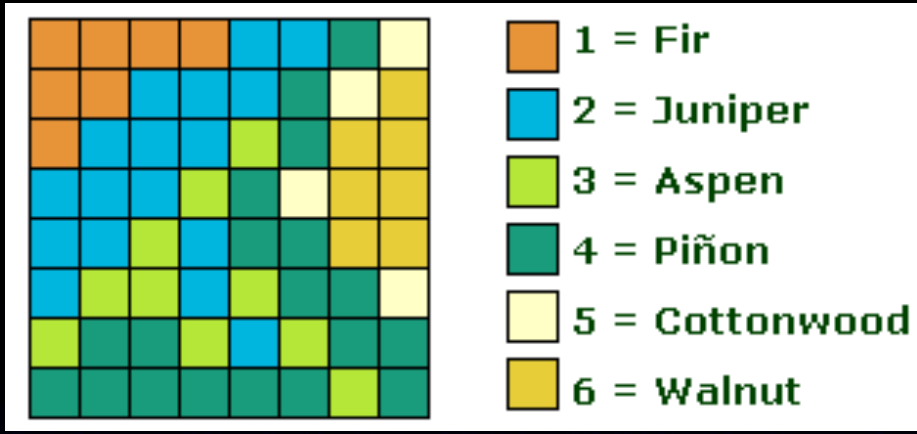
Value applies to the center point of the cell

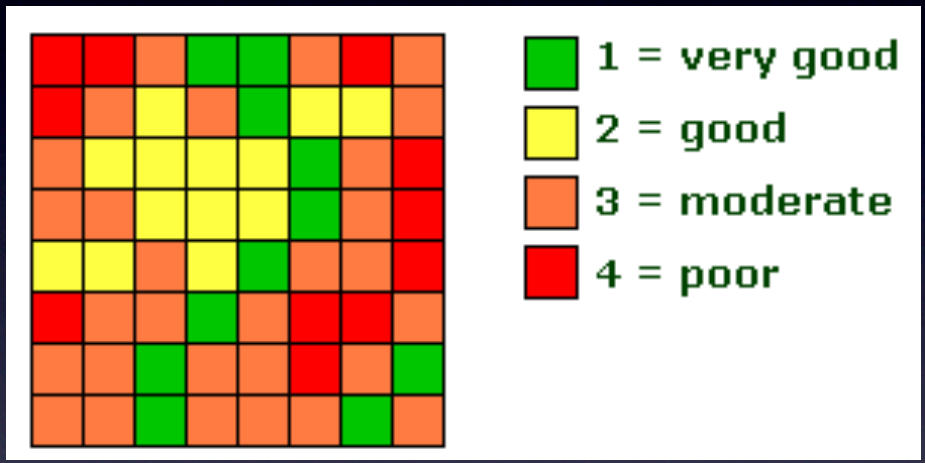
For certain types of data, the cell value represents a measured value at the center point of the cell. An example is a raster of elevation











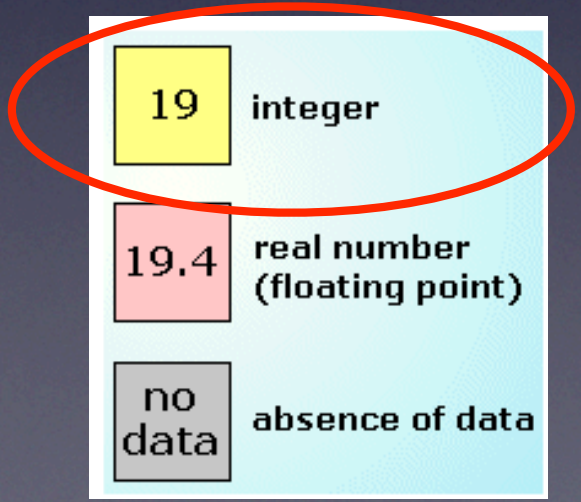
- thematic data
- nominal (categorical)
- class (name, "concept")
- cell filled with whole number
- ordinal (ranked) data
- integer data (value) as index

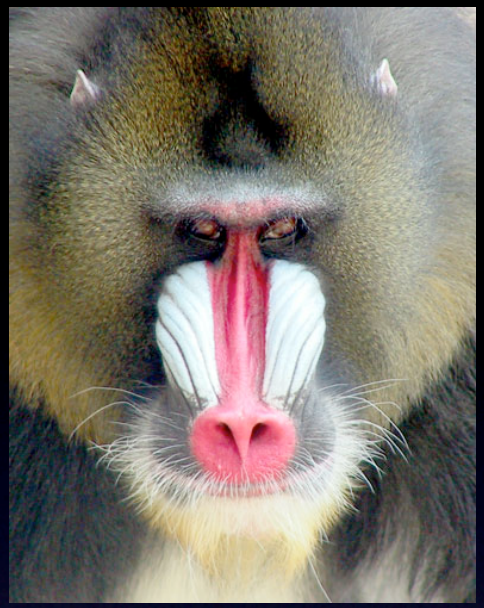
Value	Count	Landcover
1	6	Forest
2	8	Lake
3	10	Urban

Value applies to the whole area of the cell

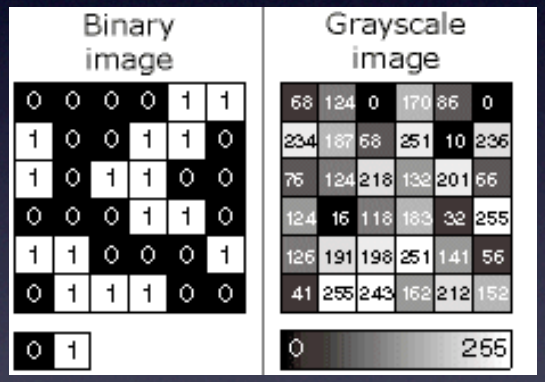
For most data, the cell value represents a sampling of a phenomenon, and the value is presumed to represent the whole cell square.

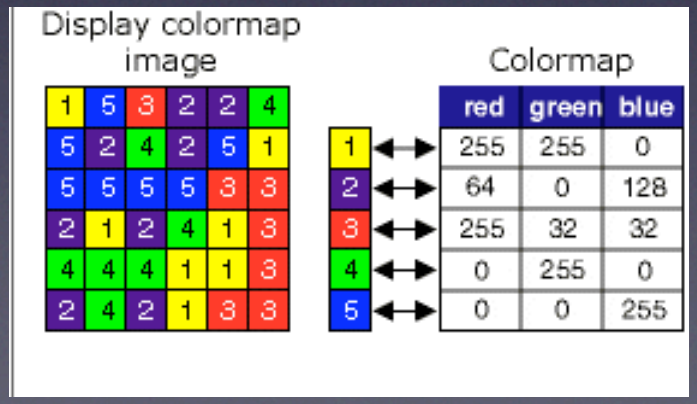
50	45	40	35
35	40	35	25
20	25	30	20

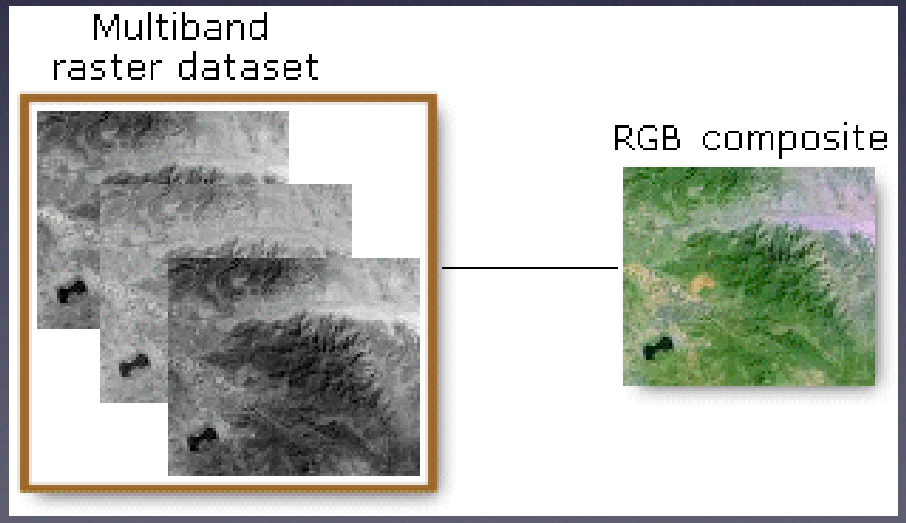


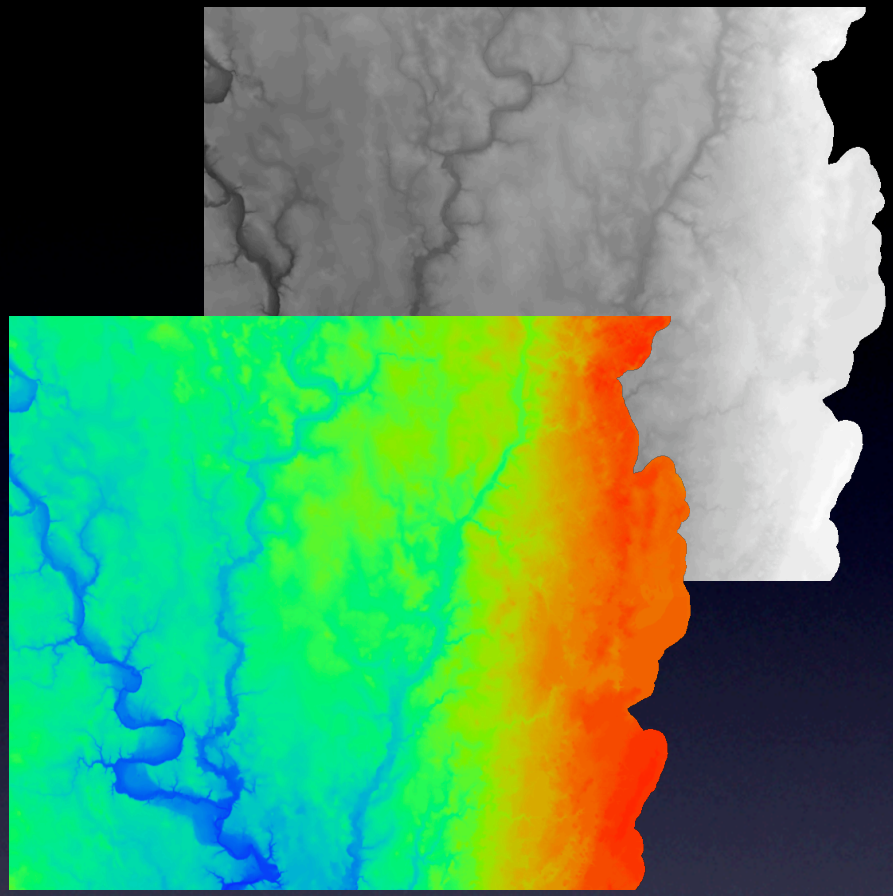


- image = raster (*)
- satellite image
- four ways of displaying raster/image
- colormap = 255 color ramp
- multiband: overlap 3 images

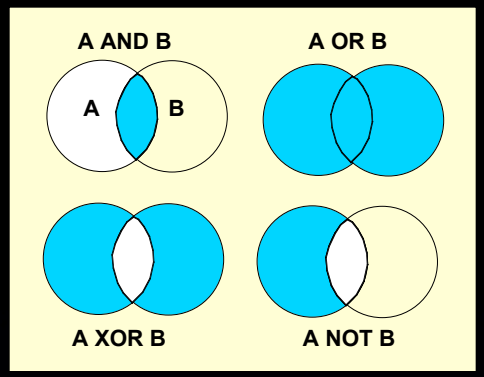




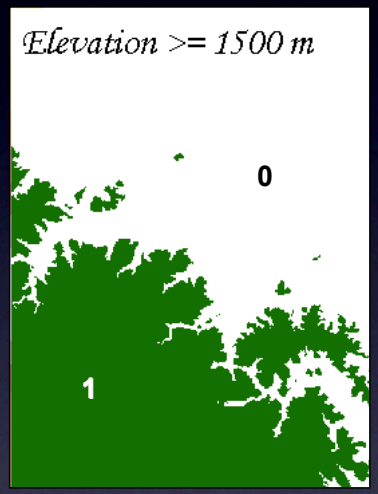


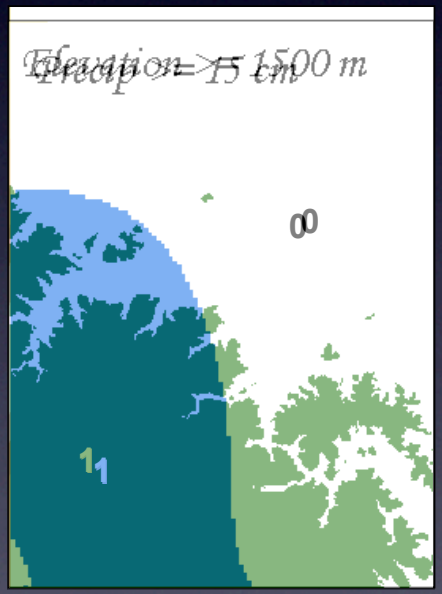


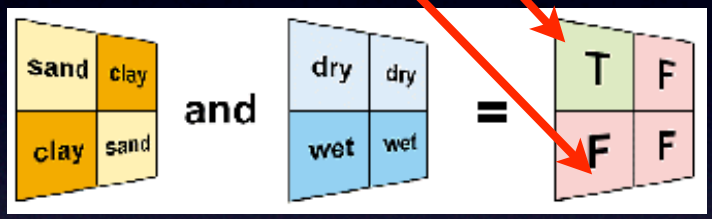
- NoData “values” (raster)
- “transparent” (image)
- no data (elevation) measured
- ArcGIS: word (NoData)
- internally” “magic” number
- any operation with NoData yields NoData
- set Cells to NoData

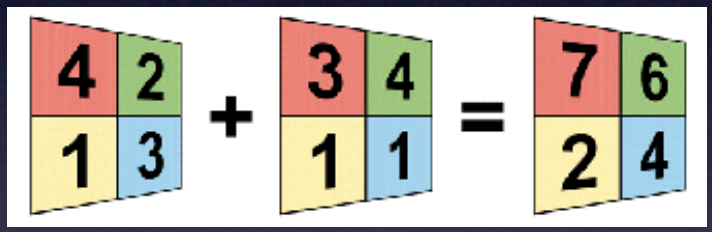


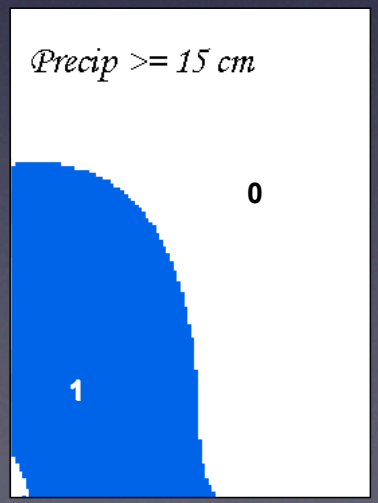
- Math with binary rasters
- presence = 1 (True, Yes)
- absence = 0 (False, No)
- Boolean function: AND, OR ... ; Math: +, -, ...

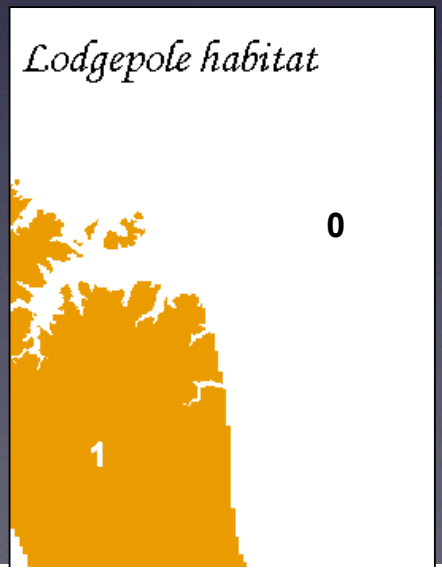


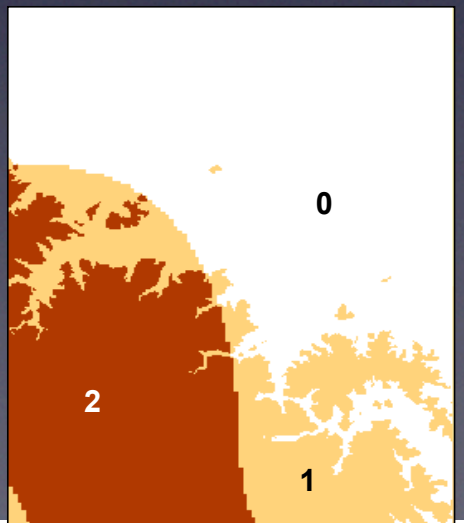


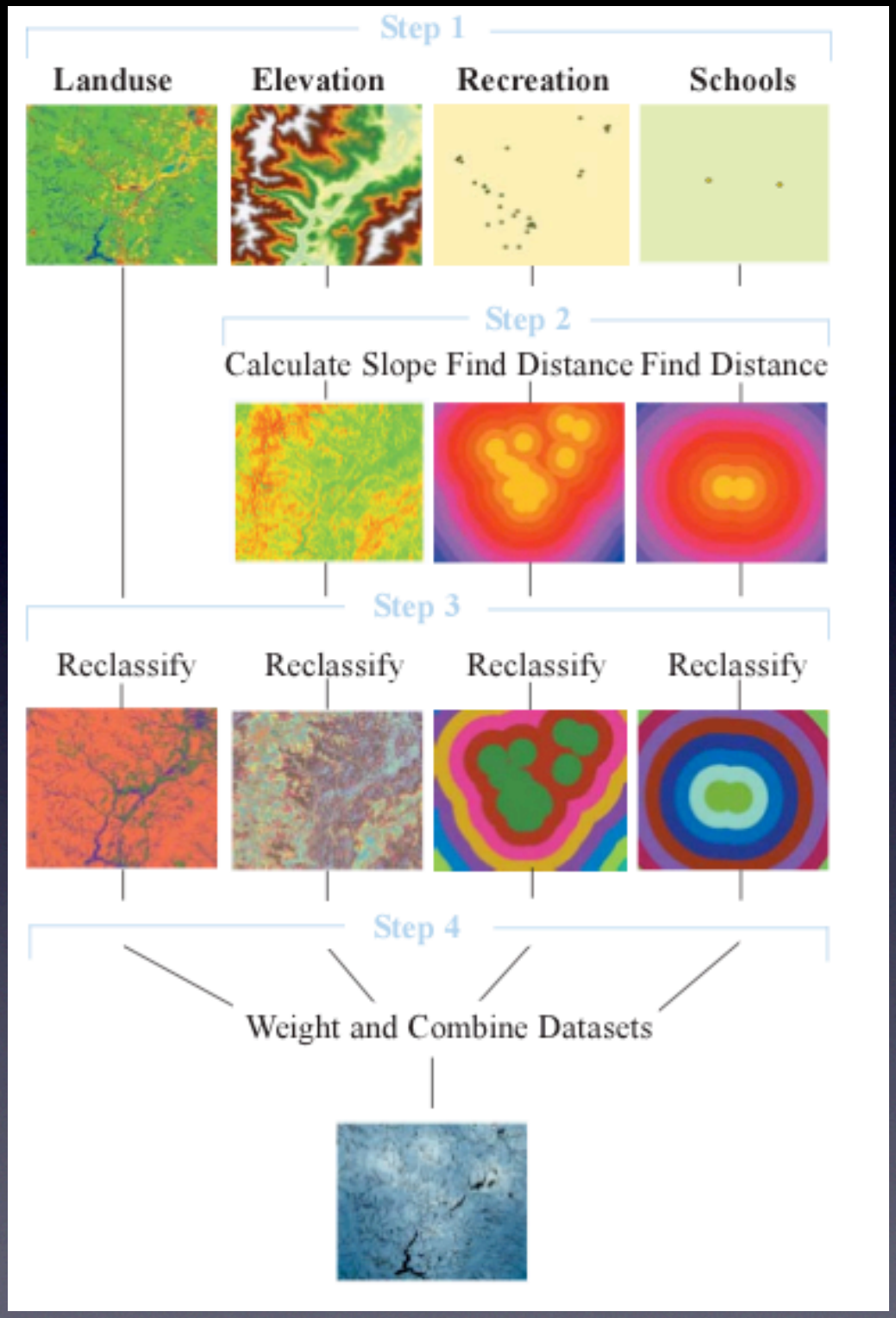












- Suitability Analysis
- Best site for new School
- define desired rules
  - slope < 10 perc.
  - close to recreation
  - not close to other schoole
- Accept simplification
  - closeness = straight line distance
- reclass inputs to 1 - 10
- weighted average of all inputs
- 10 = "perfect spot"

- Getting help:
- Public (P:) drive - ESRI folder
- Build-in help: F1, ArcToolbox Tools: right side panel
- Webhelp for ArcGIS 9.3 http://webhelp.esri.com/arcgisdesktop/9.3/
- Tutorials (flash video), including ArcGIS extensions: http://webhelp.esri.com/arcgisdesktop/9.3/index.cfm?TopicName=Tutorials

depiction of features without impacting the spatial integrity of your data. Representations provide greater control over the precision and definition of the symbolization of your data.

ArcGIS Desktop Extension Tutorials

The following tutorials are available in PDF format or as short animation files.

Tutorial	Description
3D Analyst	In this tutorial you'll learn how to drape images and features over a terrain surface, extrude points and polygons, interpolate a surface from points, build a TIN from features, create an animation, and navigate in ArcScene and ArcGlobe.
ArcGIS Publisher	In this tutorial you'll learn how to create, share, and distribute published maps.
ArcScan for ArcGIS	In this tutorial you'll learn how to generate vector data from rasters, including how to use the cell selection and raster snapping tools, perform simple raster editing and automatic vectorization, and interactively trace raster cells.
Cadastral Editor	In this tutorial you'll learn how to create, manage, and edit a cadastral fabric.
Data Interoperability	In this tutorial, you will learn how to directly read and analyze the additional data formats supported by Data Interoperability; translate data between various formats using Quick Import and Quick Export tools; transform data schemas using Custom Import, Custom Export and Custom Formats; and incorporate all these functions into your geoprocessing models.
Geostatistical Analyst	In this tutorial you'll learn how to represent and explore data and determine data trends; perform diagnostic tests on data; choose and fit a model such as kriging, cokriging, IDW, and others; and compare the results of different models.
Maplex for ArcGIS	In this tutorial you'll learn how to design and create publication-quality cartographic labels for maps using the Maplex for ArcGIS extension.
Network Analyst	In this tutorial you'll learn how to create network datasets and use them to find routes; find closest features on a network; calculate service areas; as well as how to build a model for route analysis.
Schematics Tutorial	In this tutorial you will become familiar with the Schematics graphical user interface in ArcMap by learning how to create diagrams and use many of the toolbar tools to modify the diagrams.
Schematics Designer Tutorial I	In this tutorial you will learn how to create and configure a Schematic Dataset that will use a Standard Builder diagram type to generate diagrams based on a geometric network.
Schematics Designer Tutorial II	In this tutorial you will learn how to create and configure a Schematic Dataset that will use a Custom Query Builder diagram type to generate diagrams based on tabular data from any database where connectivity between objects can be derived.
Spatial Analyst	In this tutorial you'll learn how to create, query, and analyze cell-based raster maps, derive new information from existing data, query information across multiple data layers, and fully integrate

Class Exercise 1

- model (predict) snail habitat via these simple "rules"
- snails can only exists where:
  - terrain elevation is between 1200 m - 1600 m
  - soil/geology is limestone
  - vegetation is coniferous trees
- snails cannot exists (for long, anyway):
  - within 200 m of a road (squish!)
- Task: use binary maps and raster multiplication to simulate boolean AND operation
- Whiteboard exercise?

- copy \\delphi\Geol588\data\MGIS_ch15 folder to your student folder,
- Let's work through the first part of see Ch15 Tutorial (p.539-545) together no.
- start: load MapDocuments/ex_15a.mxd
- follow along - make notes
- objective today - create the rasters needed for
- next week: graded exercise (similar content, a bit more complex)