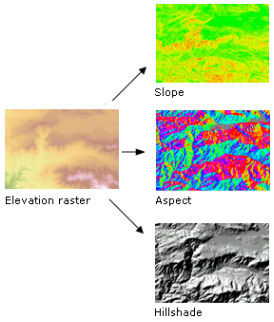
Geol 588
-
GIS for Geoscientists II

Lecture 2

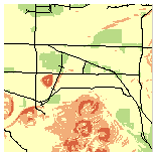
Today

- Raster concepts (start today, finish Thurs 2-3
- some examples of different rasters (geol588\data\example rasters\)
- WebCT working?
- How's the ArcGIS online course going?
-

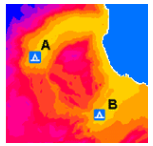
Examples of Raster GIS tasks



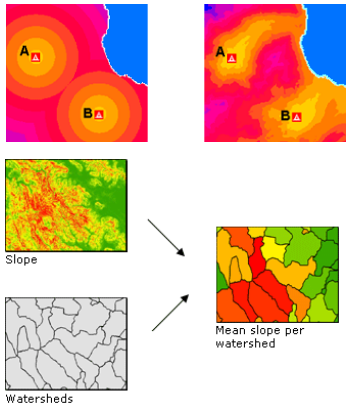
- Derive new information
- Visualize/analyze properties



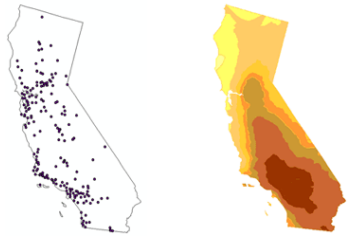
- Find area most suitable for an objective
- Suitability analysis



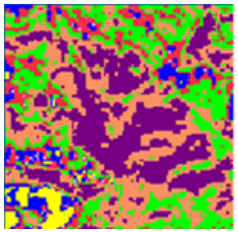
- Identify the best path between locations

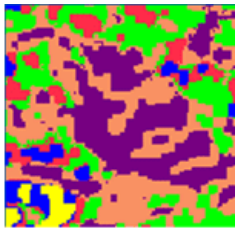


- Perform distance and cost-of-travel analyses
- Perform statistical analysis for predetermined zones



- Interpolate data values for a study area based on samples

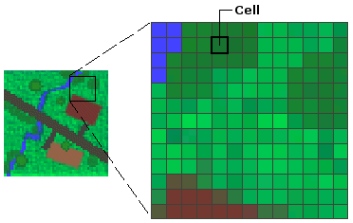


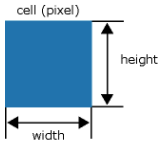


- Clean up a variety of data for further analysis
- Generalization ("image processing")

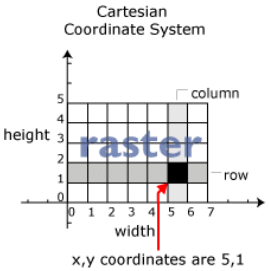
- Image processing / remote sensing background? Interest?

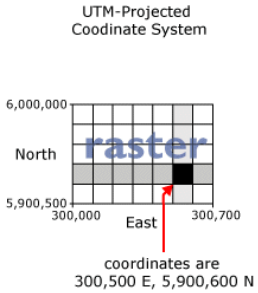
Inside a raster

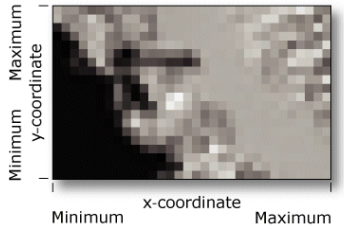


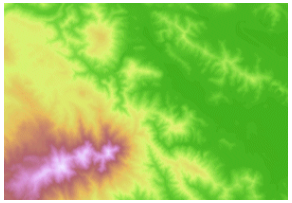


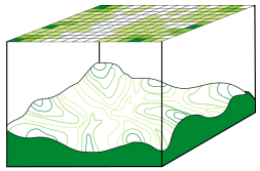
- cells (pixels) in rows (vertical) and columns (horizontal)
- 2D matrix, 2D array
- cell: width, height
- resolution
- indexed via Cartesian coords and georeferenced (UTM)
- Extend (real world)
- (Let's draw both views)



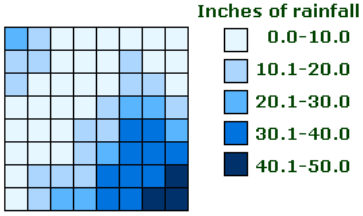






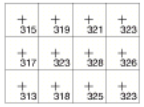


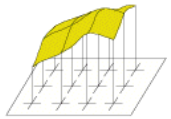
- Surface (elevation)
- Continuous Data
- no clear boundary
- each cell:
- real lnumber, floating point value
- at center of cell

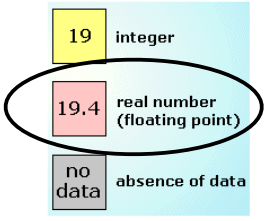


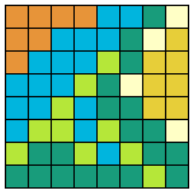
Value applies to the center point of the cell

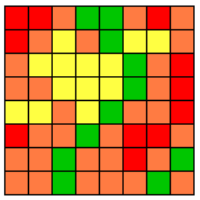
For certain types of data, the cell value represents a measured value at the center point of the cell. An example is a raster of elevation









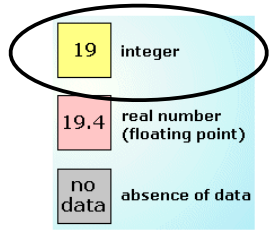


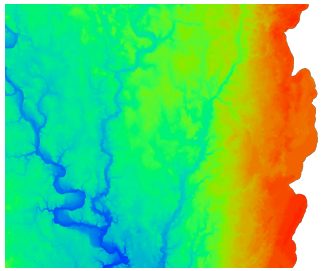
- thematic data
- nominal (categorical)
- class (name, "concept")
- cell filled with whole number
- ordinal (ranked) data
- integer data (value) as index

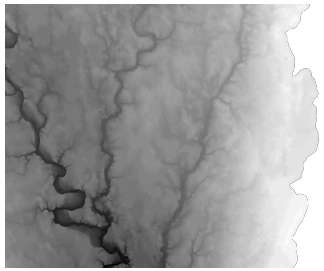
Value	Count	Landcover
1	6	Forest
2	8	Lake
3	10	Urban

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.



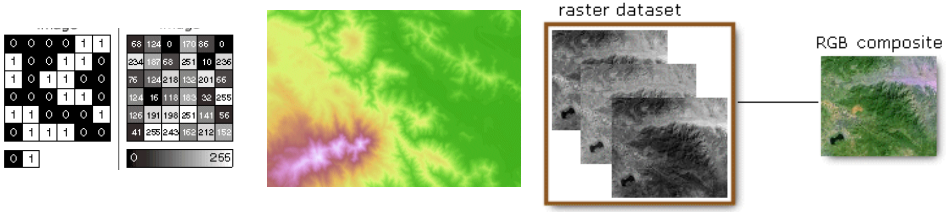




- NoData "values" -> undefined
- no data (e.g. elevation) was measured
- usuall shown as "transparent" (image)
- but: rasters must be regular grids (arrays) -> rectangular envelop
- internally: Nodata stored as "magic number" (e.g. -99999)
- any operation with NoData yields NoData
- You can set Cell value to NoData (why?)

Image data "types" (confusion alert)

- Integer (usually implies discrete data)
  - 1 bit: contains only 1s and 0s
  - shown as black/white)
  - 8 bit: hold 256 different values
- floating point data (usually continuous data)
  - stores decimal numbers: -infinity - + infinty
  - bits (16, 32), single double only indicate precision!
- multiband data:
  - package of overlapping images (bands) visualized as RGB composite)
- **data storage and data visualization (coloring) are two different issues!**



Look at some examples of rasters in ArcMap

- raster are in data\example rasters (no need to copy them - I hope)
- New ArcMap document - just add them
  (yes to pyramids, ignore wrong datum warnings)
- look at image parameters via Layer properties:
  - Cell size, number of row/columns?
  - Extend, spatial reference
  - Integer of float? How many bits? (1, 8, ...)
  - discrete or continuous?
  - Type of raster? (TIFF, GRID, IMG, ...)?
- (the jpgs are **not georeferenced** - where on Earth are they?)
- Play around with different ways of symbolizing the same raster
  (Unique values, classified, stretched)