

GIS Data Types:

Vector vs. Raster

VECTOR

Basic Elements:

- Location (x,y) or (x,y,z)
- Explicit, i.e. pegged to a coordinate system
- Different coordinate system (and precision) require different values
 - e.g. UTM as integer (but large)
 - Lat, long as two floating point numbers +/-
- Points are used to build more complex features

Advantages of Vector Data Structures:

- Good representation of phenomenonology
- Compact
- Topology can be completely described
- Accurate graphics
- Retrieval, updating and generalization of graphics and attributes possible

Disadvantages of Vector Data Structures:

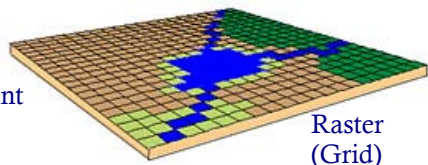
- Complex Data Structures
- Combination of several vector polygon maps through overlay creates difficulties
- Simulation is difficult because each unit has a different topological form
- Display and plotting can be expensive, particularly for high quality color
- The technology is expensive, particularly for the more sophisticated software and hardware
- Spatial analysis and filtering within polygons are impossible

VECTOR FORMATS

1. Shapefile

Contains:

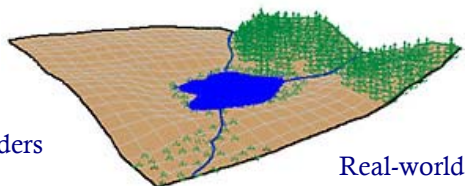
- Point, or multi-point
- Line, or polyline
- Polygon



2. Coverage

Contains:

- Point, or node
- Arc, or line
- Polygon
- Label



EXAMPLES

- Administrative borders
- Linear features
- Roads
- Rivers
- Discrete habitat boundaries

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RASTER

Basic Elements:

- Extent
 - # Rows
 - # Columns
- Origin
- Orientation
- Resolution: pixel = grain = grid cell

Advantages of Raster Data Structures:

- Simple data structures
- Overlay and combination of maps and remote sensed images easy
- Some spatial analysis methods simple to perform
- Simulation easy, because cells have the same size and shape
- Technology is cheap

Disadvantages of Raster Data Structures:

- The use of large cells to reduce data volumes means that phenomenonologically recognizable structures can be lost and there can be a serious loss of information
- Crude raster maps are considerably less beautiful than line maps
- Network linkages are difficult to establish
- Projection transformations are time consuming unless special algorithms or hardware is used.

EXAMPLES

- Temperature (air, water)
- Air pressure
- Ecotones
- Soil ph
- Precipitation
- Salinity
- Elevation & its derivatives
- Flow
- Direction, distance
- Reflectance (photography/imagery)

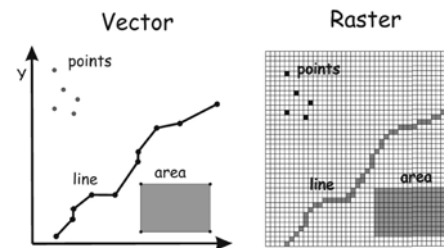


Figure 2-8: Vector and raster data models.

For more information, visit:
<http://giif.cnr.berkeley.edu>



Tuxen & Kelly, 2007
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