

## 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

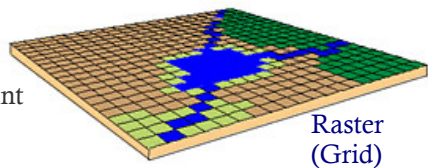
Disadvantages of Vector Data Structures:

- 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

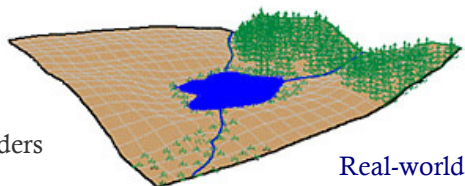
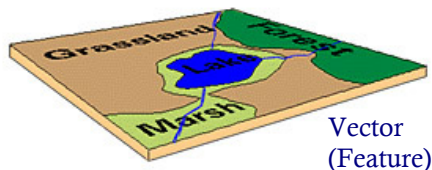
### 1. Shapefile

- 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

## 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 phenomenologically 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)

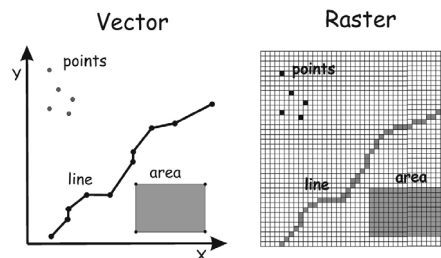


Figure 2-8: Vector and raster data models.