

# Planning a GIS Project

## Steps in a GIS Project

- Identify you objectives
- Create a project database
- Analyze the data
- Present the result

# Identify Your Objectives

- Problem statement
  - Greenvalley is growing and needs a new wastewater treatment and recycling plant...
- Identify the spatial components in the problem statement
  - Siting or routing
  - Location-allocation
  - Spatial modeling (prediction)
  - System control and data acquisition (SCADA)
  - AM/FM

## Regional Equity Atlas Project

([http://www.cfuture.org/projects/atlas/index\\_html](http://www.cfuture.org/projects/atlas/index_html))

- How fair is our regional development approach?  
How can we make it more fair?
  - Can workers in every community afford to live **near** their jobs?
  - Which communities have ample **access** to parks and natural areas?
  - What neighborhoods in our region lack **access** to grocery stores?
  - Which cities have sufficient resources to provide public **services** to residents?

## What information do you need?

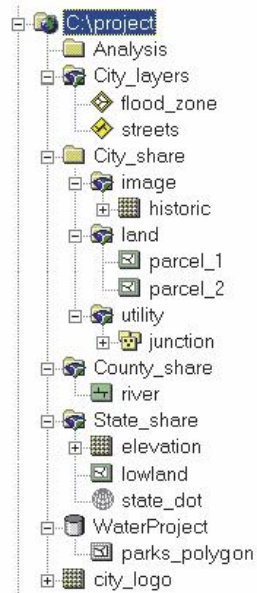
- Decision criteria
- Scenarios
- Assumptions/estimates
- Intended audience/users

# Create a Project Database

- Designing
- Automating
- Managing

CRITERIA	DATASET	ATTRIBUTES
LESS THAN 365 METERS ELEVATION	ELEVATION	ELEVATION IN METERS
OUTSIDE THE FLOODPLAIN	FLOODPLAIN	N/A
WITHIN 1,000 METERS OF THE RIVER	RIVER	N/A
AT LEAST 150 METERS FROM RESIDENTIAL PROPERTY	PARCELS	LAND USE
AT LEAST 150 METERS FROM PARKS	PARKS	N/A
ON VACANT LAND	PARCELS	LAND USE
WITHIN 1,000 METERS OF THE WASTEWATER JUNCTION	WASTEWATER JUNCTION	N/A
WITHIN 50 METERS OF A ROAD	ROADS	N/A
AT LEAST 150,000 SQ. METERS	PARCELS	AREA IN SQUARE METERS

Hooray!



# GIS Analysis

- Visualization
- Querying
  - Attribute querying
  - Location (spatial) querying
- Distance (Proximity)
- Overlay
- Modeling

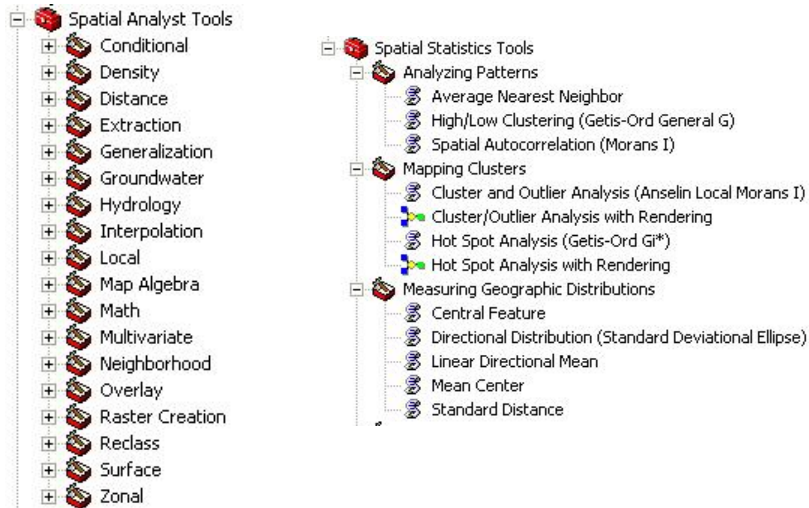
# GIS Tools (ArcGIS)

The image displays the ArcGIS interface. On the left, the ArcToolbox is visible, showing a tree structure of tools under 'Analysis Tools'. The tools listed include: Extract (Clip, Select, Split, Table Select), Overlay (Erase, Identity, Intersect, Symmetrical Difference, Union, Update), Proximity (Buffer, Multiple Ring Buffer, Near), Point Distance, Statistics (Frequency, Summary Statistics), and 3D Analyst Tools.

On the right, the 'Geostatistical Analyst' menu is open, showing options: Explore Data, Geostatistical Wizard..., and Create Subsets... The 'Geostatistical Wizard...' option is selected, and a sub-menu is visible with the following tools: Histogram, Normal QQPlot, Trend Analysis, Voronoi Map, Semivariogram/Covariance Cloud, General QQPlot, and Crosscovariance Cloud.

Below the menu, the 'Geostatistical Wizard: Choose Input Data and Method' dialog box is open. It has two tabs: 'Dataset 1' and 'Validation'. The 'Dataset 1' tab is active, showing fields for 'Input Data', 'Attribute', 'X Field', and 'Y Field'. There are checkboxes for 'Use NODATA value'. The 'Validation' tab also has similar fields. Below the input fields, there is a 'Methods' list with 'Inverse Distance Weighting' selected. To the right of the methods list is a text box titled 'About Inverse Distance Weighting' which contains the following text: 'Inverse Distance Weighting (IDW) is a quick deterministic interpolator that is exact. There are very few decisions to make regarding model parameters. It can be a good way to take a first look at an interpolated surface. However, there is no assessment of prediction errors, and IDW can produce "bull eyes" around data locations. There are no assumptions required of the data.'

## GIS Tools (ArcGIS)



## GIS Tools (Others)

- Landscape pattern analysis - FRAGSTATS
- Network analysis
  - ArcGIS Network Analyst Extension (<http://www.esri.com/software/arcgis/extensions/networkanalyst/>)
- Spatial statistical modeling
  - Spatial Statistics Toolbox for Matlab ([http://www.spatial-statistics.com/software\\_index.htm](http://www.spatial-statistics.com/software_index.htm))
  - S-Plus (<http://lib.stat.cmu.edu/S/>)
  - R (<http://sal.agecon.uiuc.edu/csiss/Rgeo/>)
  - Geoda (<https://www.geoda.uiuc.edu/>)
- Agent-based modeling
  - ArcGIS Agent Analyst Extension
  - Netlogo (<http://ccl.northwestern.edu/netlogo/>)

## GIS Tools (Others)

- Optimization (?)
  - Multi-objective decision-making (IDRISI – MOLA)
- Data mining (?)
- Geovisualization (?)
- Coupling with other models (?)

### Where to get help?

- ArcGIS Online Help  
(I:\Students\Data\GIS\ArcGIS Documentation\ArcGIS9.1\_documentation\ESRI\_Library)
- ArcScripts (<http://arcscripts.esri.com/>)
- ESRI Developer Network (<http://edn.esri.com/>)

## Software Installation

- Send requests to Geography Lab Manager, David Banis ([dbanis@pdx.edu](mailto:dbanis@pdx.edu))
- Provide a copy of or a link to the software
- Indicate which computers to have the software