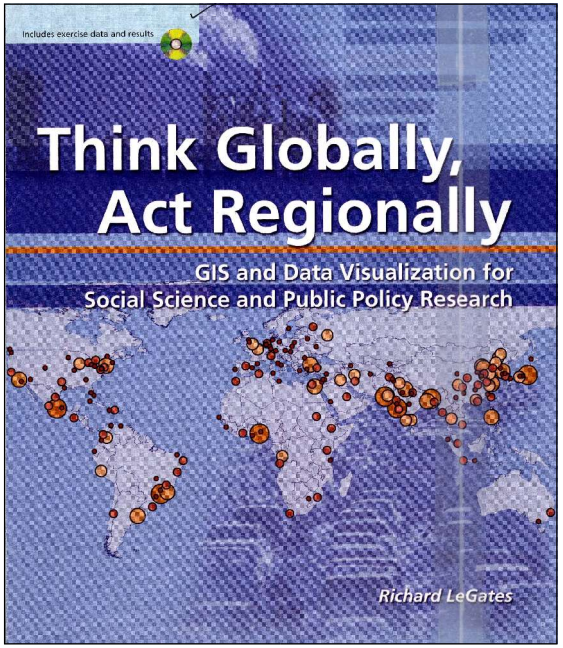
The *Think Globally, Act Regionally* Instructional Module

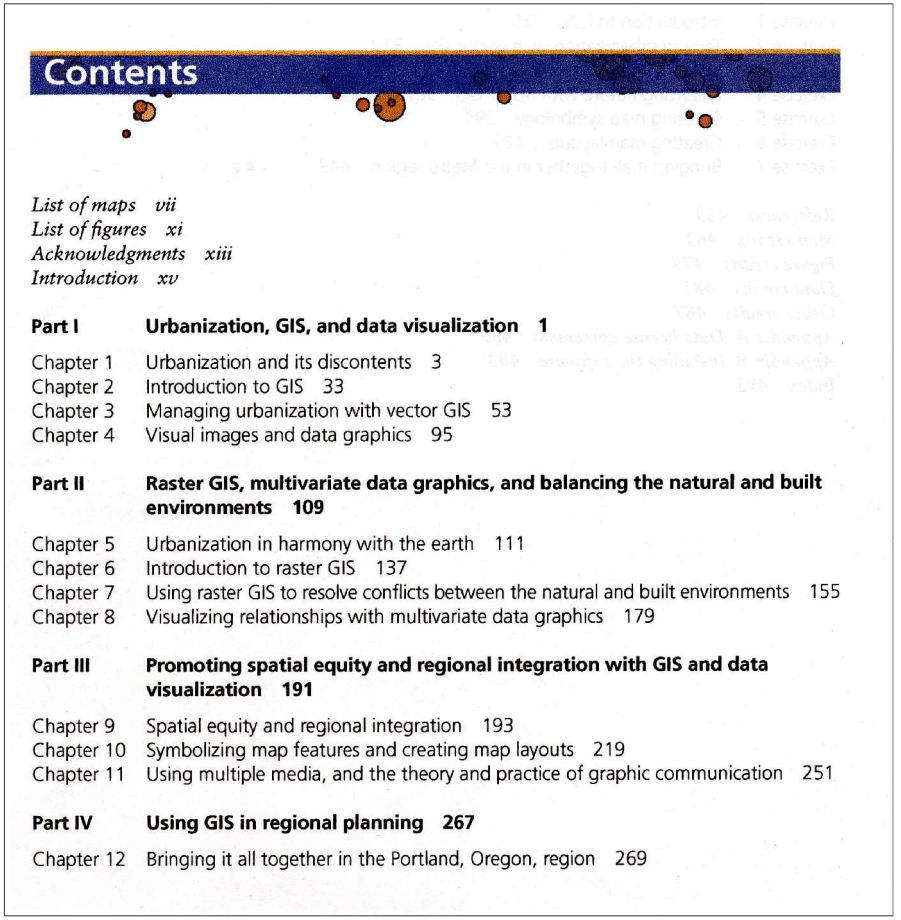


Richard LeGates

ACSP Conference
Kansas City 2005

The TGAR Module

- Text (book)
  - 4 chapters on urban planning issues
  - 5 chapters on GIS concepts and operations
  - 3 chapters on data visualization
  - 7 exercises (text)
  - Glossary
  - Questions for further study
  - Bibliography
- Exercises (CD-ROM)
  - 6 Step-by-step exercises
  - 1 culminating exercise using Portland Metro data



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Chapters on urban planning issues

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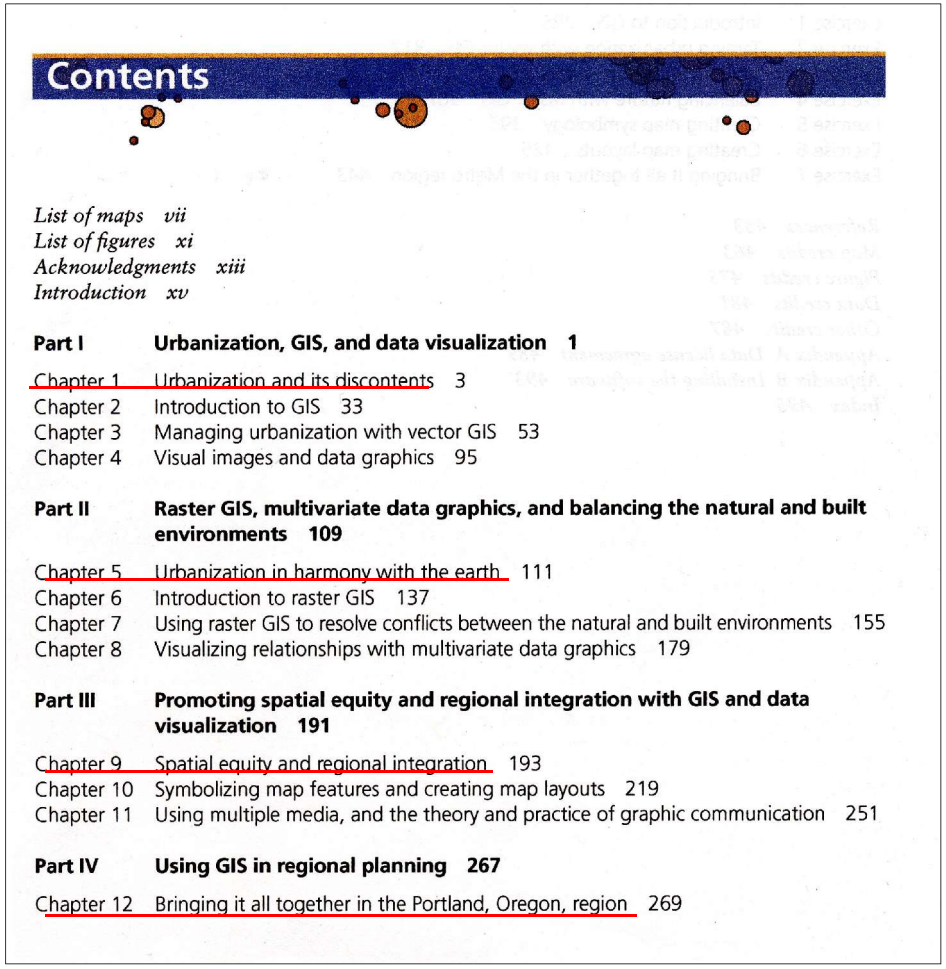
Ch 5 Urbanization in harmony with the earth
Ch 9 Spatial equity and regional integration
Ch 12 Bringing it all together in the Portland, Oregon, region



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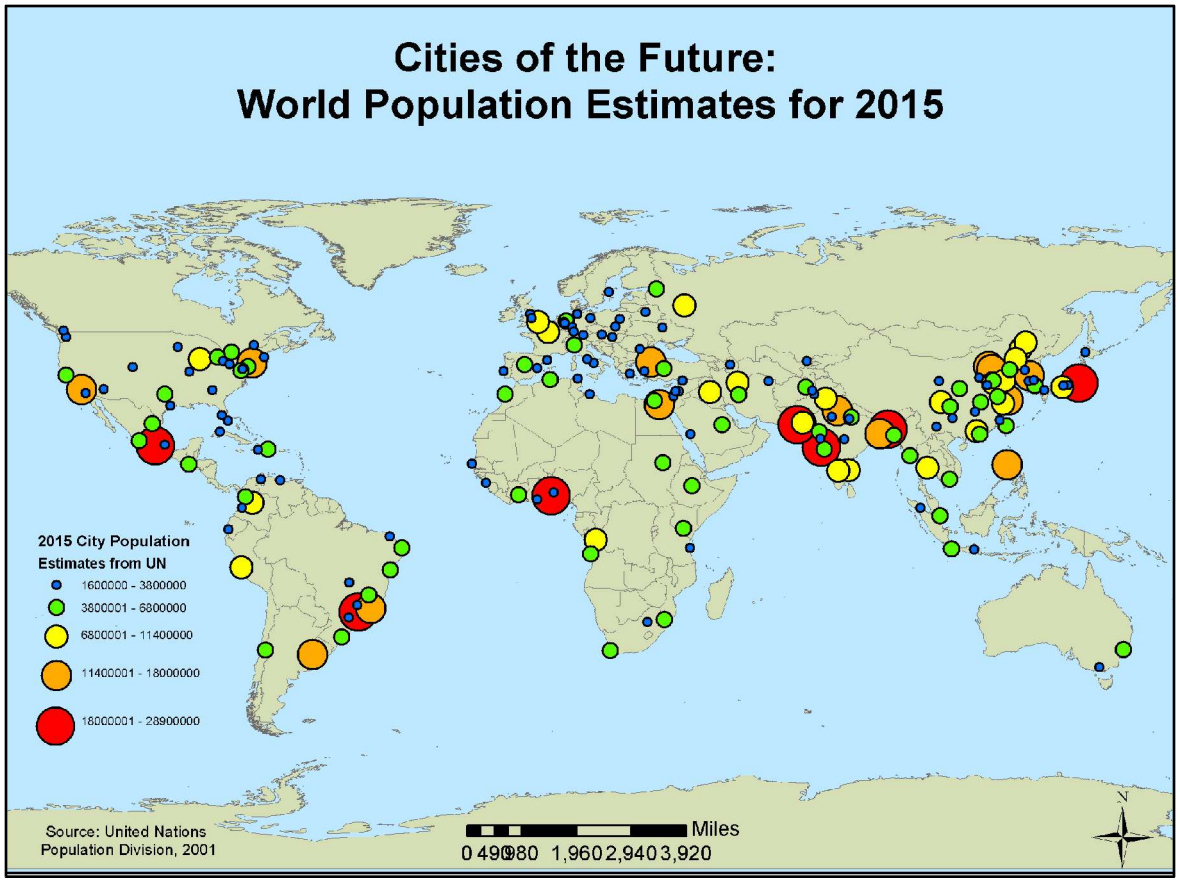
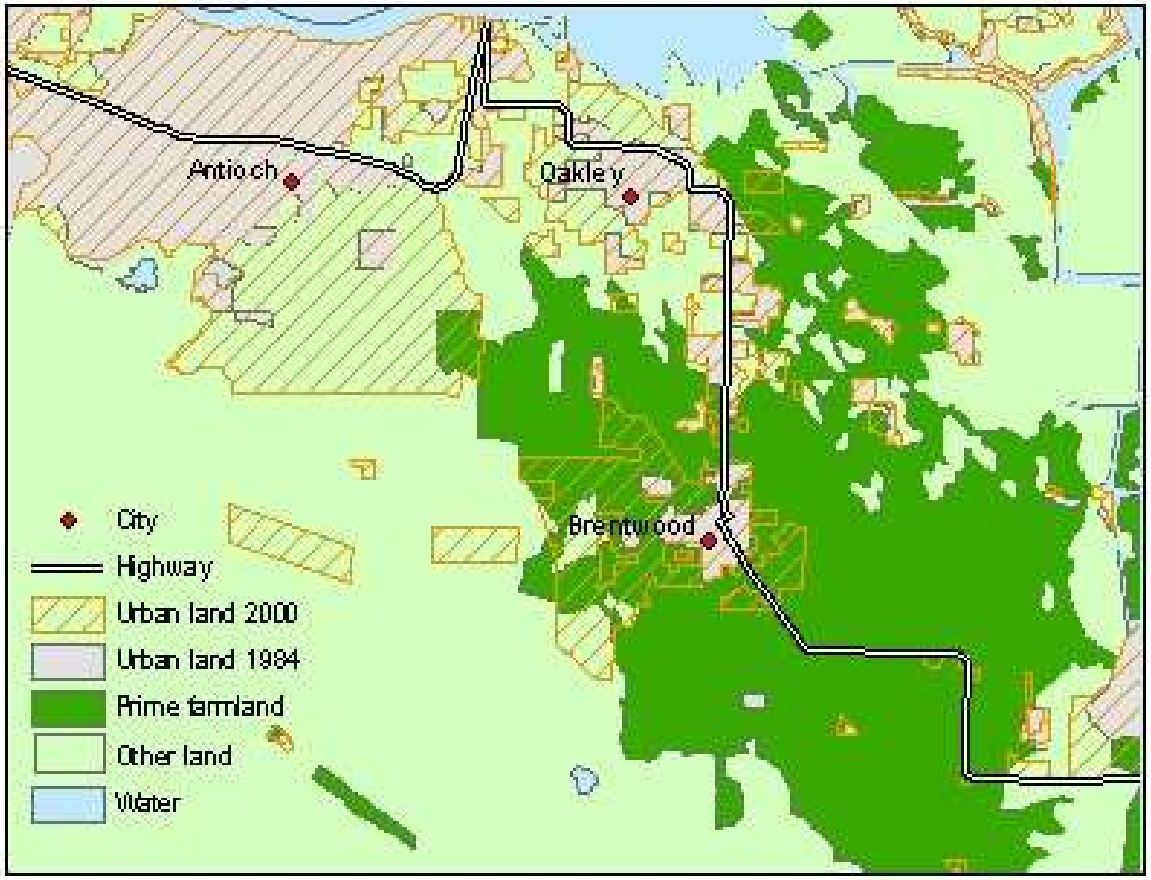
Part I: Urbanization and its discontents

Understanding Urbanization

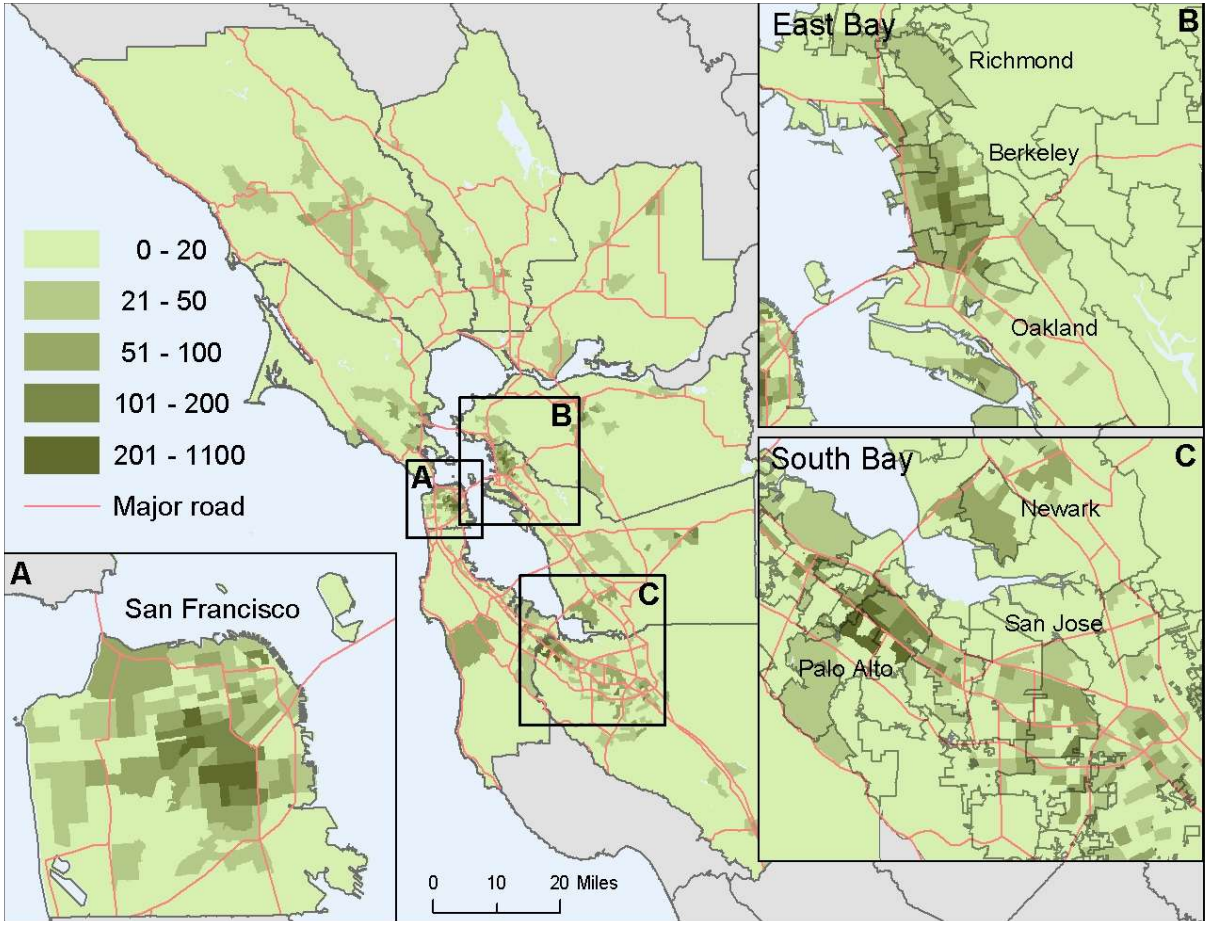
Analyzing current and projected world city populations



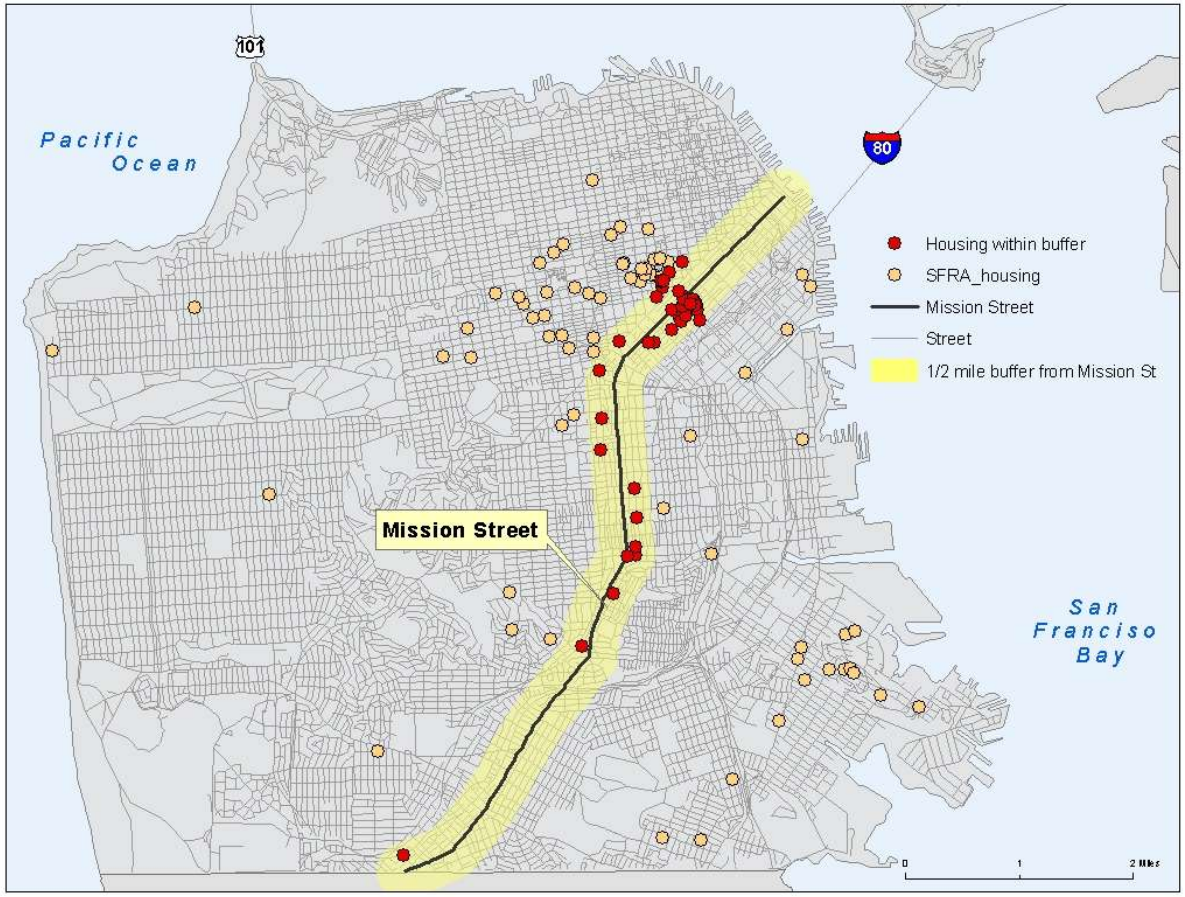
Managing urban sprawl



Providing transportation alternatives

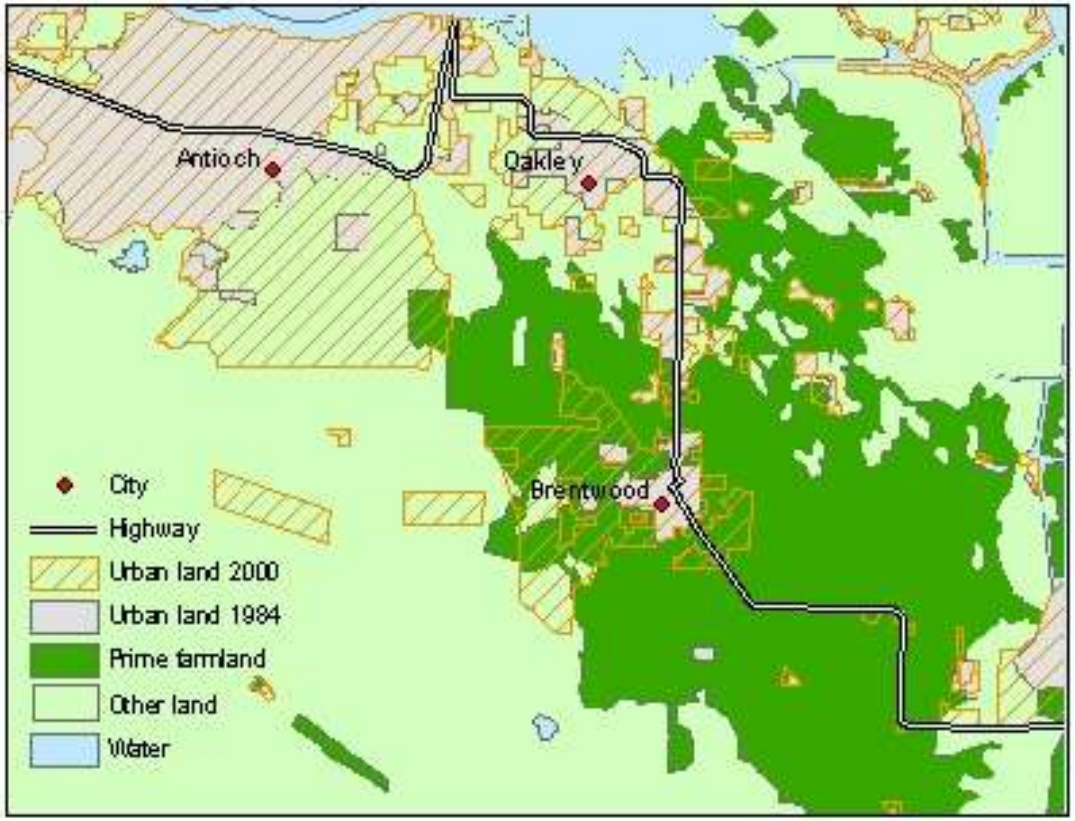


Siting affordable housing

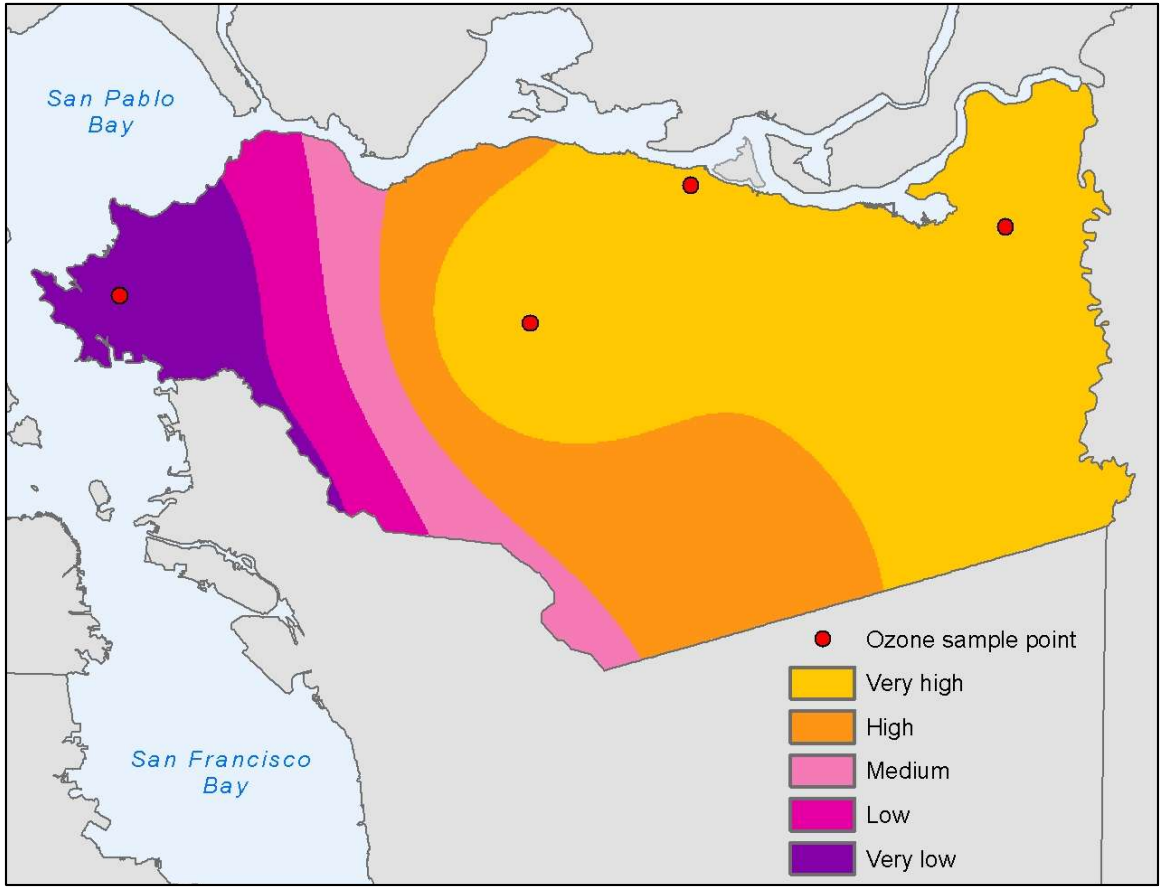


Part II: Harmonizing the Built and Natural Environment

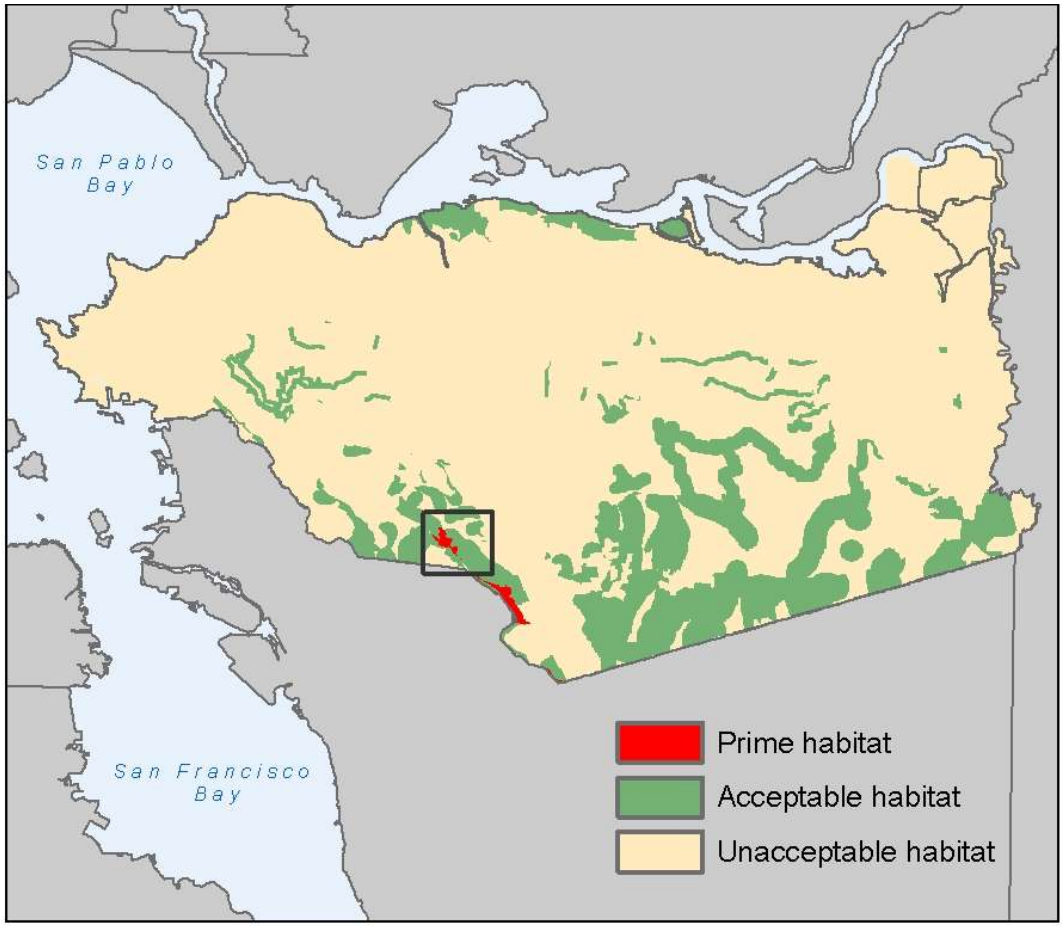
Protecting prime farmland



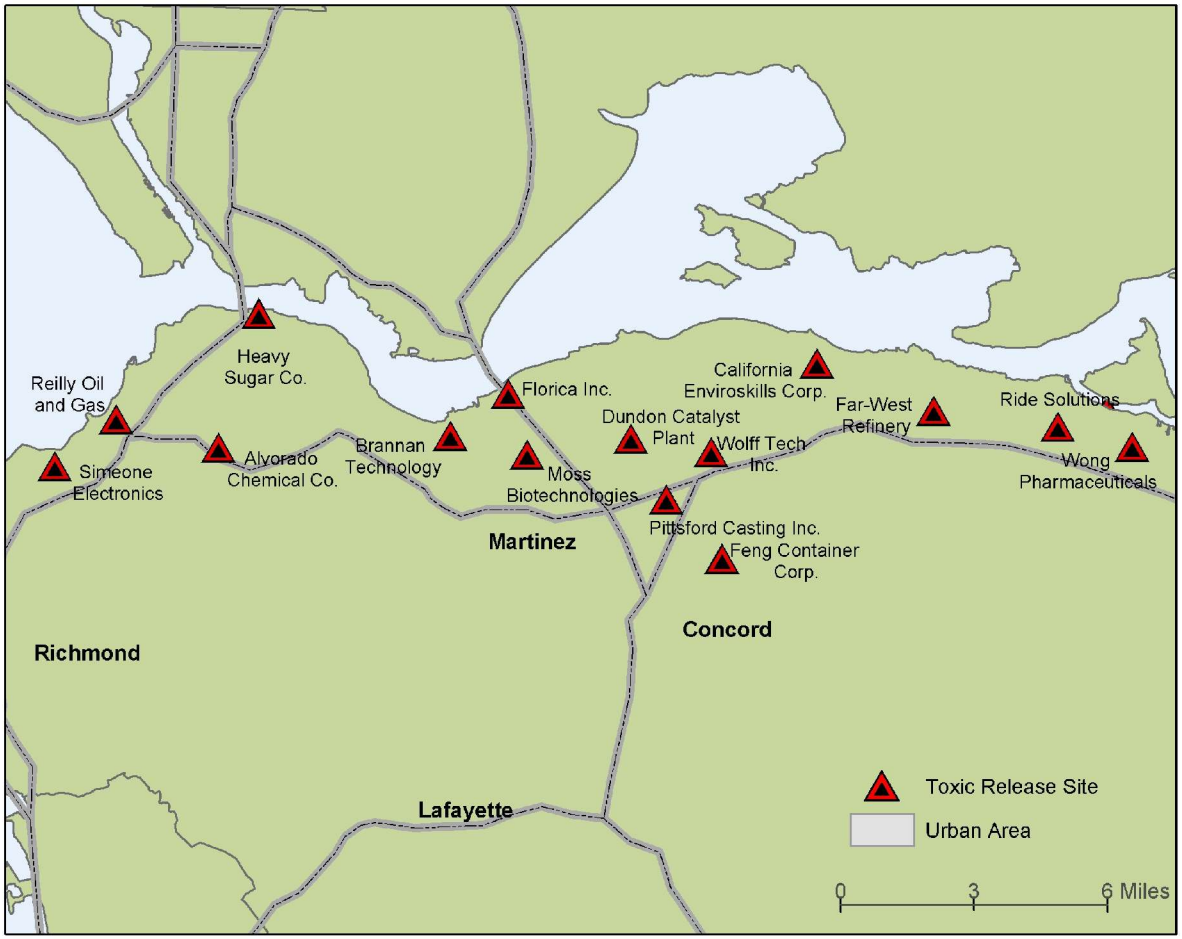
Reducing ozone pollution



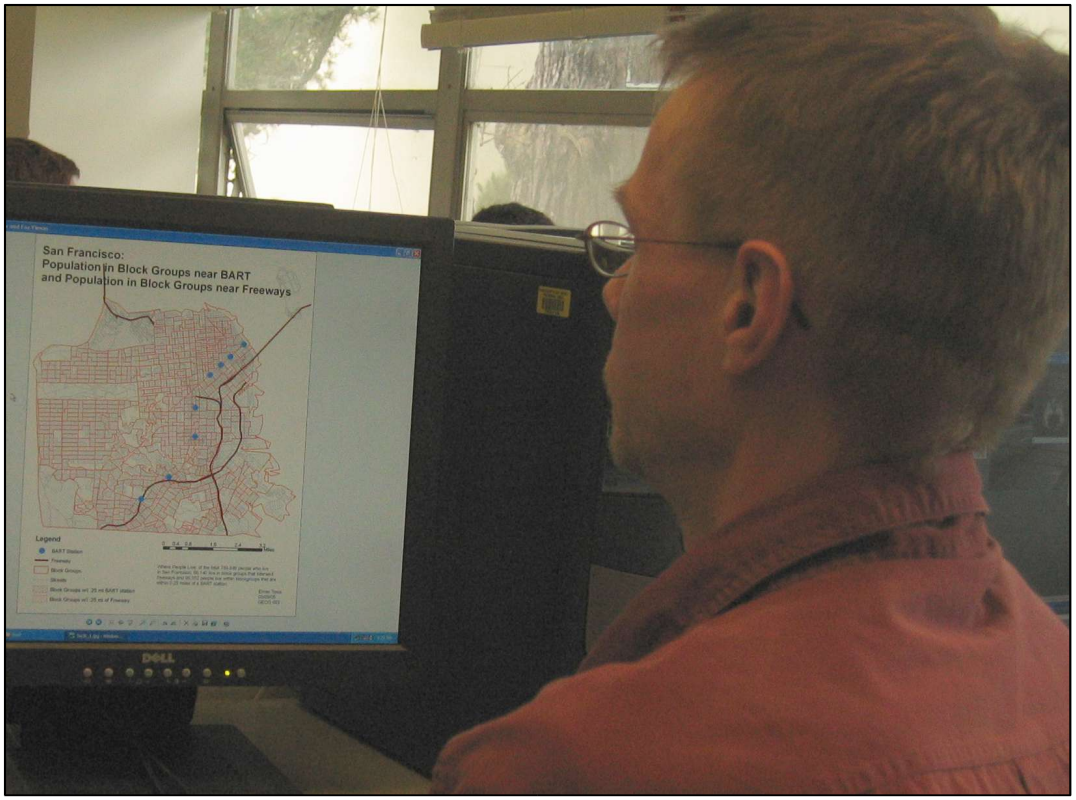
Preserving endangered species habitat



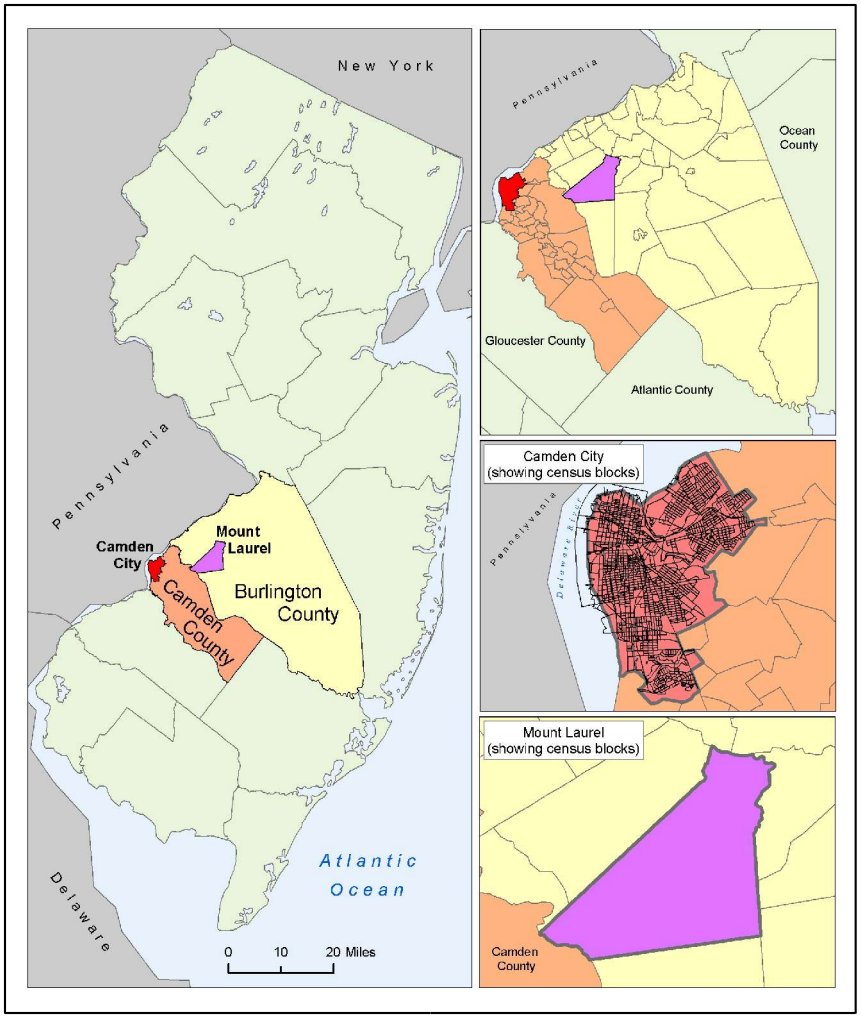
Preventing toxic release incidents



Part III: Regional equality and spatial integration

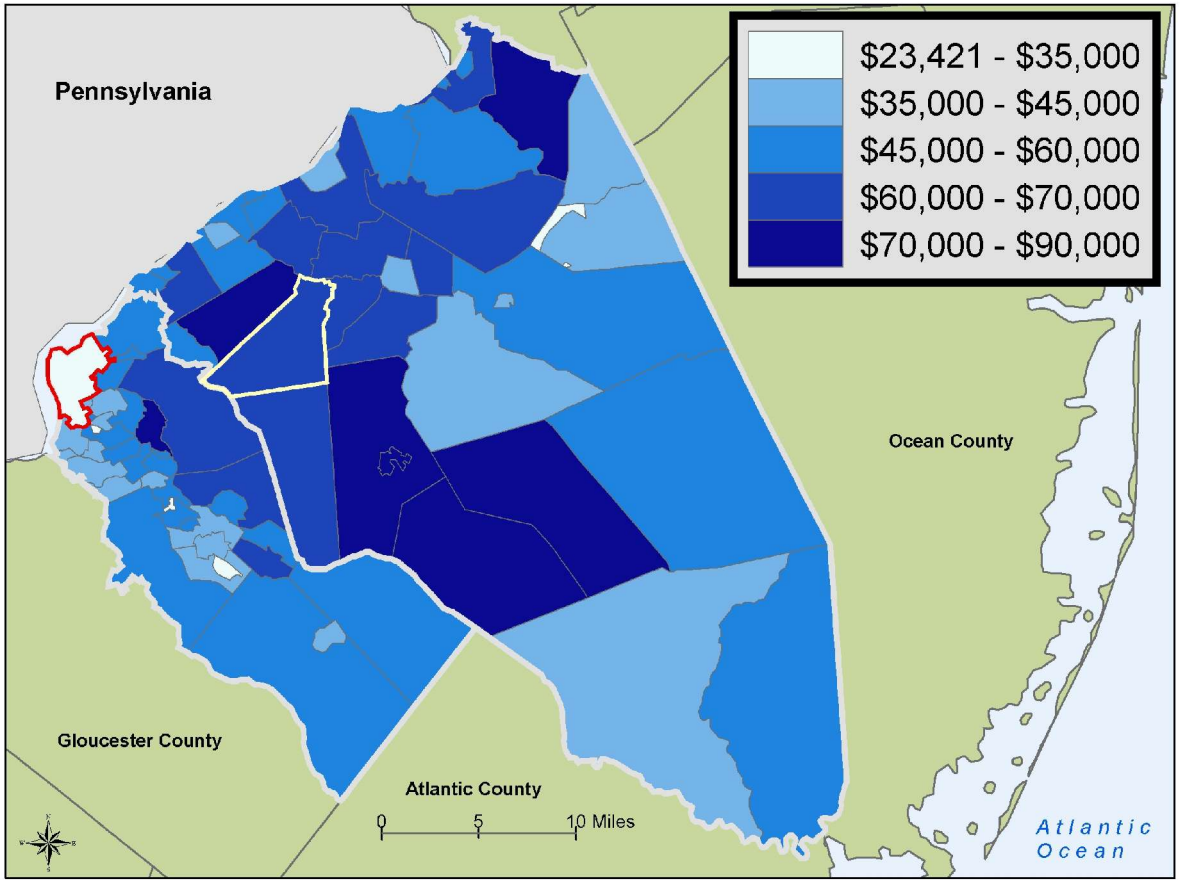


Understanding regional inequality

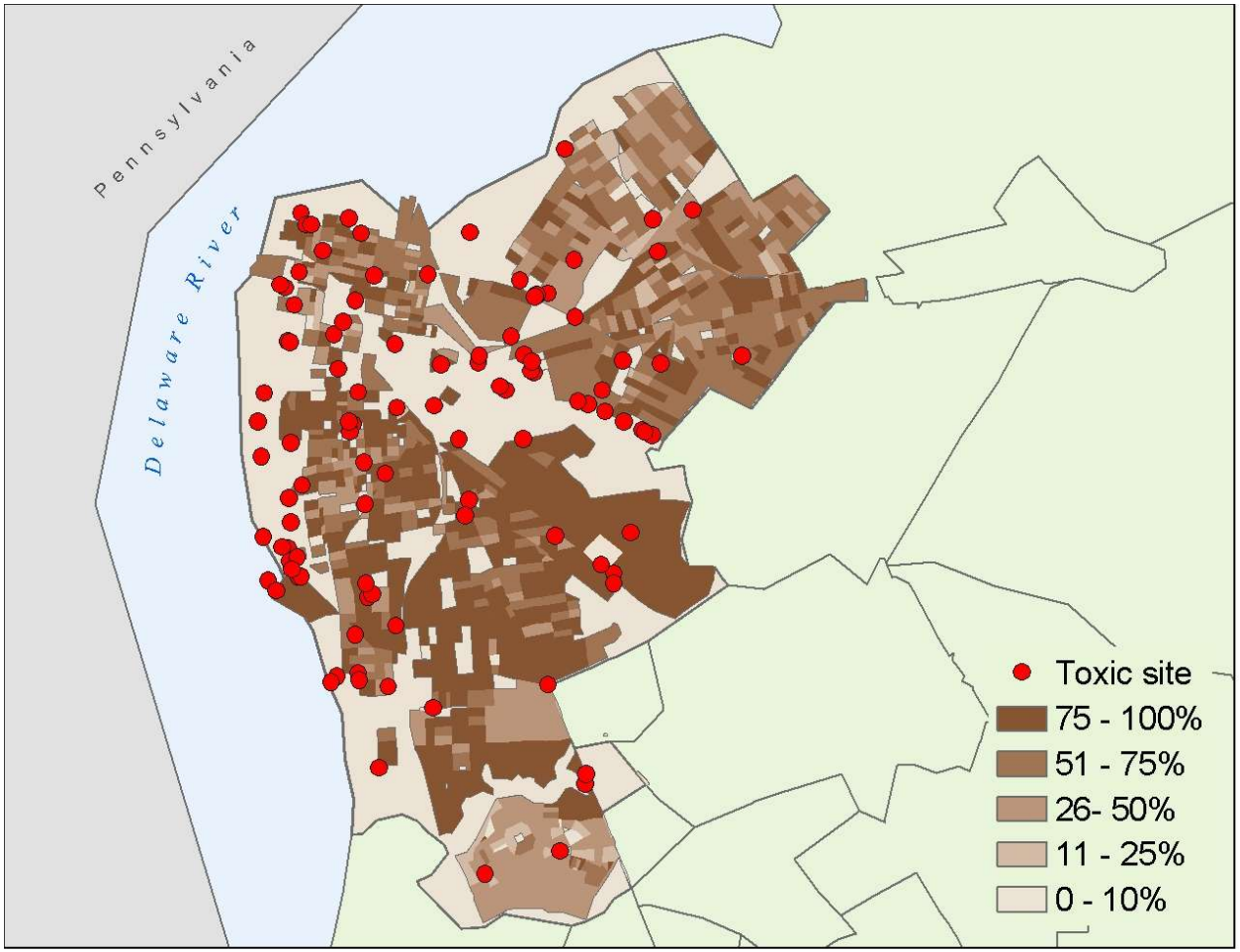


promoting school integration

equalizing local taxes and service



promoting environmental justice



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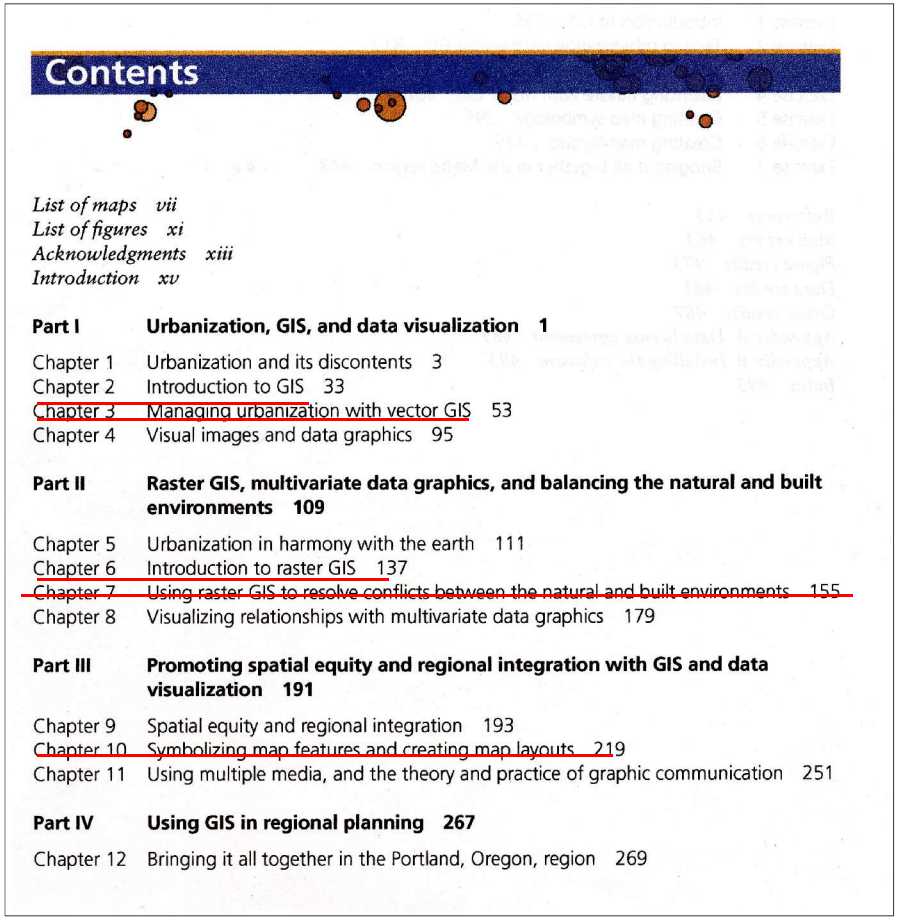
Ch 10 Symbolizing map features and creating map layouts



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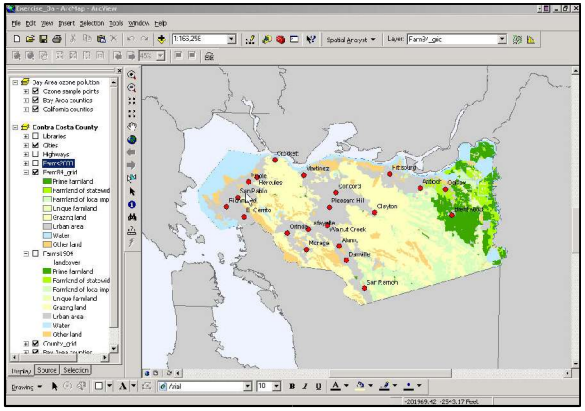
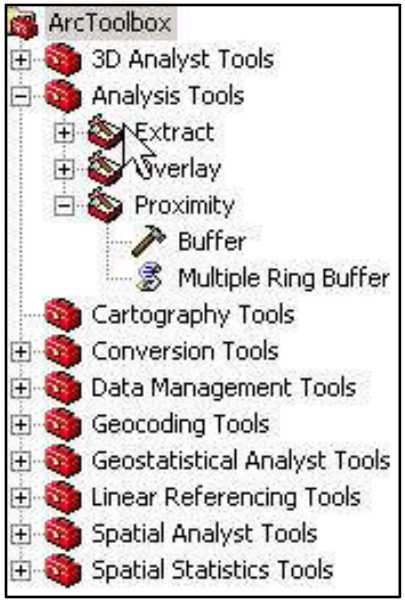
Understanding ArcGIS components, terminology, and operations

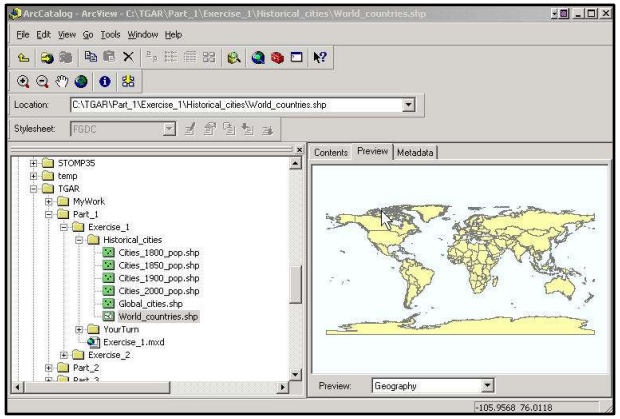
ArcMap



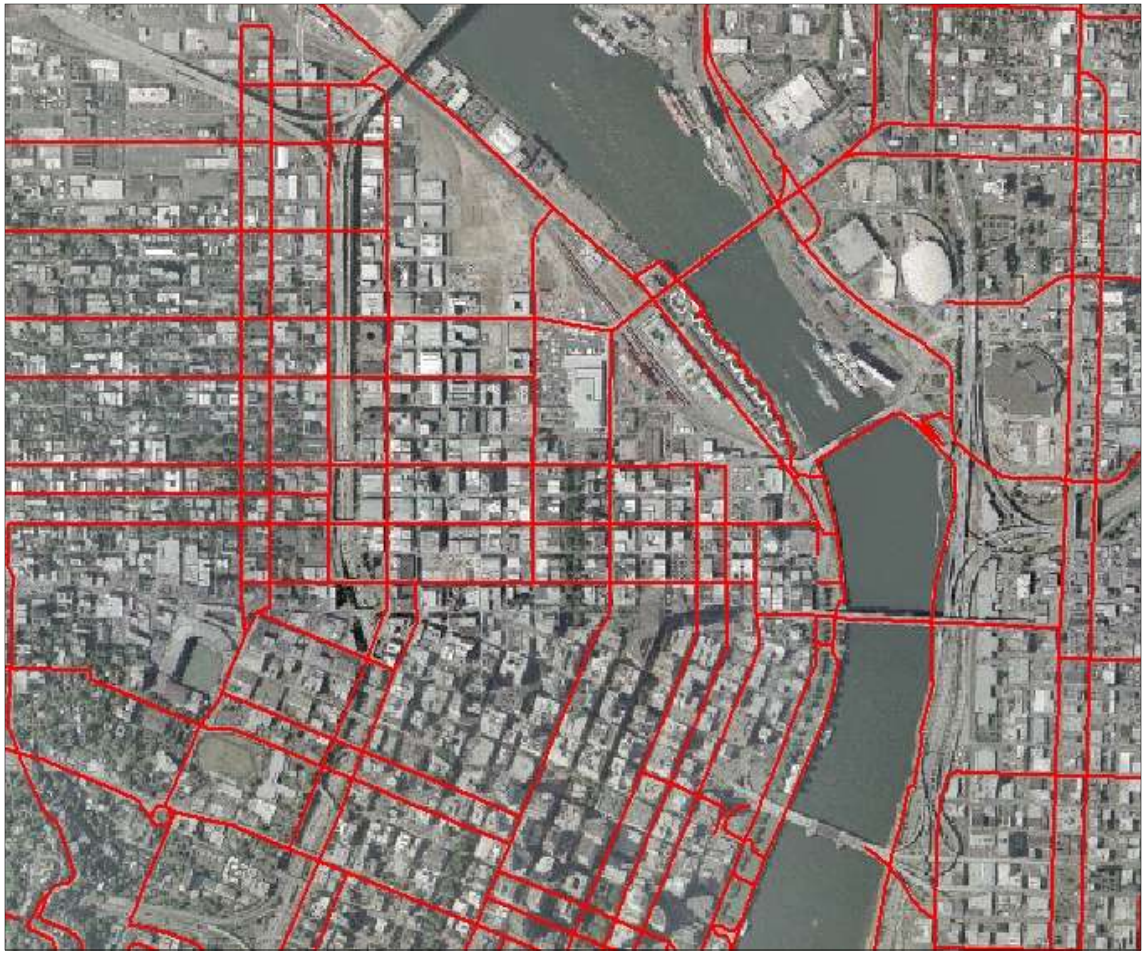
ArcToolbox



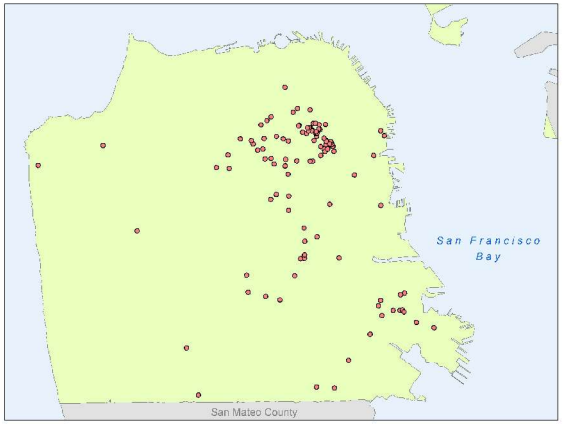
ArcCatalog

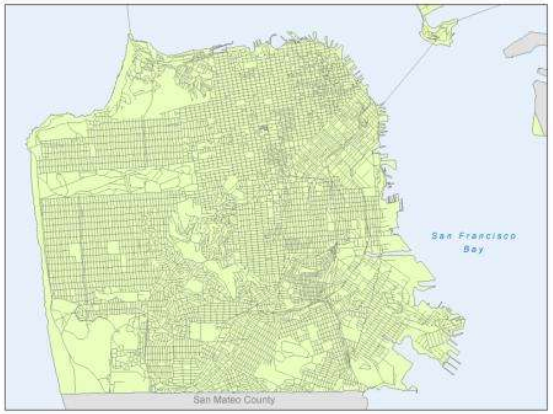


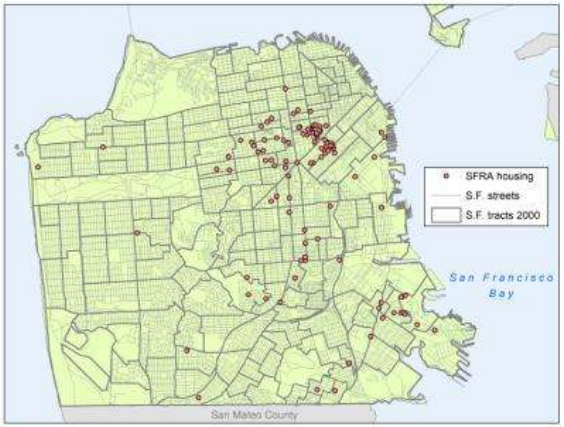
…Understanding map layers and overlay analysis



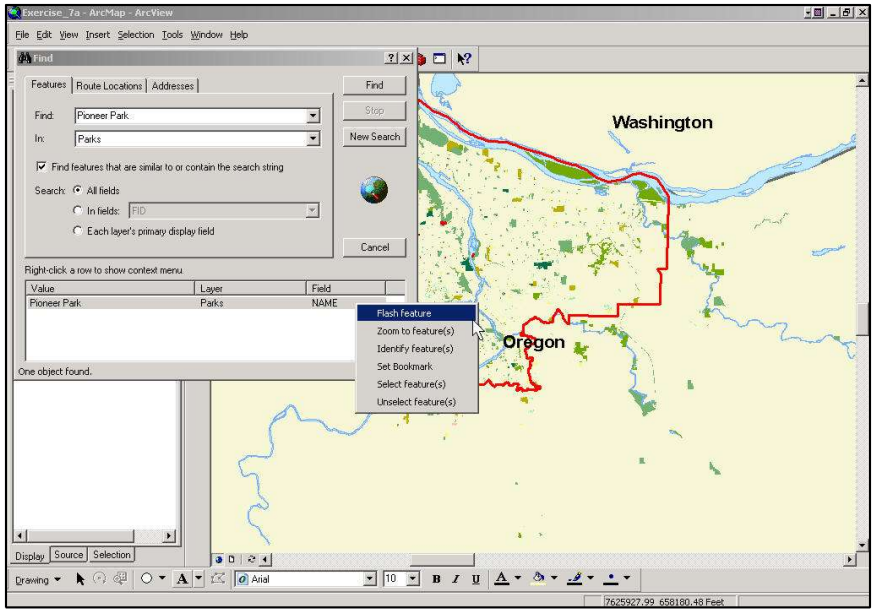
The vector GIS model

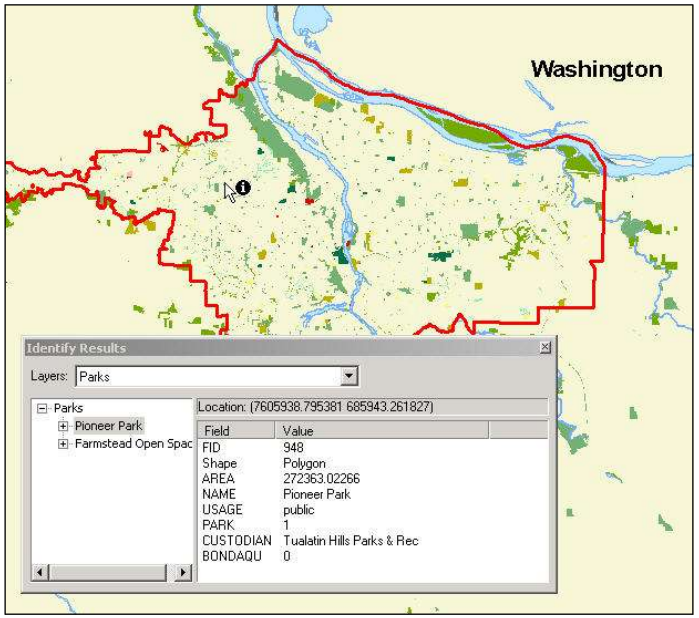




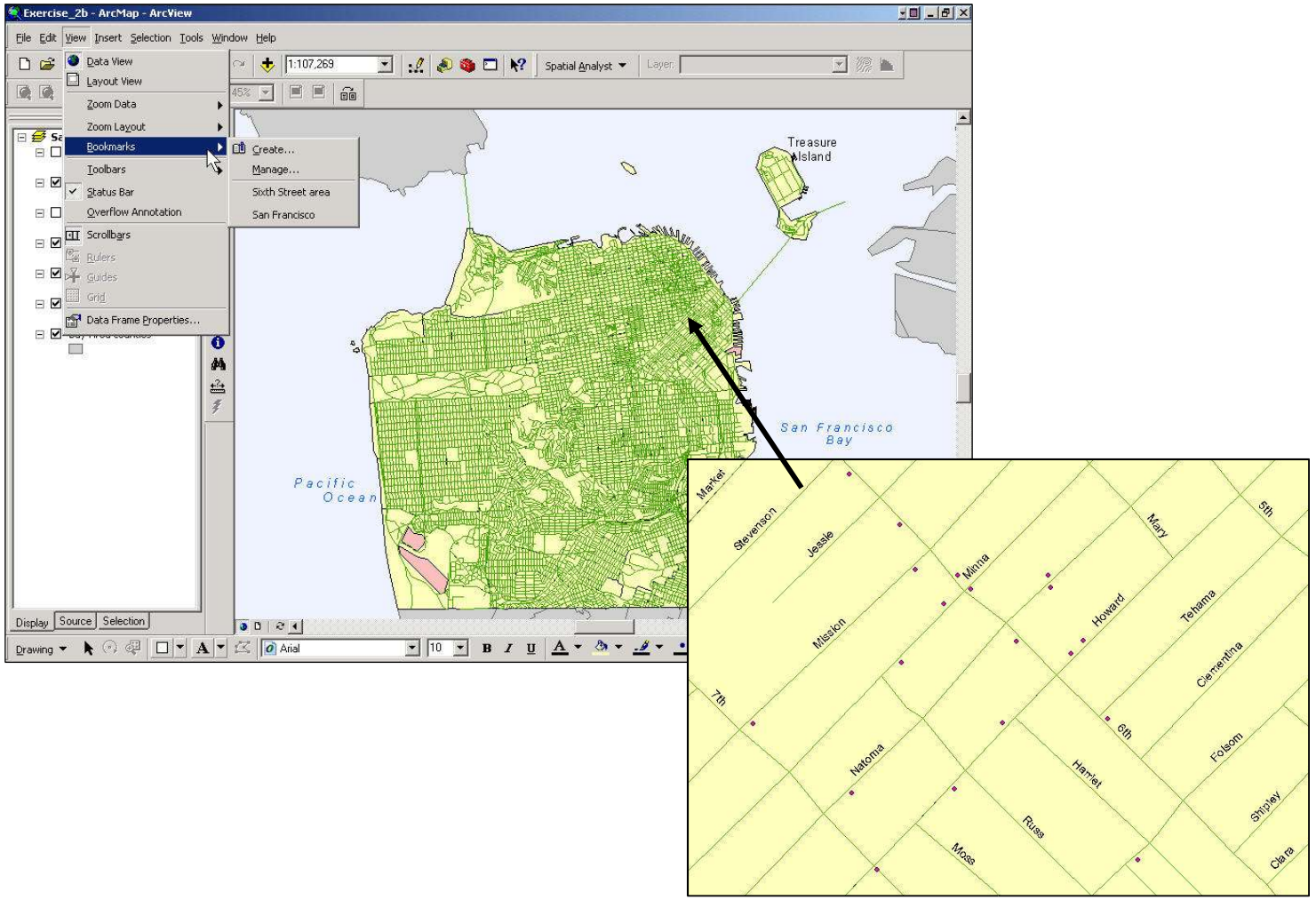


Finding and identifying features

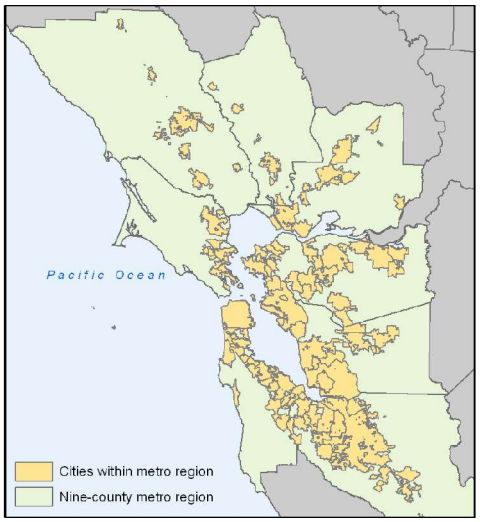


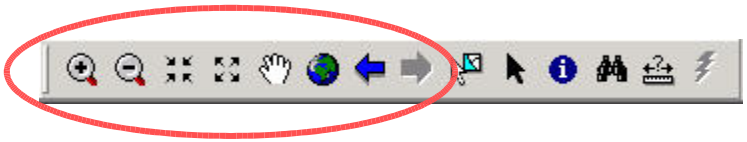


Using bookmarks

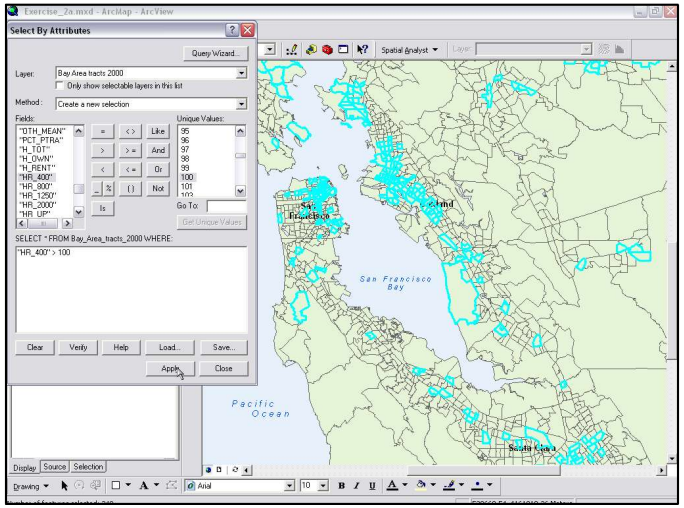


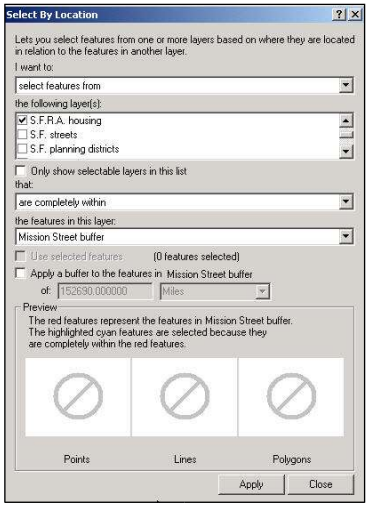
Zooming and Panning



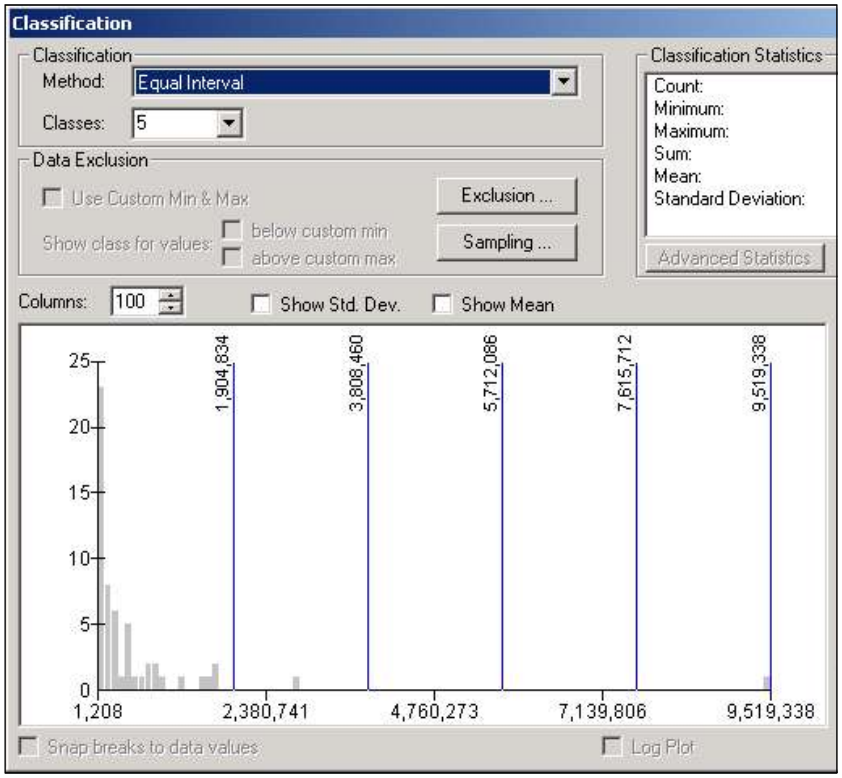


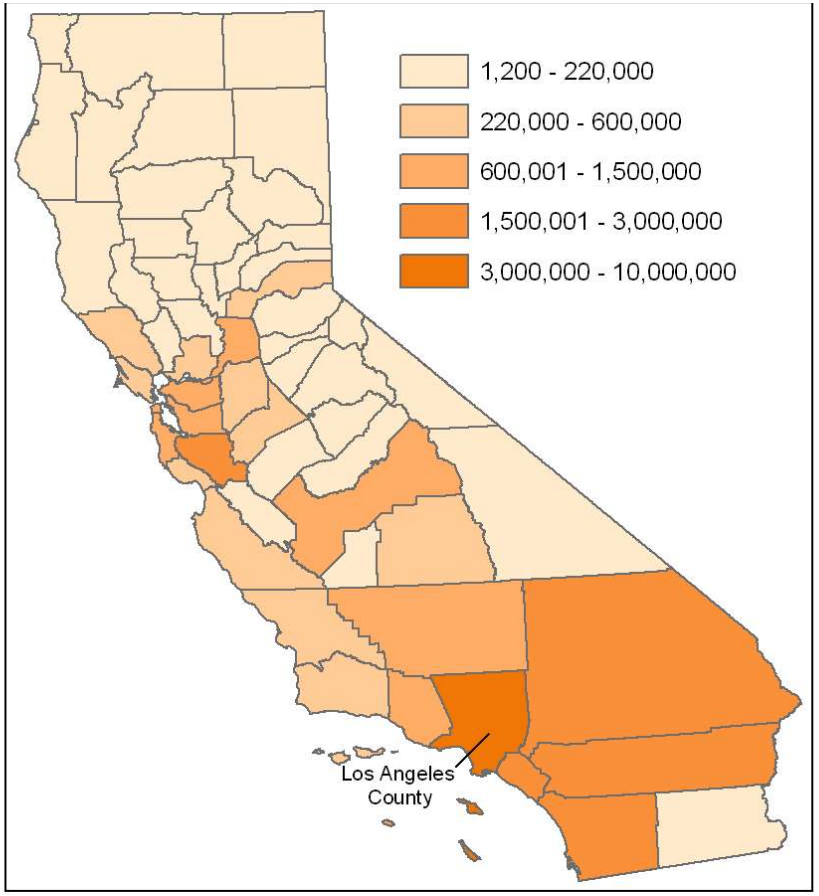
Querying data based on attributes and location



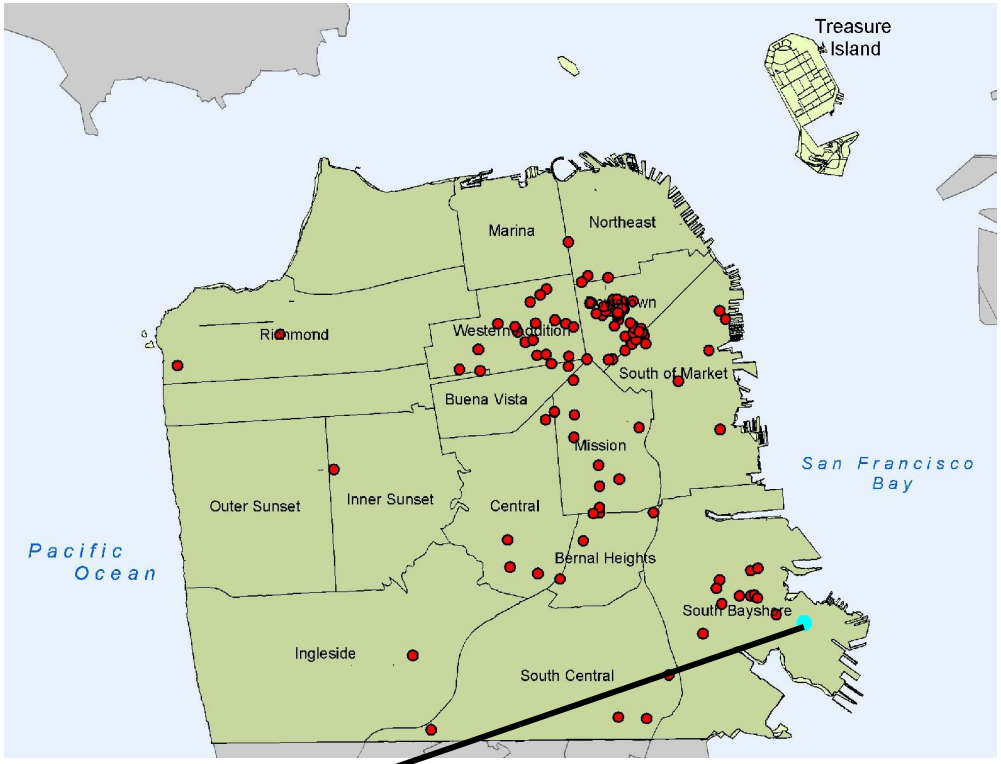


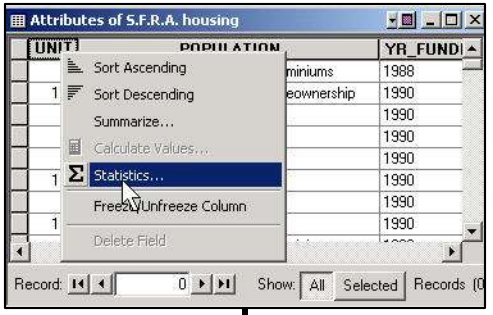
Classifying spatial features

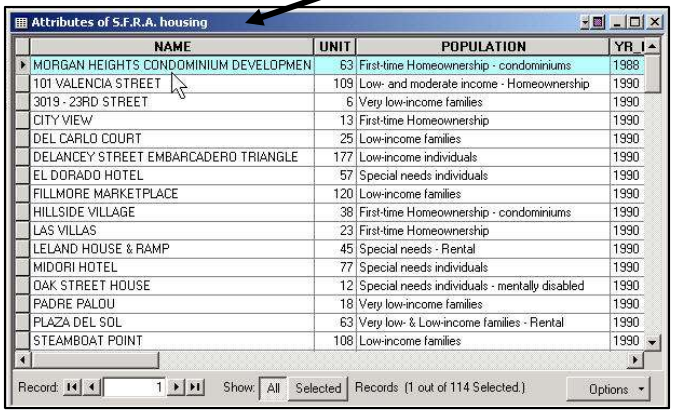


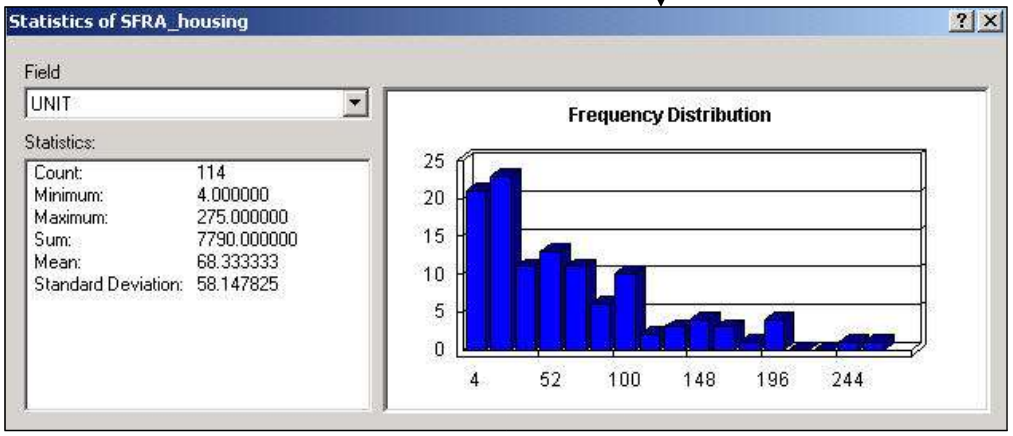


Examining and analyzing data in attribute tables



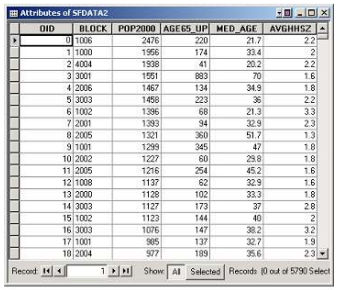






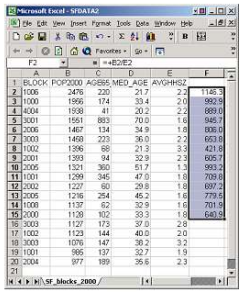
Integrating GIS with statistical analysis

Box 11.1 Using GIS data in spreadsheets and statistical packages



OID	BLOCK	POP2000	AGE65_UP	MED_AGE	AVGHHSZ
0	1006	2476	220	21.7	2.2
1	1000	1956	174	33.4	2
2	4004	1938	41	20.2	2.2
3	3001	1551	883	70	1.6
4	2006	1467	134	34.9	1.8
5	3003	1458	223	36	2.2
6	1002	1396	68	21.3	3.3
7	2001	1393	94	32.9	2.3
8	2005	1321	360	51.7	1.3
9	1001	1299	345	47	1.8
10	2002	1227	60	29.8	1.8
11	2005	1216	254	45.2	1.6
12	1008	1137	62	32.9	1.6
13	2000	1128	102	33.3	1.8
14	3003	1127	173	37	2.8
15	1002	1123	144	40	2
16	3003	1076	147	38.2	3.2
17	1001	985	137	32.7	1.9
18	2004	977	189	35.6	2.3

Data from a GIS attribute table (ArcMap)…



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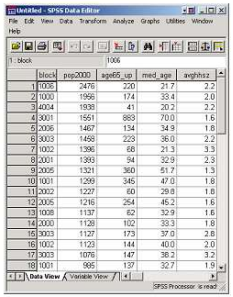
1000	1956	174	33.4	2.0	982.9
4004	1938	41	20.2	2.2	889.0
3001	1551	883	70.0	1.6	945.7
2006	1467	134	34.9	1.8	806.0
3003	1458	223	36.0	2.2	663.8
1002	1396	68	21.3	3.3	421.8
2001	1393	94	32.9	2.3	605.7
2005	1321	360	51.7	1.3	993.2
1001	1299	345	47.0	1.8	709.8
2002	1227	60	29.8	1.8	697.2
2005	1216	254	45.2	1.6	779.6
1008	1137	62	32.9	1.6	701.9
2000	1128	102	33.3	1.8	640.9
3003	1127	173	37.0	2.8	
1002	1123	144	40.0	2.0	
3003	1076	147	38.2	3.2	
1001	985	137	32.7	1.9	
2004	977	189	35.6	2.3	

…can be manipulated in a spreadsheet (EXCEL)



block	pop2000	age65_up	med_age	avghhsz
1006	2476	220	21.7	2.2
1000	1956	174	33.4	2.0
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3001	1551	883	70.0	1.6
2006	1467	134	34.9	1.8
3003	1458	223	36.0	2.2
1002	1396	68	21.3	3.3
2001	1393	94	32.9	2.3
2005	1321	360	51.7	1.3
1001	1299	345	47.0	1.8
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2005	1216	254	45.2	1.6
1008	1137	62	32.9	1.6
2000	1128	102	33.3	1.8
3003	1127	173	37.0	2.8
1002	1123	144	40.0	2.0
3003	1076	147	38.2	3.2
1001	985	137	32.7	1.9

Correlations

		AGE65_UP	AVGHHSZ	POP2000	MED_AGE
AGE65_UP	Pearson Correlation	1	-.329	.112	.871**
	Sig. (2-tailed)	.	.170	.649	.000
	N	19	19	19	19
AVGHHSZ	Pearson Correlation	-.329	1	-.029	-.434
	Sig. (2-tailed)	.170	.	.906	.063
	N	19	19	19	19
POP2000	Pearson Correlation	.112	-.029	1	-.279
	Sig. (2-tailed)	.649	.906	.	.247
	N	19	19	19	19
MED_AGE	Pearson Correlation	.871**	-.434	-.279	1
	Sig. (2-tailed)	.000	.063	.247	.
	N	19	19	19	19

** Correlation is significant at the 0.01 level (2-tailed).

…or analyzed in a statistical package (SPSS)

Chapters 5 and 6 on raster GIS

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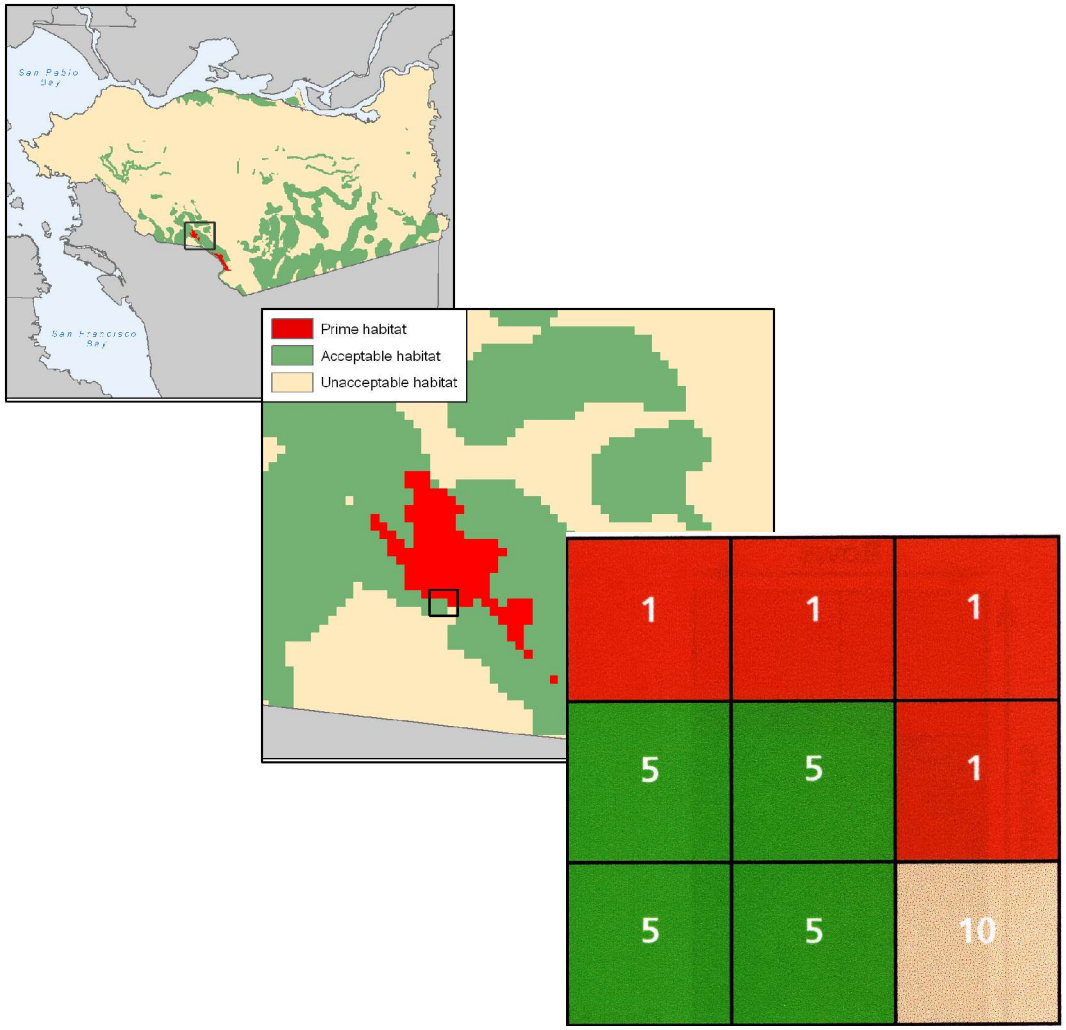
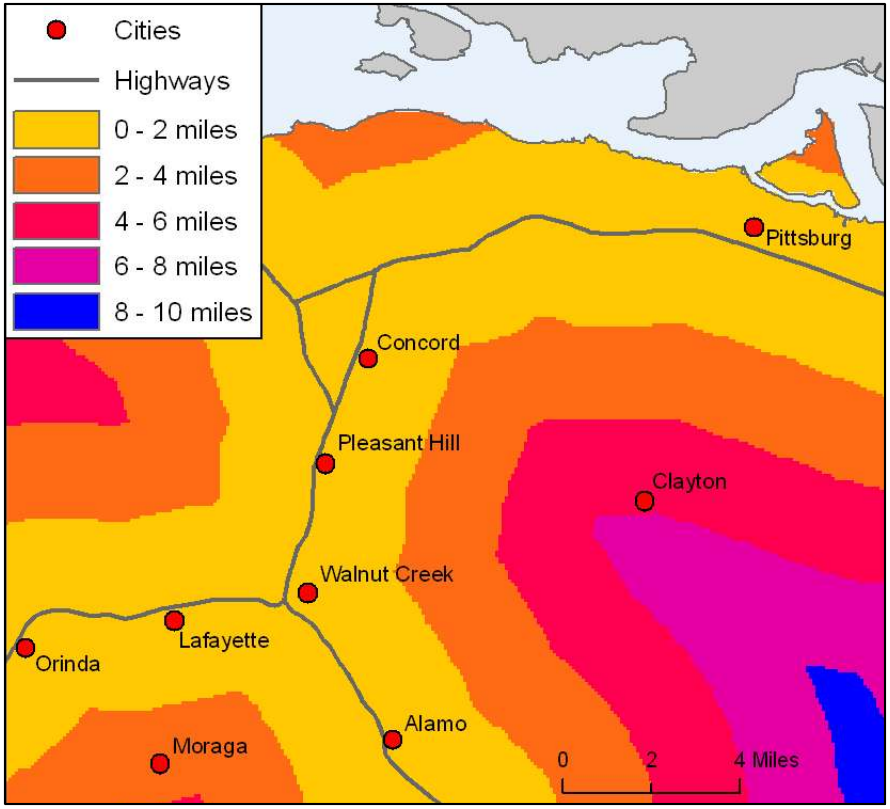
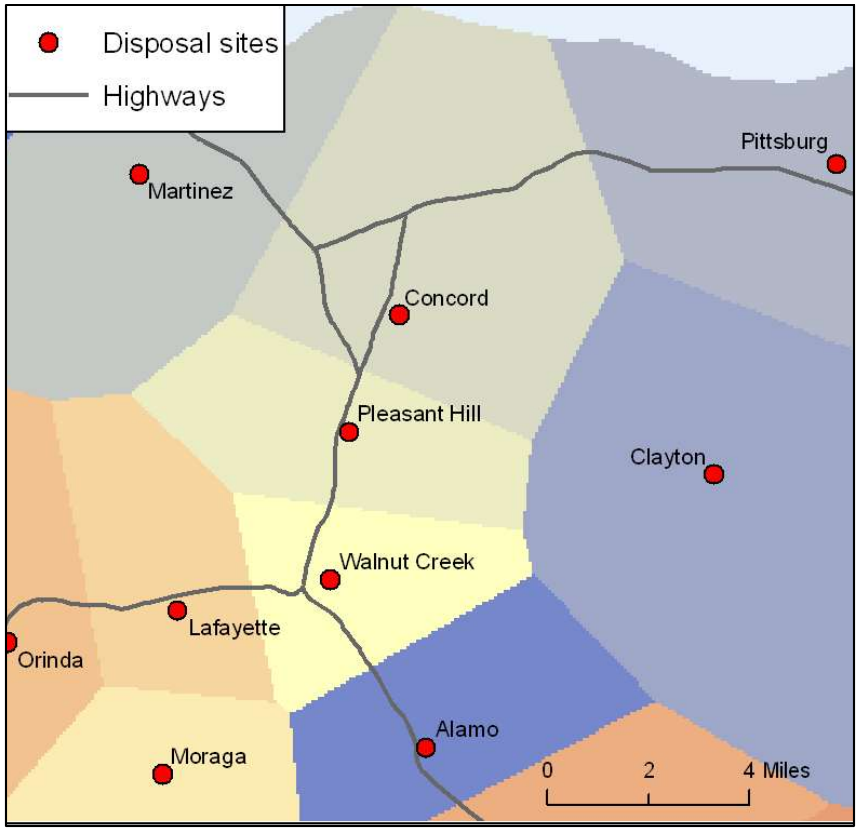
Understanding the raster model



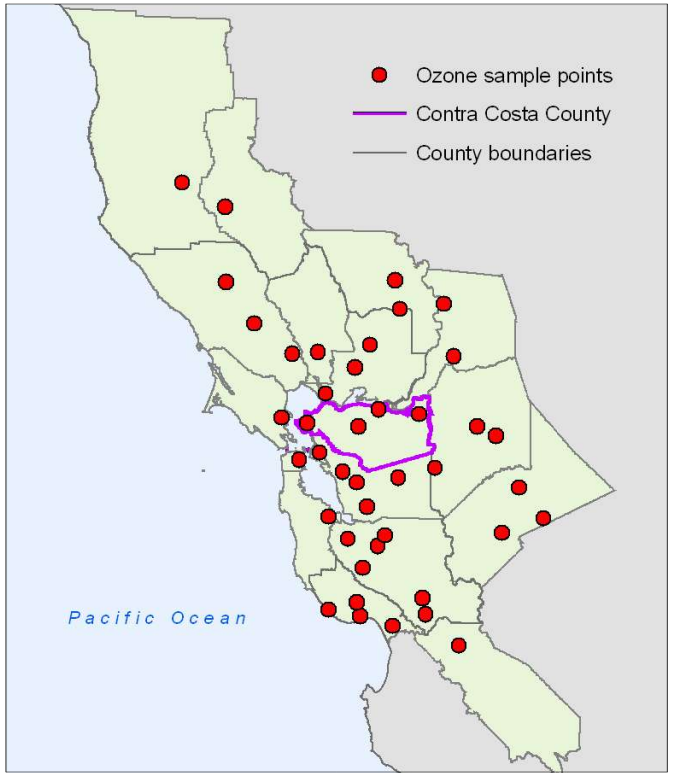
Doing straight line distance analysis

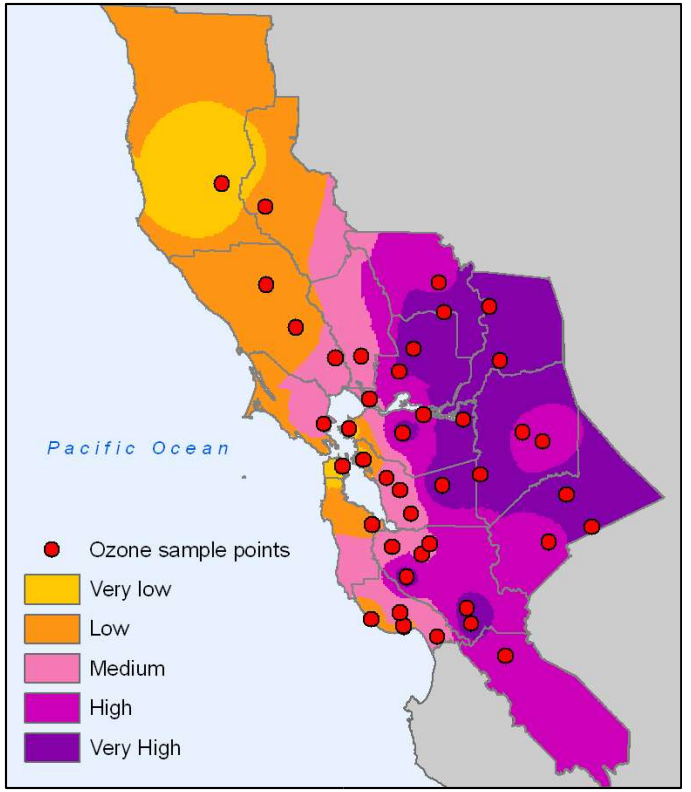


Doing distance allocation analysis (creating Thiessen polygons)

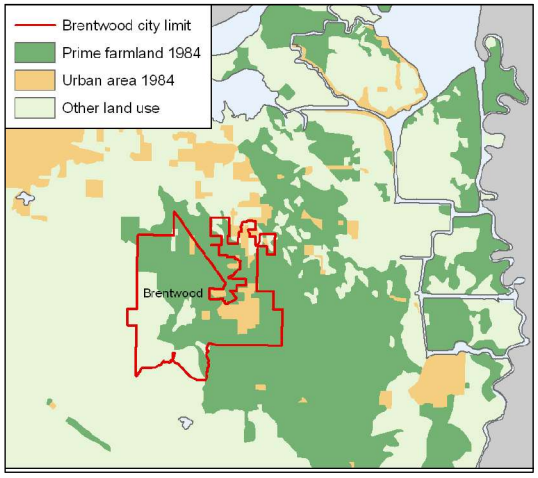


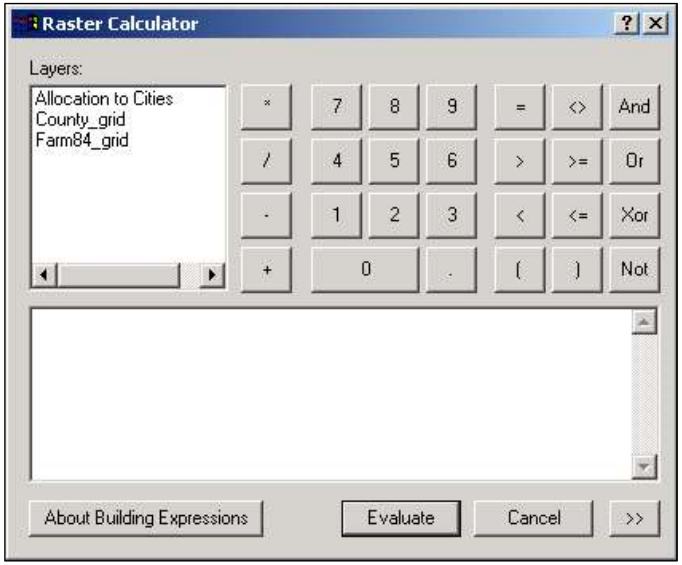
…Interpolating a statistical surface

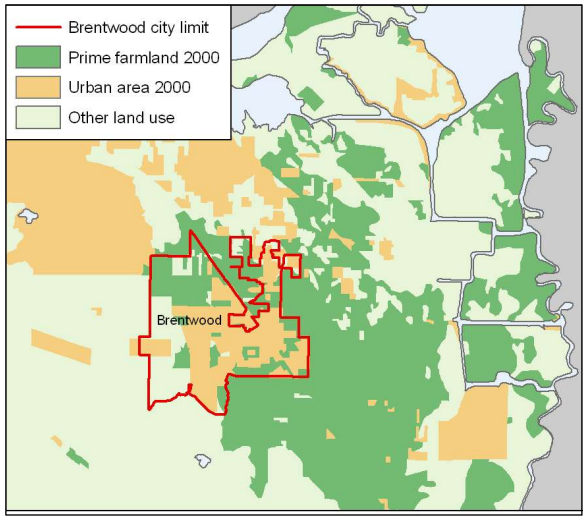


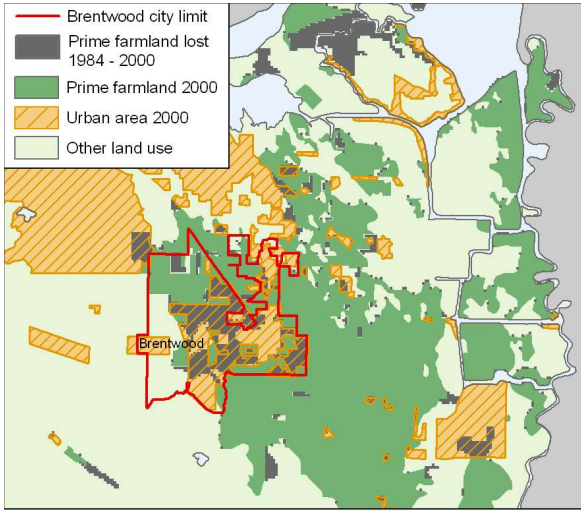


Using map algebra

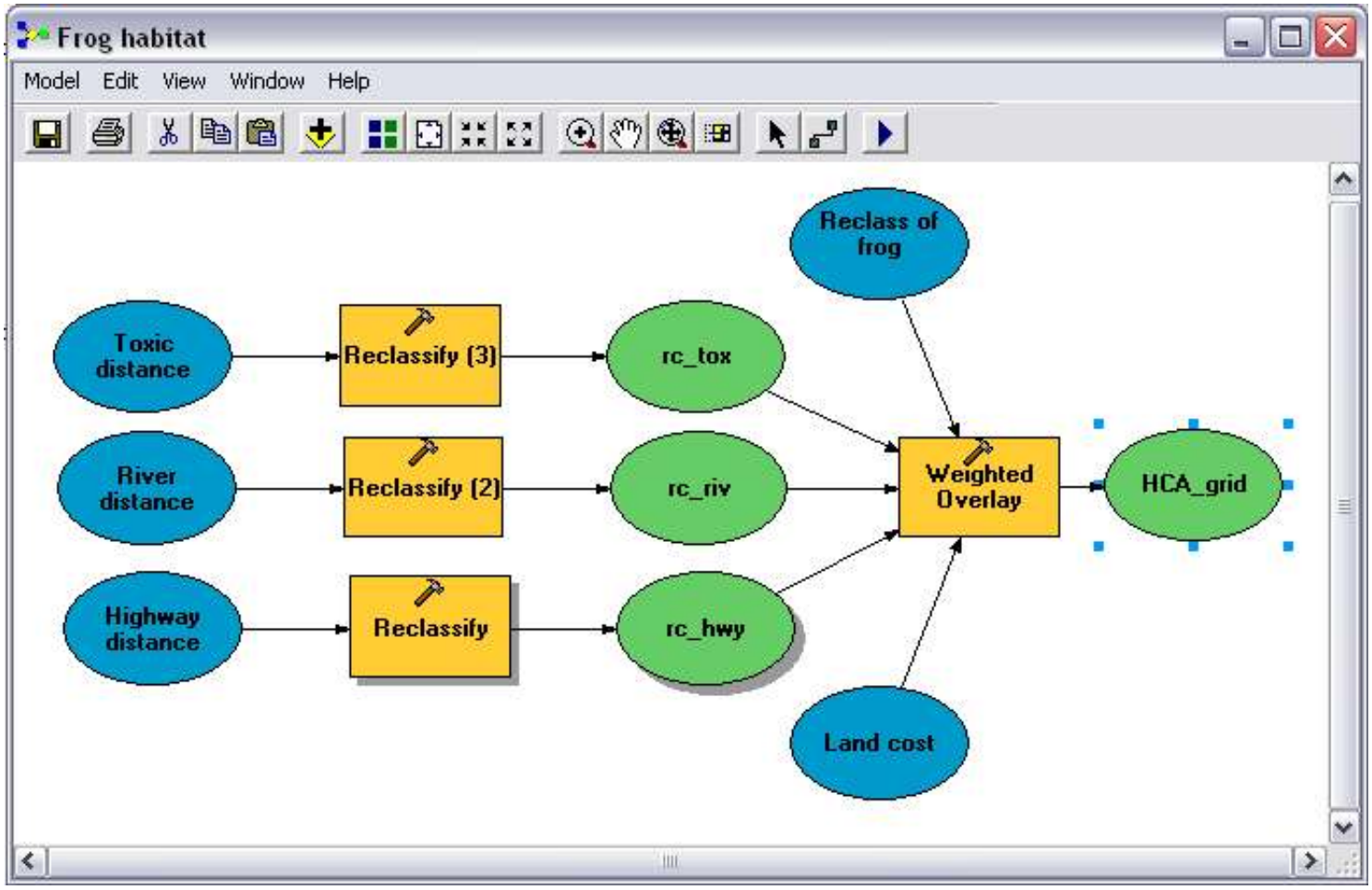








Creating a suitability model using ModelBuilder



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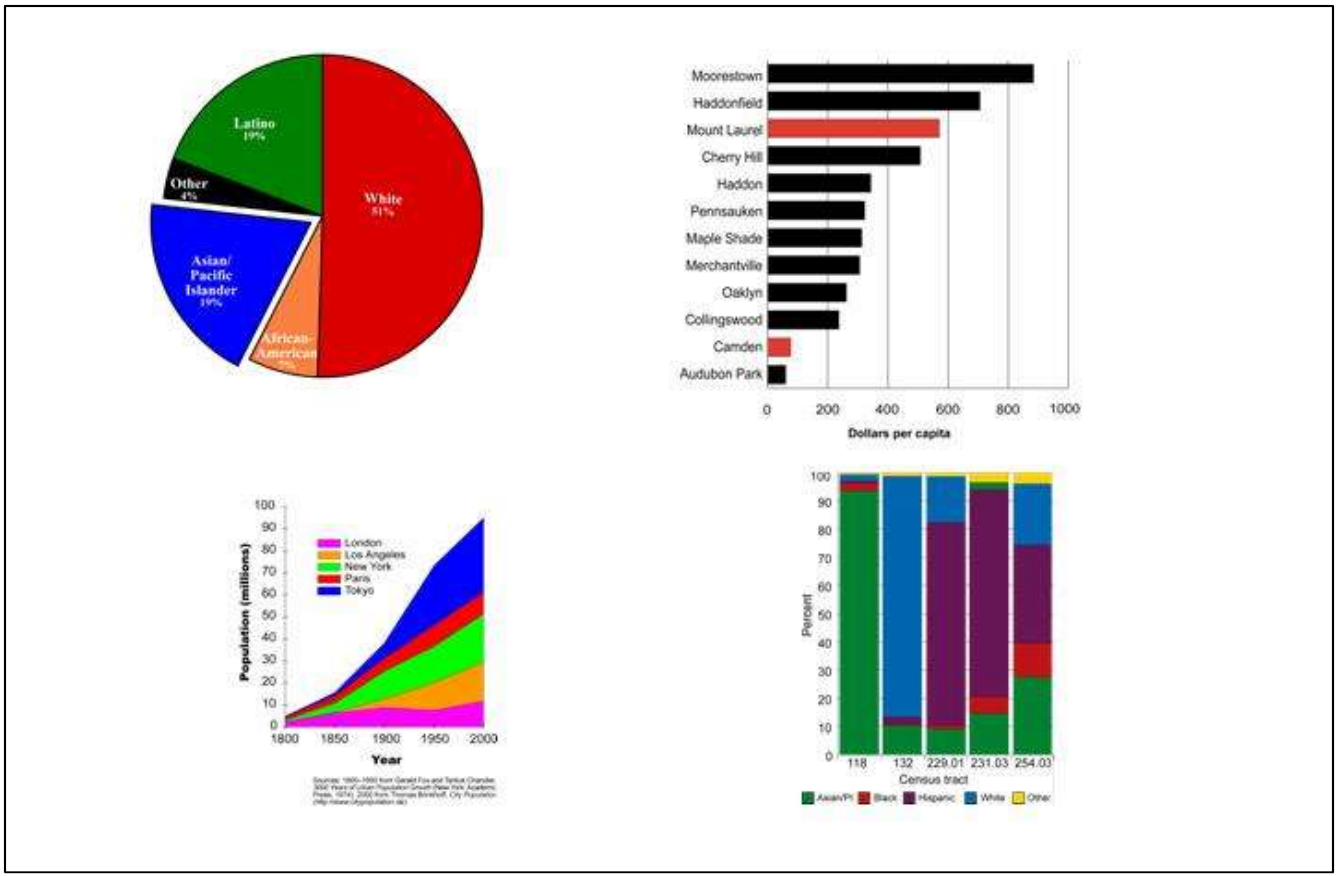
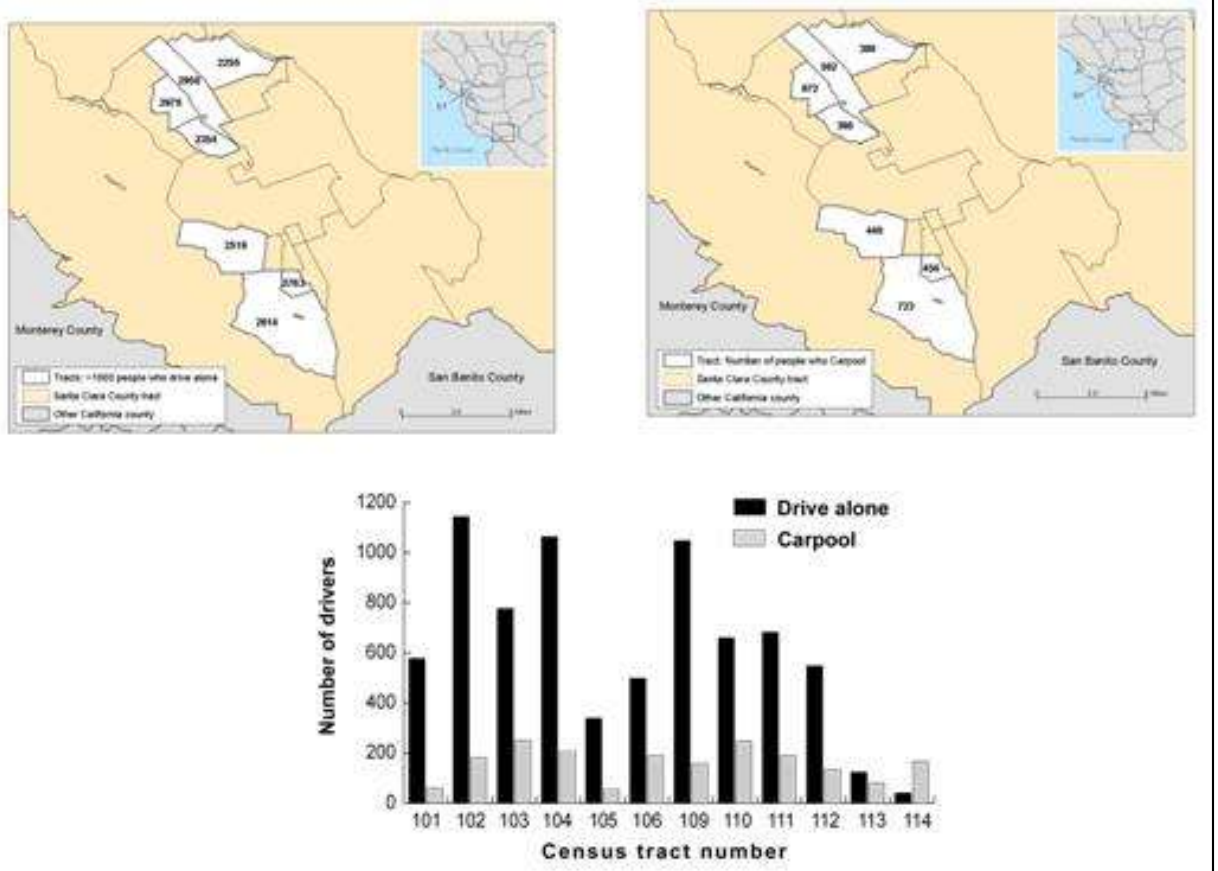
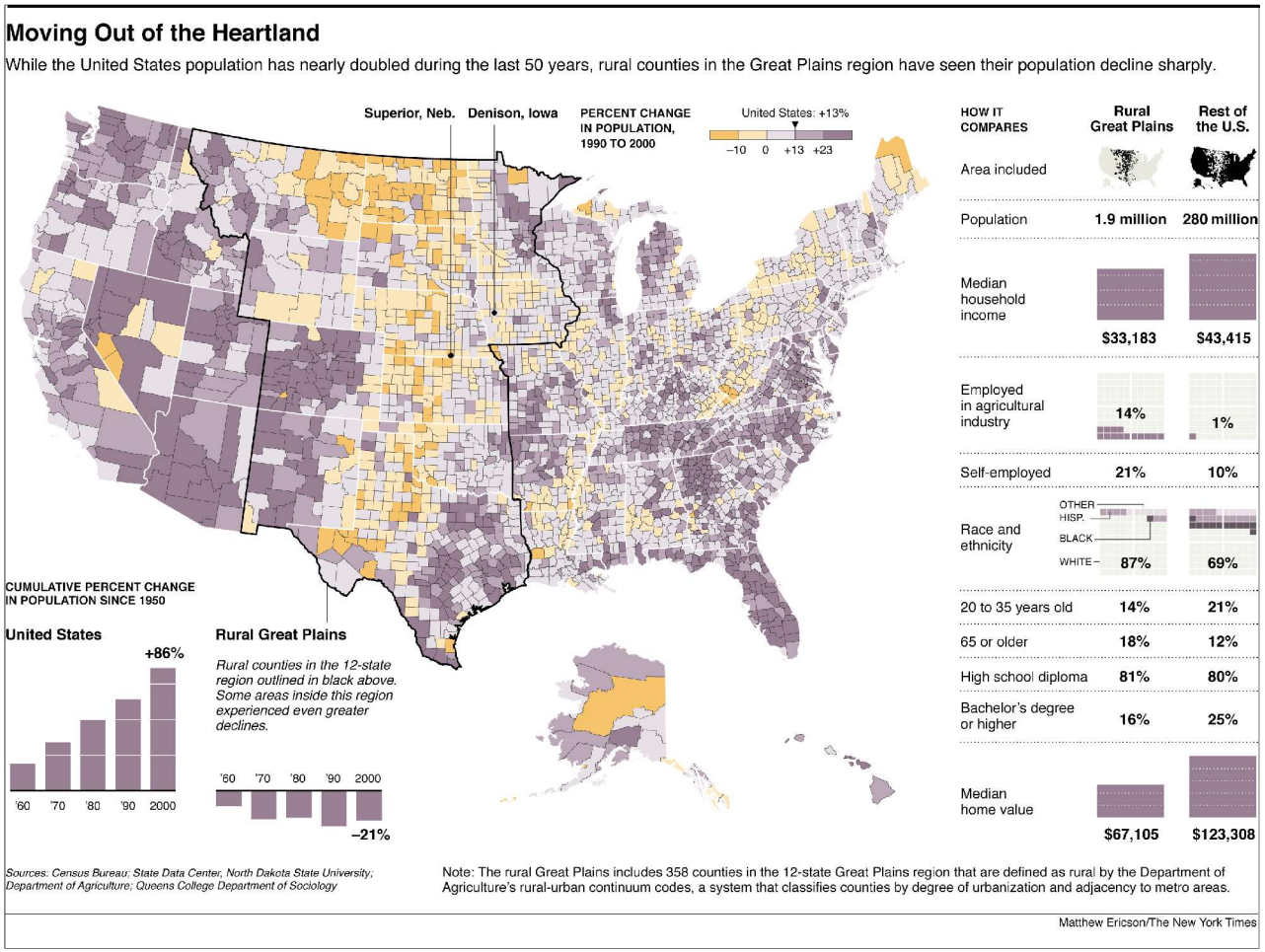
Univariate and multivariate data graphics



Visualizing the same data spatially and graphically



Theory and practice of visual and graphic communication



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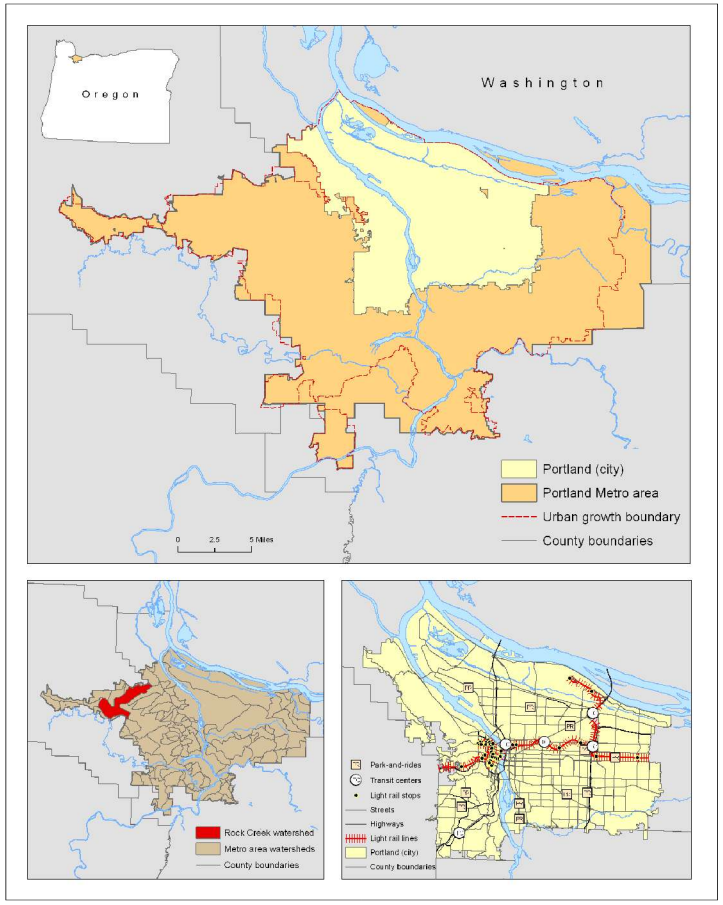
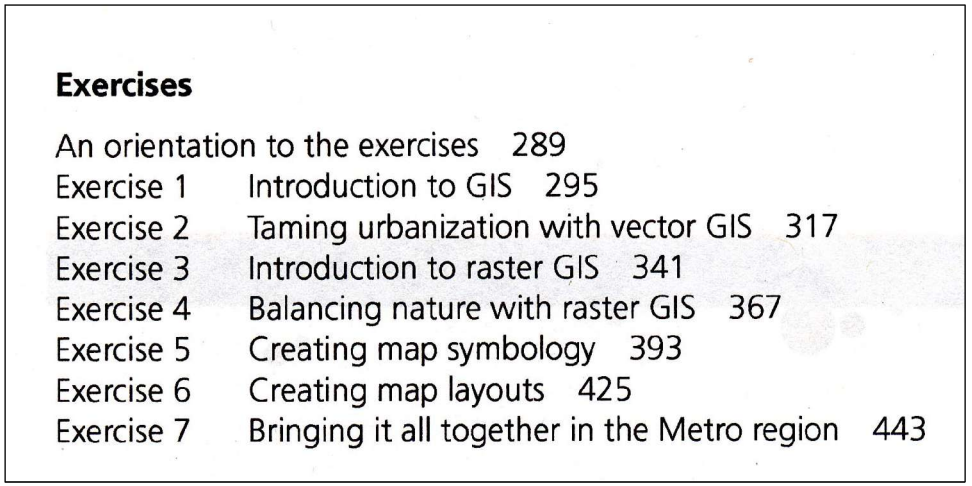
How Metro's RLIS system facilitates regional planning



Exercises

- Book contains hardcopy exercises
- CD-ROM contains exercise data
- 6 step-by-step exercises track GIS chapters
- Portland Metro exercise to synthesize the module



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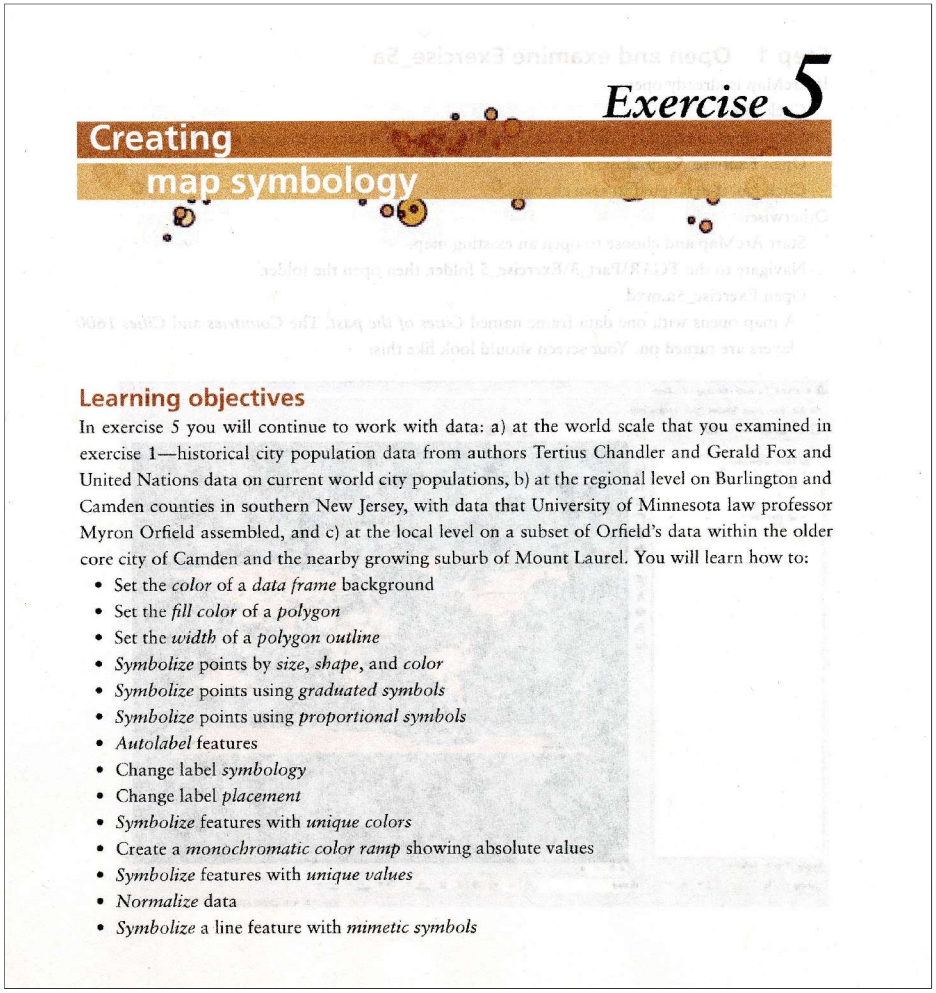
Each of the step-by-step exercises has

…learning objectives



Exercise 5

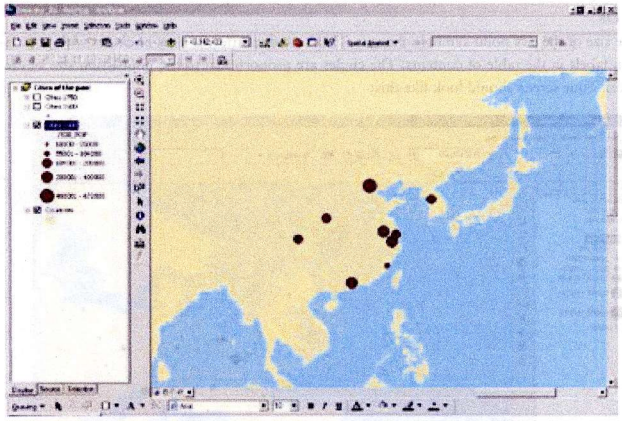
Creating map symbology

Learning objectives

In exercise 5 you will continue to work with data: a) at the world scale that you examined in exercise 1—historical city population data from authors Tertius Chandler and Gerald Fox and United Nations data on current world city populations, b) at the regional level on Burlington and Camden counties in southern New Jersey, with data that University of Minnesota law professor Myron Orfield assembled, and c) at the local level on a subset of Orfield's data within the older core city of Camden and the nearby growing suburb of Mount Laurel. You will learn how to:

- Set the *color* of a *data frame* background
- Set the *fill color* of a *polygon*
- Set the *width* of a *polygon outline*
- *Symbolize* points by *size*, *shape*, and *color*
- *Symbolize* points using *graduated symbols*
- *Symbolize* points using *proportional symbols*
- *Autolabel* features
- Change label *symbology*
- Change label *placement*
- *Symbolize* features with *unique colors*
- Create a *monochromatic color ramp* showing absolute values
- *Symbolize* features with *unique values*
- *Normalize* data
- *Symbolize* a line feature with *mimetic symbols*

…Step-by-step instructions to teach GIS operations



Question 3: How does the population of Paris in 1500 (the largest city in Europe at that time) compare to the population of large cities in China: Peking (Beijing), Hangchow, Nanking, and Canton? Refer to the attribute table to find the populations of these cities.

Step 8 Autolabel the cities

Click the ***View*** pull-down menu.
Click ***Bookmarks***.
Click the ***England*** bookmark.
The map zooms in on England. Only London, England and Edinburgh, Scotland had populations of 18,000 or greater in 1500.
Turn off *Cities 1500* and collapse its legend.
Turn on *Cities 1750*.
Right-click ***Cities 1750***.
Click ***Label Features***.
The names of the cities appear. In autolabeling, the city reads the text from a field in the attribute table. One of the fields is the city's name. ArcMap assigns the name to the point.
Right-click the **Cities 1750** layer and uncheck *Label Features*.
The labels disappear. *Label Features* is a toggle.
Turn the labels back on.
These labels are helpful, but the font is a little small and there are some placement problems.

…and a “Your Turn” section

Your Turn

1. If you are continuing from Exercise_5, navigate to the **TGAR\Part_3\Exercise_5\YourTurn** folder, open it, and open the *YourTurn_5.mxd* file. Click ***No*** when prompted “Save changes to Exercise_5c?”

   Otherwise open ArcMap and navigate to the **TGAR\Part_3\Exercise_5\YourTurn** folder, open it, and open the *YourTurn_5.mxd* file.
2. A map opens showing Burlington and Camden counties with poor symbology and background. You will improve the map symbology.
3. Change the data frame background to white.
4. Click the *Camden County* ***symbol*** and change the symbol *Outline Width* to .40, and *Outline Color* to Gray 60%.
5. Open the *Burlington County* layer properties. Change the symbology to *Features* with a *Single symbol*. Then make the *Fill Color* Sugilite Sky (top row).
6. Turn on the ***Schools*** layer;
7. Change the point symbol color to Mars Red and size to 4 points.
8. Change the *Schools* layer to *Graduated symbol* using the **NAM00** (number of non-Asian minority students in 2000) field. Use the *Identify* tool to identify the community in Burlington County with the highest concentration of non-Asian minority students in schools.

   Question 1: Are non-Asian American students clustered in certain areas of Burlington County? What community in Burlington County had many non-Asian minority students in its schools in 2000?

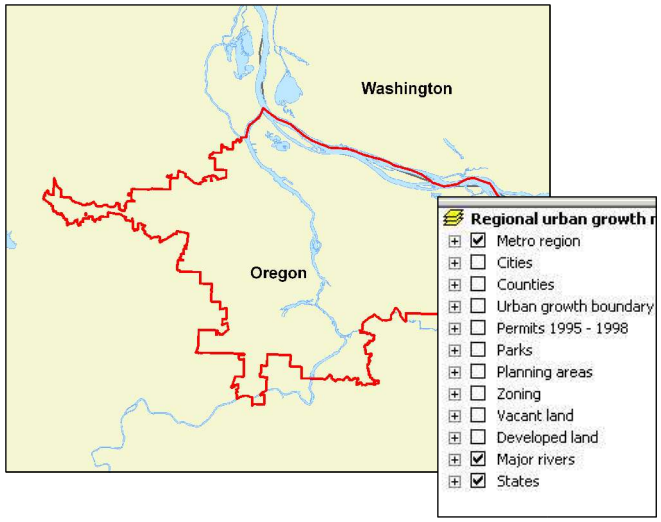
9. Use the *Camden City* bookmark to zoom into that area.
10. Turn on the labels for *Schools*.
11. Change the labels for *Schools* so the font size is 7 points. Remove the *bold* font weight. Change the label placement to *Prefer Bottom Left, all allowed*. Click the ***Conflict Detection*** tab and change the *Feature Weight* to *High* and add a *Buffer* of .50.
12. Create a *dot density* map based on crimes per 10,000 people (crimeper10) using the *Burlington County* layer and the field **CRIMEPER10**. Make the *Dot Size* 2 and *Dot Value* 100.
13. Repeat the process for *Camden County*.

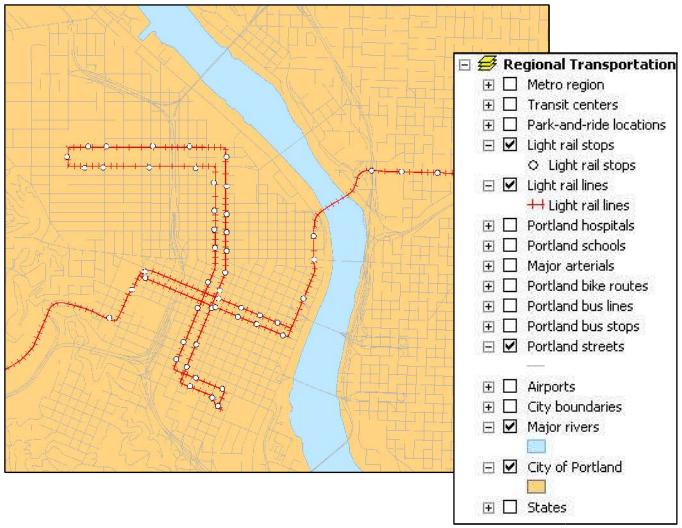
    Question 2: Are crimes per 10,000 people more densely concentrated in some areas than others?

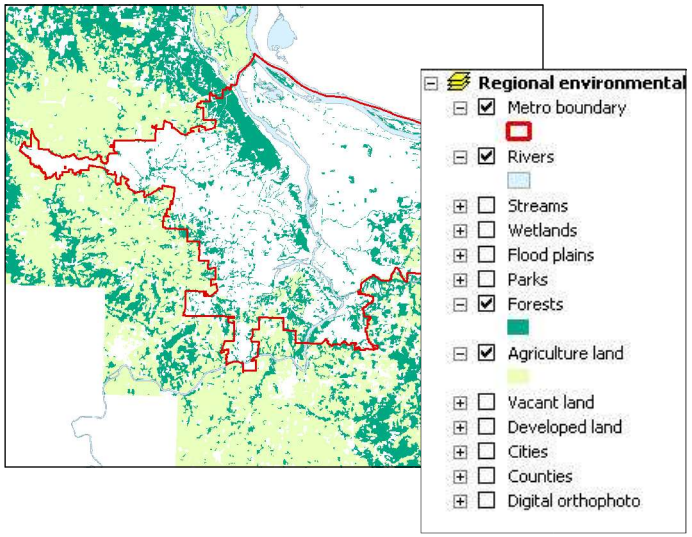
14. Turn on the *Census blocks* layer showing absolute population data.

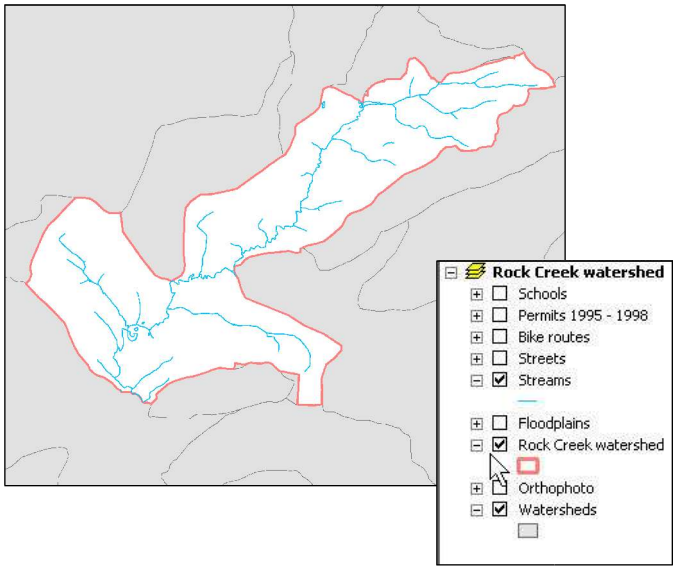
    Question 3: Do census blocks with larger populations appear to have more crimes? Does this indicate that you are more likely to be a crime victim if you live in a census block with a large population? What would help you understand if that were true?

Exercise 7 provides Metro RLIS data for a culminating project

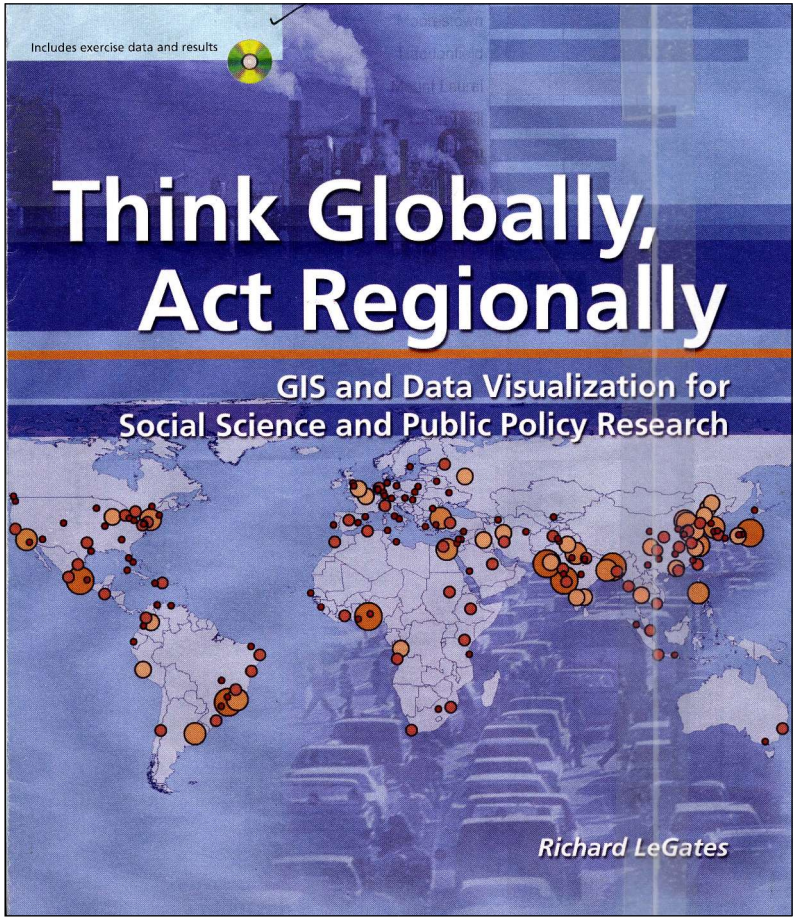








Thank you


Includes exercise data and results
Think Globally, Act Regionally
GIS and Data Visualization for Social Science and Public Policy Research
Richard LeGates