Table of Contents

Course Introduction

The National Oceanic and Atmospheric Administration (NOAA) Coastal Services Center developed this course to provide the GIS users in the coastal resource management community with the opportunity to address a variety of coastal issues using ArcView 8 technology. It is assumed that all participants will have satisfactorily completed the *Introduction to ArcGIS I*™ course developed by the Environmental Systems Research Institute, Inc. ® (ESRI) prior to beginning this course. For those who may not have taken the ESRI course within the past year, it is strongly recommended that you familiarize yourself with the concepts presented therein as the material presented in this course is both comprehensive and fast-paced. In this manual, you will find exercises that focus on the following concepts:

- using various Internet resources to locate and retrieve geospatial data and associated metadata
- database design and data management
- in-depth thematic analysis
- planning, collecting, and integrating GPS data
- development and implementation of an in-depth GIS analysis
- customization of the ArcView 8 interface

All of the modules in this course will allow you to continue to build and synthesize your technical skills with ArcCatalog,® ArcMap,® and ArcToolbox,® using them as problem-solving tools for real-world coastal applications. Problem-solving exercises integrate the basic and intermediate GIS topics outlined above with real-world scenarios dealing with population growth, sensitive habitats, and marine protected areas. The course format includes lectures, demonstrations, small group discussions, and hands-on problem-solving exercises.

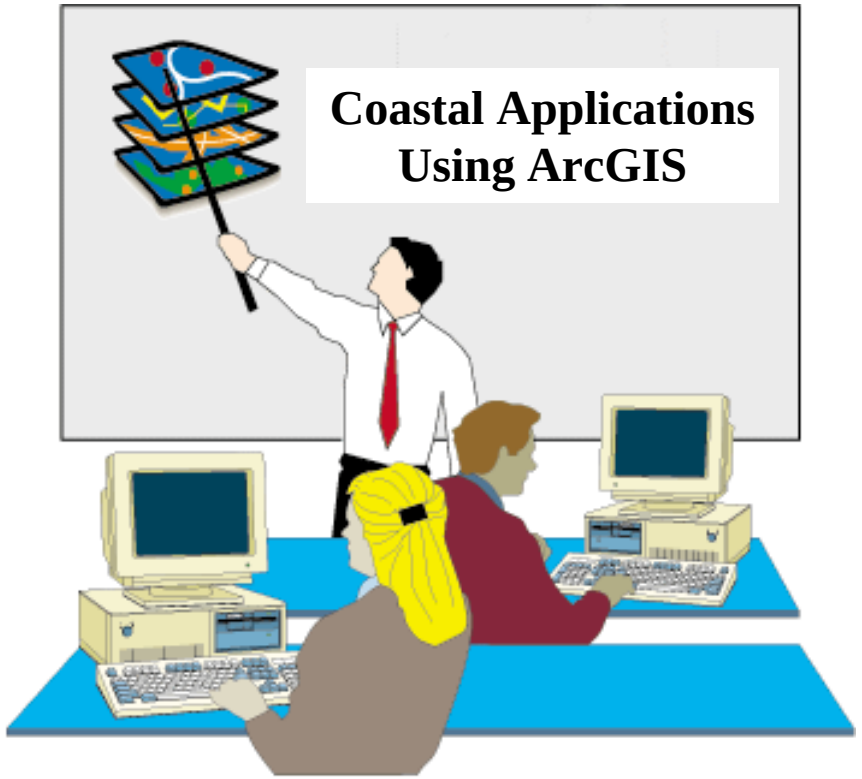
What to Expect

Instructor introduction

- Name and educational background
- GIS experience

Student introductions

- Name
- Organization
- Role in organization
- GIS experience
- Goals and expectations for this class



What to Expect

Logistics

Daily schedule

- Start _____
- Lunch _____
- Finish _____

Facilities

- Refreshments and break area
- Restrooms
- Telephones and messages
- Internet access
- Student ID badges
- Parking

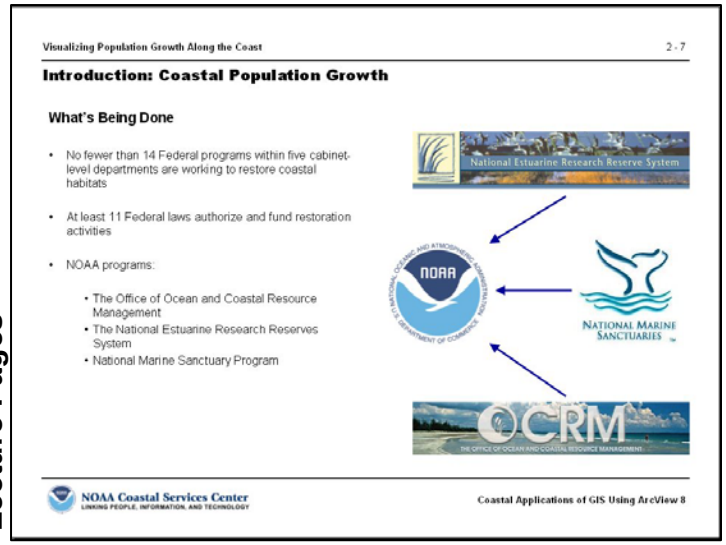
What to Expect

Lectures

Many of the modules in this course begin with brief lectures outlining the coastal issue at hand, study area, and GIS theory that students will encounter as they work through the exercises contained in the module. Additional lectures are provided throughout the course, focusing on such topics as understanding LIDAR, data management, and GIS analysis and process development. Each module contains full-size copies of the presentation slides.

While the format is slightly different, the content of the presentation slides is the same as the lecture pages found in your manual.

Lecture Pages



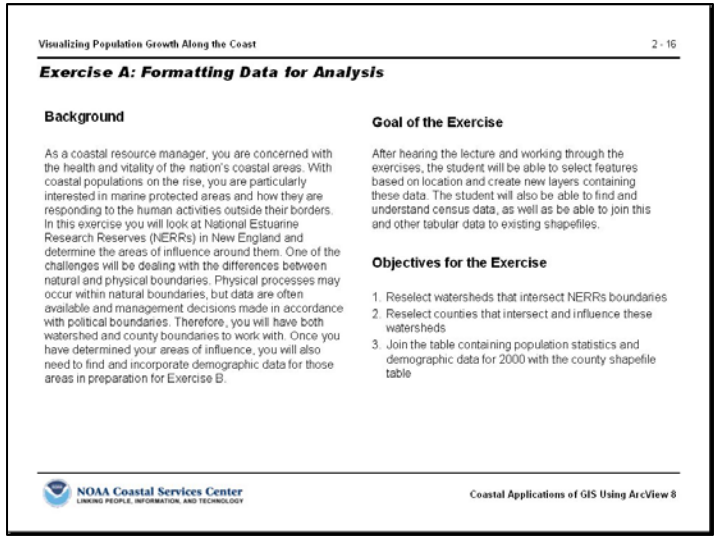
Presentation Slides

What to Expect

Exercises

Each module contains several problem-solving exercises that integrate ArcView 8 technology with important issues facing the coastal resource management community. The first two pages of each exercise serve as an introduction, providing background information, goals and objectives, a summary of the process steps, data, and tools to use. Many of the pages within each exercise contain a sidebar with helpful hints, Web links, and glossary terms that give students additional information about the material that they are working on. Following the conclusion of the activity is a summary of the processes that were used to complete the exercise.

Exercise Introduction



Visualizing Population Growth Along the Coast 2 - 16

Exercise A: Formatting Data for Analysis

Background

As a coastal resource manager, you are concerned with the health and vitality of the nation's coastal areas. With coastal populations on the rise, you are particularly interested in marine protected areas and how they are responding to the human activities outside their borders. In this exercise you will look at National Estuarine Research Reserves (NERRs) in New England and determine the areas of influence around them. One of the challenges will be dealing with the differences between natural and physical boundaries. Physical processes may occur within natural boundaries, but data are often available and management decisions made in accordance with political boundaries. Therefore, you will have both watershed and county boundaries to work with. Once you have determined your areas of influence, you will also need to find and incorporate demographic data for those areas in preparation for Exercise B.

Goal of the Exercise

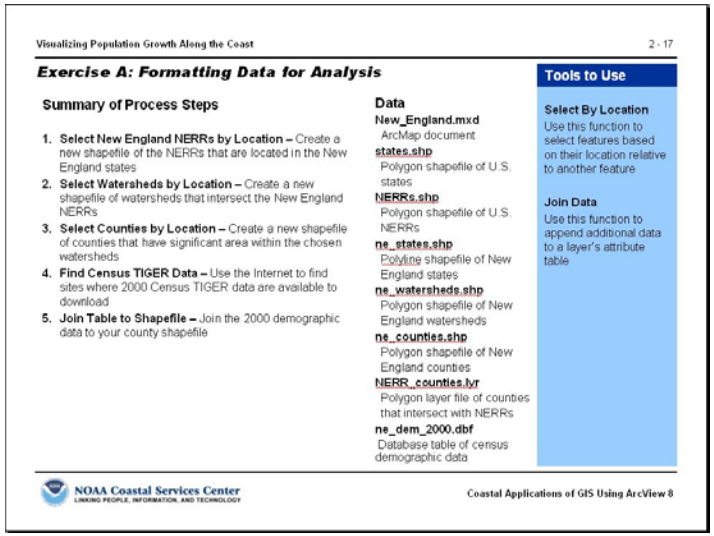
After hearing the lecture and working through the exercises, the student will be able to select features based on location and create new layers containing these data. The student will also be able to find and understand census data, as well as be able to join this and other tabular data to existing shapefiles.

Objectives for the Exercise

1. Reselect watersheds that intersect NERRs boundaries
2. Reselect counties that intersect and influence these watersheds
3. Join the table containing population statistics and demographic data for 2000 with the county shapefile table

NOAA Coastal Services Center

Coastal Applications of GIS Using ArcView 8



Visualizing Population Growth Along the Coast 2 - 17

Exercise A: Formatting Data for Analysis

Summary of Process Steps

1. **Select New England NERRs by Location –** Create a new shapefile of the NERRs that are located in the New England states
2. **Select Watersheds by Location –** Create a new shapefile of watersheds that intersect the New England NERRs
3. **Select Counties by Location –** Create a new shapefile of counties that have significant area within the chosen watersheds
4. **Find Census TIGER Data –** Use the Internet to find sites where 2000 Census TIGER data are available to download
5. **Join Table to Shapefile –** Join the 2000 demographic data to your county shapefile

Data

New_England.mxd
ArcMap document

states.shp
Polygon shapefile of U.S. states

NERRs.shp
Polygon shapefile of U.S. NERRs

ne_states.shp
Polyline shapefile of New England states

ne_watersheds.shp
Polygon shapefile of New England watersheds

ne_counties.shp
Polygon shapefile of New England counties

NERR_counties.lyr
Polygon layer file of counties that intersect with NERRs

ne_dem_2000.dbf
Database table of census demographic data

Tools to Use

Select By Location
Use this function to select features based on their location relative to another feature

Join Data
Use this function to append additional data to a layer's attribute table

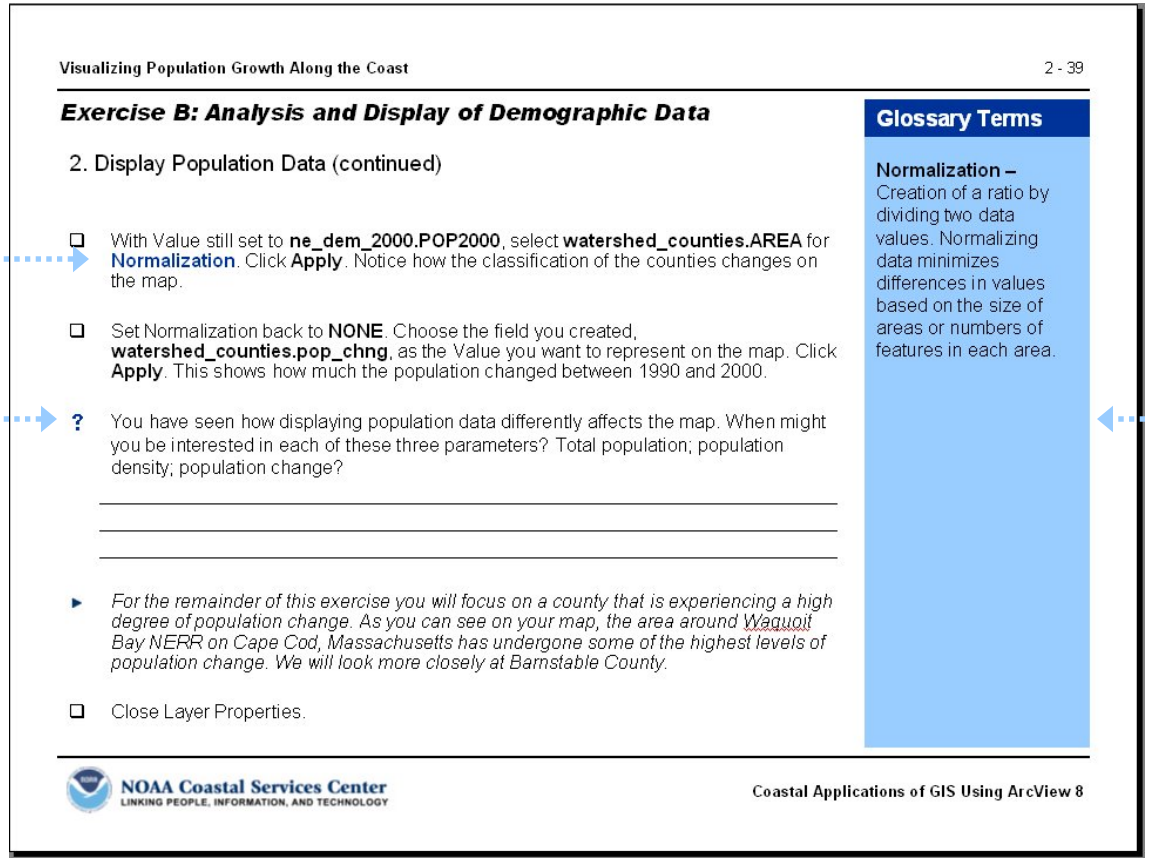
NOAA Coastal Services Center

Coastal Applications of GIS Using ArcView 8

What to Expect

Exercises

Glossary terms are highlighted in blue. Definitions can be found in the sidebar.



Visualizing Population Growth Along the Coast 2 - 39

Exercise B: Analysis and Display of Demographic Data

2. Display Population Data (continued)

- ☐ With Value still set to **ne_dem_2000.POP2000**, select **watershed_counties.AREA** for **Normalization**. Click **Apply**. Notice how the classification of the counties changes on the map.
- ☐ Set Normalization back to **NONE**. Choose the field you created, **watershed_counties.pop_chng**, as the Value you want to represent on the map. Click **Apply**. This shows how much the population changed between 1990 and 2000.
- ? You have seen how displaying population data differently affects the map. When might you be interested in each of these three parameters? Total population; population density; population change?

_____

_____

_____

- ▸ *For the remainder of this exercise you will focus on a county that is experiencing a high degree of population change. As you can see on your map, the area around Waquoit Bay NERR on Cape Cod, Massachusetts has undergone some of the highest levels of population change. We will look more closely at Barnstable County.*
- ☐ Close Layer Properties.

Glossary Terms

Normalization – Creation of a ratio by dividing two data values. Normalizing data minimizes differences in values based on the size of areas or numbers of features in each area.

NOAA Coastal Services Center
LINKING PEOPLE, INFORMATION, AND TECHNOLOGY

Coastal Applications of GIS Using ArcView 8

In the sidebar you'll find everything from glossary term definitions to helpful hints.

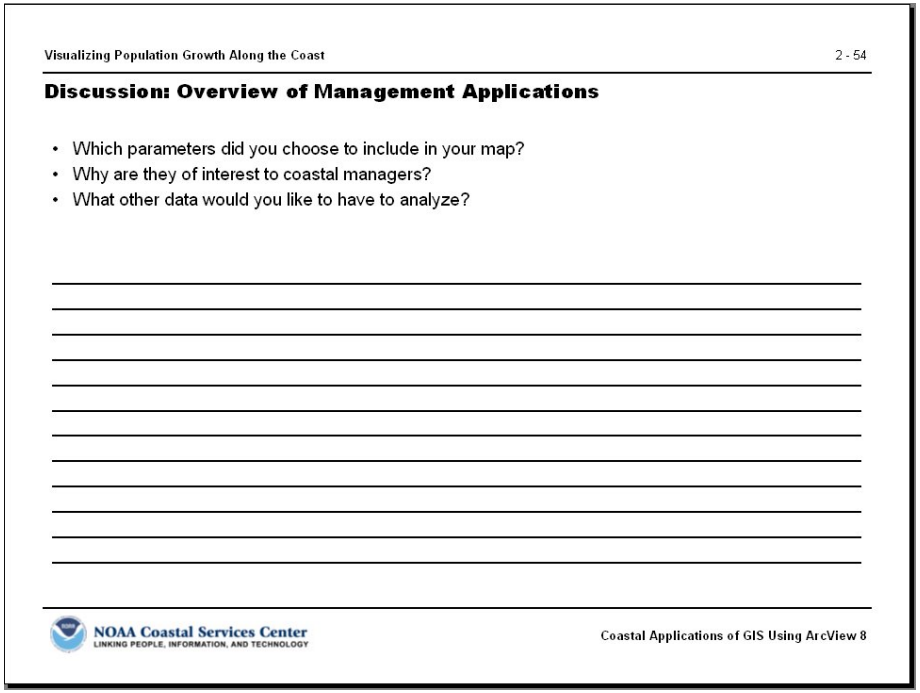
?

Questions for you to answer are found throughout each exercise. The answers follow the exercise summary.

What to Expect

Discussion

At the conclusion of each exercise, you will find a discussion section. In it, you will find questions pertaining to certain issues found in the exercise, as well as designated space for your answer. Once everyone in the class has had a chance to answer the questions posed, the instructor will moderate a short discussion session with the class as a whole.



Before You Begin

Included with this manual is a CD-ROM that contains all of the data that you will need to complete the course. Before you begin working on the exercises, some of the data will need to be copied to your PC in order for proper use with ArcGIS.

- Insert the CD-ROM into the drive
- Using Windows Explorer, copy the **Student** directory to your root **C:** directory.

That's all there is to it, you are now ready to begin! In addition to the data that are required for each exercise, the CD-ROM also contains the following

- Read-only copies of this manual and the lecture slides
- Backup data
- Supplemental Global Positioning System (GPS) information