Climate Ready Great Lakes

NOAA

U.S. National Oceanic and Atmospheric Administration, U.S. Department of Commerce

Sea Grant

Great Lakes Network

Great Lakes Climate Change Module 3

Climate Change Adaptation Tools Available to Great Lakes Communities as of January 1, 2011

Climate Ready Great Lakes

- **Module 1:** Predicted impacts of climate change
- **Module 2:** Overview of an adaptation plan
- **Module 3:** Available tools and information

Climate Ready Great Lakes Module 3

What tools and information are available to help me?

- Choosing tools to help with adaptation planning
- Using tools effectively
- Learning about the kinds of tools that are available

Part 1

Introduction to Tool Use and Selection

What is a Tool?

For this module, "tool" refers to any tools based on a method, software, or non-software, which are used for climate change adaptation planning.

Why use tools for adaptation planning?

- Provide decision-making support
- Organize information
- Offer a mechanism for turning raw data into useful information
- Use data and analysis relevant to Great Lake communities

Choosing a Tool

1. What is the goal?
2. Which climate impacts are you trying to target?
3. What resources are available for the project?
4. How does this project fit into overall community planning?
5. Where are expert resources?

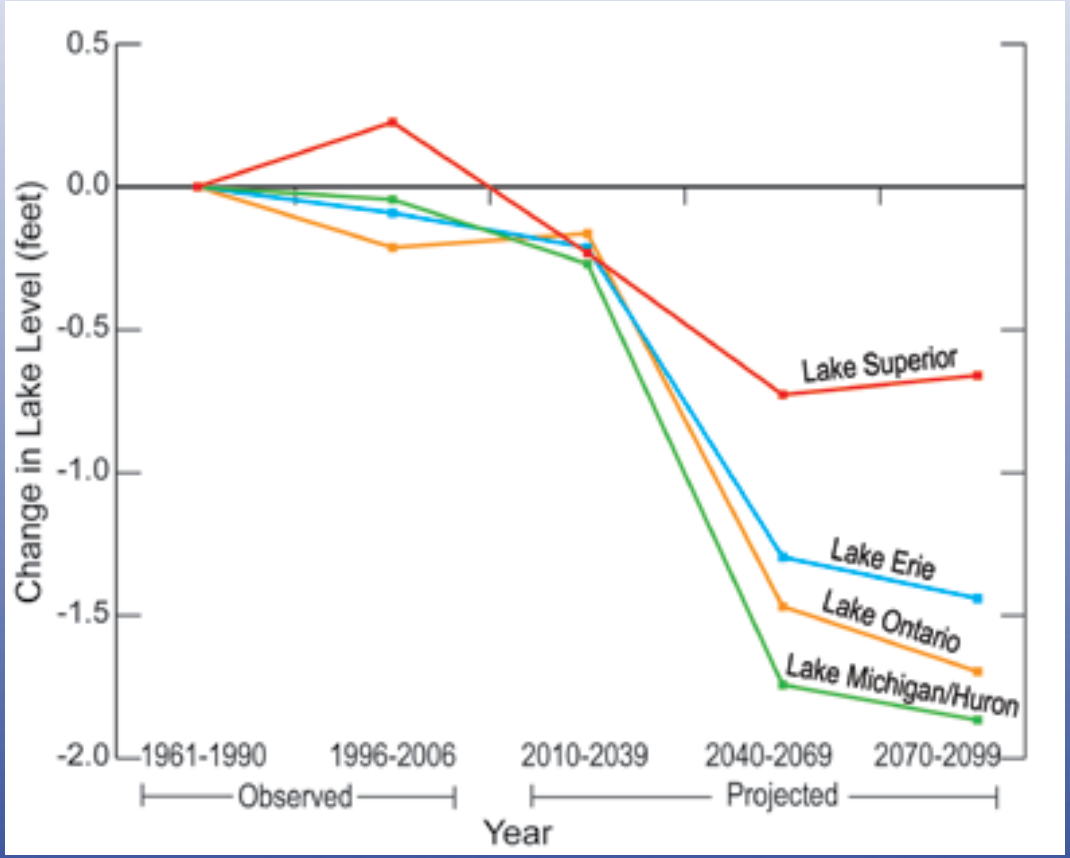
Defining Your Goal

- What outcome are you trying to achieve?
- How does this goal fit into existing plans and objectives for your area?

See Module 2 for additional resources on defining adaptation goals.

Identifying Climate Impacts

- Lake-level variation
- Ice cover
- Severe weather
- Ecosystem impacts
- Human impacts



NOAA Regional Impacts Report: Midwest

What resources are available?

- Existing projects
- Funding
- External partnerships
- Data

Handout: Tool/Impact Spreadsheet

CLIMATE IMPACTS	Stormwater Management	Flood Hazard Reduction	Drought	Building/ City Infrastructure	Shoreline Infrastructure	Transportation	Energy	UHI/Human Health	Air a Wat Qual
TOOL NAME									
Building Coast-Smart Communities: A Role Play Exercise	X	X	X	X	X	X	X	X	X
Environmental Planning for Small Communities (TRILOGY)	X	X	X	X	X	X	X	X	X
Green Communities	X	X	X	X	X	X	X	X	X
CAKE	X	X	X	X	X	X	X	X	X
Coastal Inundation Toolkit	X	X		X	X				
Coastal Services Center Modules	X	X	X	X	X	X	X	X	X
EBM	X	X	X	X	X	X	X	X	X
Great Lakes Weather and Climate	X	X	X						
National Estuarine Research Reserve Training	X	X	X	X	X			X	X
Sea Grant Training: Ohio State University Webinars									X
Coastal County Snapshots		X							
GLIN	X	X	X	X	X	X	X	X	X
Historical Maps and Charts	X	X	X	X	X	X	X	X	X
MyEnvironment								X	X
NOAA Digital Coast	X	X	X	X	X	X	X	X	X
NOS Data Explorer	X	X	X		X				
BASINS	X	X	X						X
CITYgreen	X	X		X			X	X	X
Coastal Ecosystem Restoration									
CVAT	X	X		X				X	X
FEMA HAZUS		X		X					
Habitat Priority Planner				X					
i-Tree v3.0	X	X		X					X
Impervious Surface Analysis Tool	X	X							X
NatureServe Vista				X		X	X		
Lake Superior Duluth Streams.org	X	X							X
NatureServe Website									
NOAA Coastal Climate Adaptation	X	X	X	X	X	X	X	X	X
NOAA Coastal Service How-to-Guide	X	X	X	X	X	X	X	X	X
NOAA Climate Services Portal	X	X	X	X	X	X	X	X	X
NOAA State of the Coast				X	X				X
CanVis	X	X	X	X	X	X	X	X	X
Climate Wizard	X	X	X	X	X	X	X	X	X
Visualizing Coastal Erosion					X				

Tool Description Handout

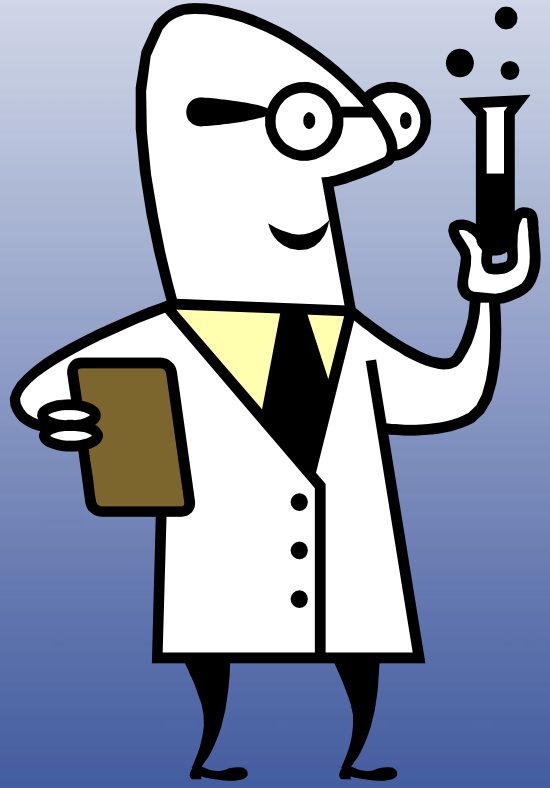
The handout provides a more detailed description of each tool and is categorized according to types of tools.

- **Description:** Coastal County Snapshots is an interactive, web-based tool that allows users to access floodplain and flood zone information for their area. Once the tool is launched, users click on a U.S. state, and then click on their county, if available. Then, users have access to county demographics within the floodplain, including population, infrastructure, and environment. http://www.csc.noaa.gov/digitalcoast/tools/snapshots
- **Cost:** None
- **Training/Time Requirements:** None
- **Other Requirements/Notes:** None

Using Tools Effectively

In order to use tools as effectively as possible, it is important that users are familiar with:

- How the tool works
- Data sources
- Technical assistance



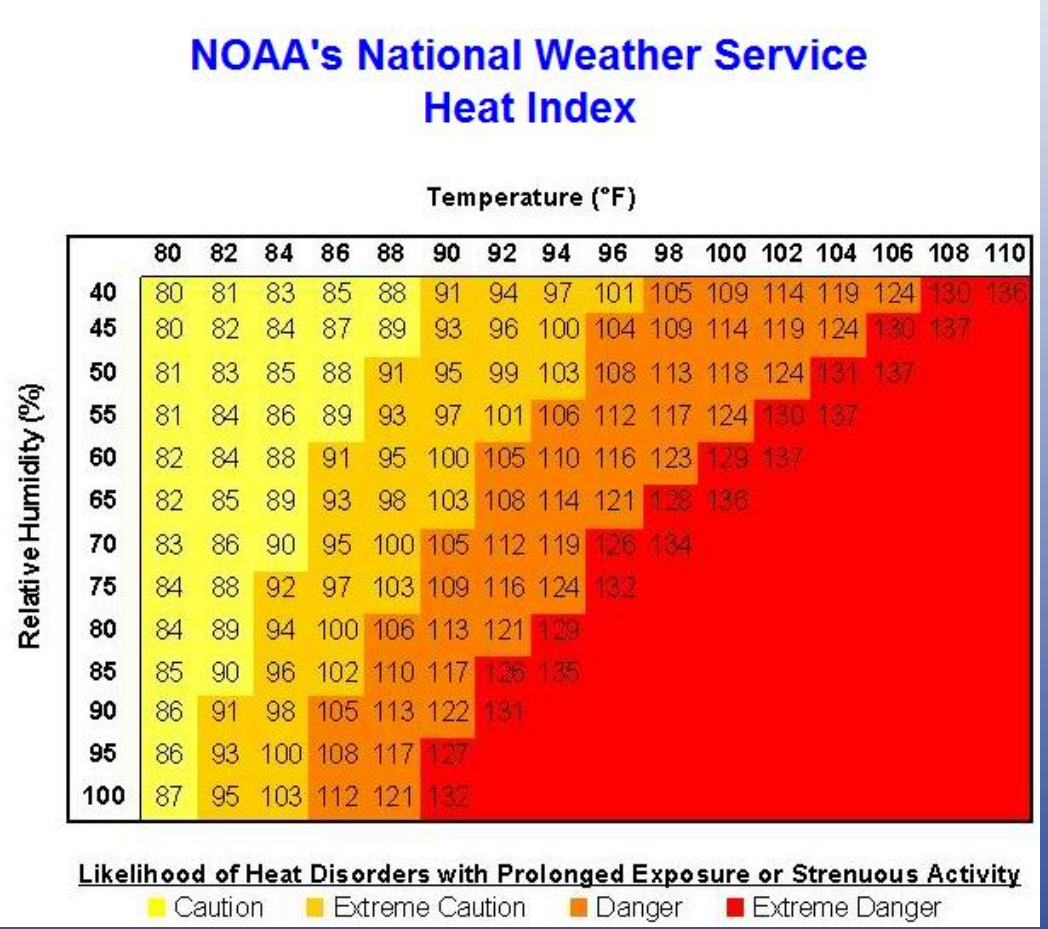
Learning Tool Mechanics

1. Read the user manual
2. Consider additional resources, including:
   - Training on the tool creator's website
   - Training that may accompany software
   - Training offered through other organizations
   - Getting in touch with contacts listed on the website

Understanding Tool/Data Origin

It is important to understand:

- The assumptions and origin of the tool
- The assumptions and origins of the data used in the tool
- Why you selected specific data



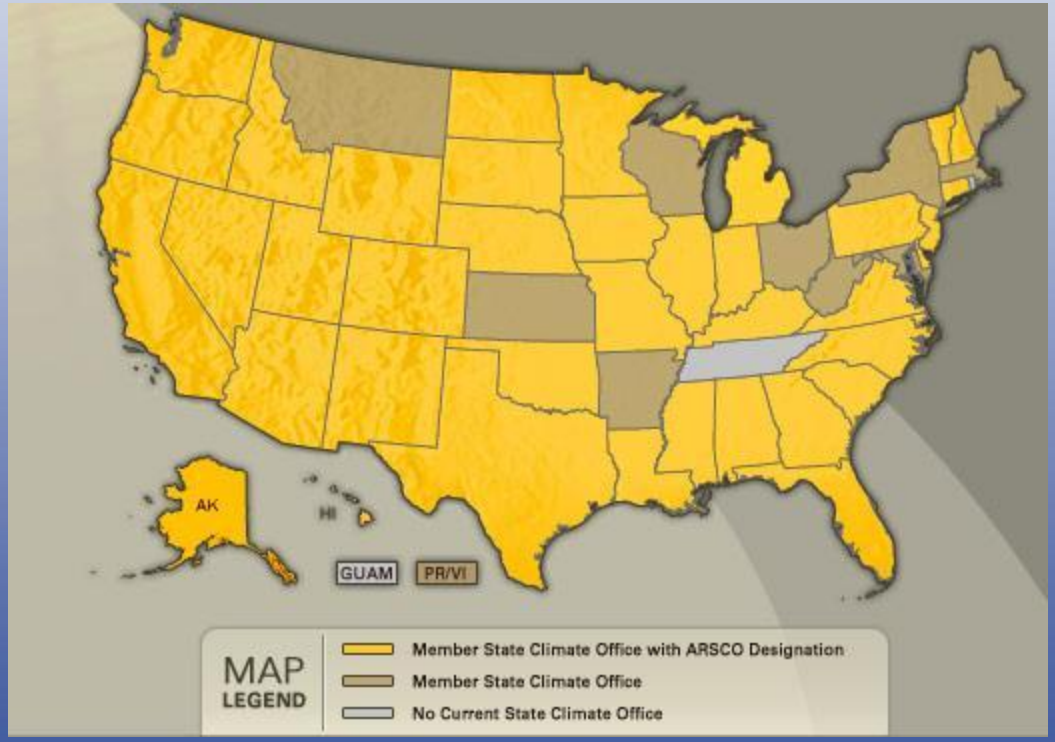
http://www.weather.gov/os/heat/index.shtml

Utilizing Technical Assistance

- Technical professionals are particularly important in helping users learn to effectively and properly use tools.
- Other contacts are available who can help users find appropriate data.

Finding Effective Data

- Determine the geographic scale of interest
- Look for data that matches identified geography
- Remember that metadata is important



Part 2

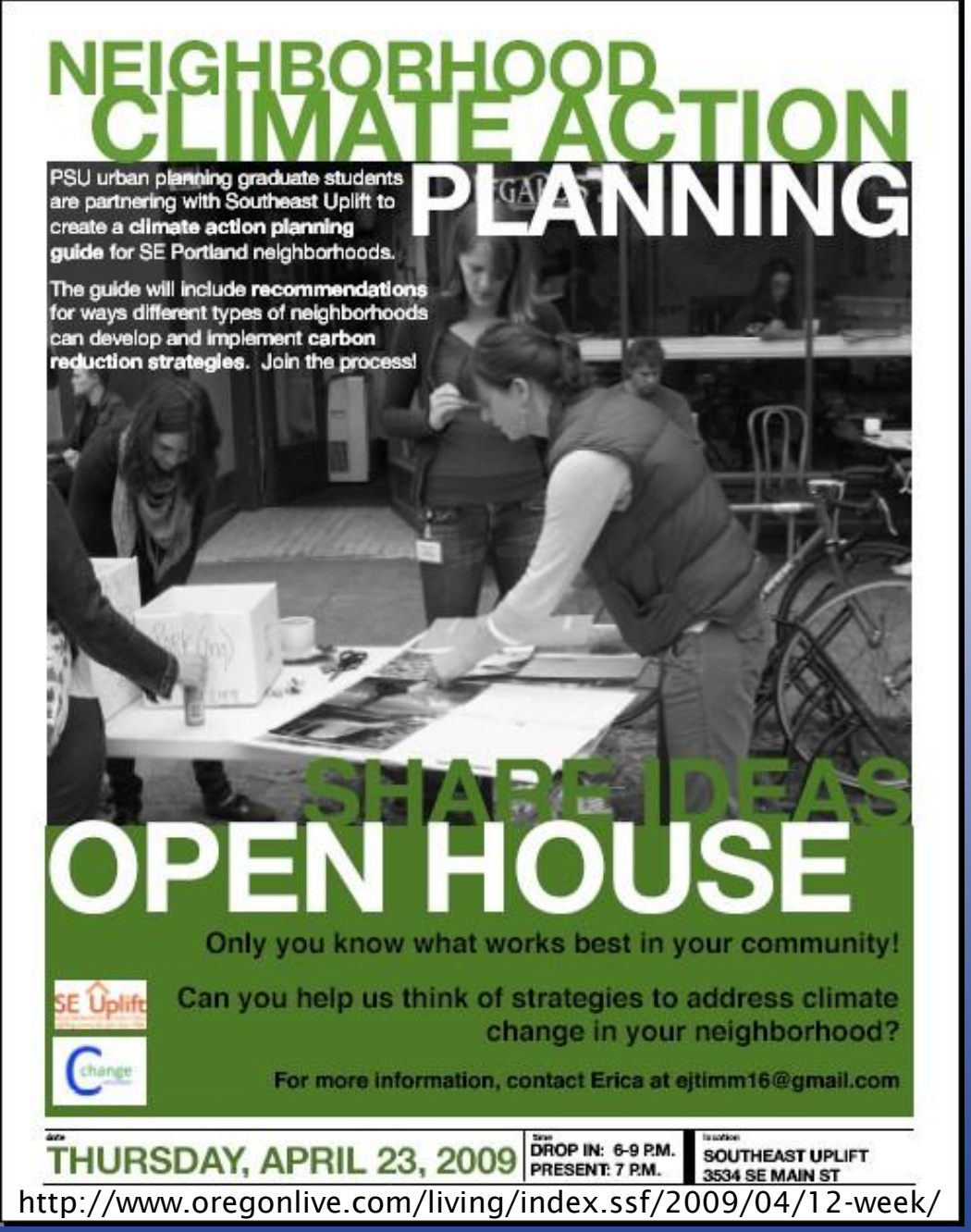
Survey of Available Tools

Tool Categories

- Community Outreach Tools
- Education, Training, and Support
- Data Websites
- Analysis Tools and Systems
- Other Informational Websites
- Visualization Tools

Community Outreach Tools

Tools that help decision makers communicate with other members of the community, including the public.



http://www.oregonlive.com/living/index.ssf/2009/04/12-week/

Community Outreach Adaptation Planning Applications

For every step of the planning process it is important to get community input, feedback, and participation.

Building Coast-Smart Communities

How Will Maryland Adapt to Climate Change?

Type and hit enter to search

Contact | Game Materials | Event Info | Learn More | Maryland Mediators

Role Play Exercise Rallies MD Coastal Communities Around Climate Change

On April 27 in Annapolis, more than 170 mayors, county commissions, environmentalists, business leaders and Maryland state officials came together for an interactive summit about community-level responses to climate risks such as sea-level rise and storm surge that threaten the state's coast.

The summit's centerpiece was an innovative negotiation role-play that demonstrated the key challenges and policy options coastal communities face. To view television coverage of the event, visit http://wiz.com/local/sea.level.2.995698.html

Use the Role Play in Your Community

How will your coastal community adapt to rising seas, increased storm surge and diminishing fresh-water resources? This half-day role play helps begin that discussion at a local level. It's fun, engaging and quickly introduces people to the challenges coastal communities face and main options for addressing them. Local government authorities, planning departments, chambers of commerce, civic groups and residents associations all could host this game in

"With over 4,000 miles of coastline, we cannot wait to tackle this threat … we must ensure our communities are *Coast-Smart* now—ready, adaptive and resilient."
Governor Martin O'Malley

MARYLAND Smart, Green & Growing

cbi Consensus Building Institute

NOAA

MIT-USGS Science Impact Collaborative

CCD

http://maryland.coastsmart.org/

NOAA Sea Grant Great Lakes Network

Coast-Smart Communities Factsheet

- **Description:** Community role-play exercise
- **Cost:** Free
- **Training/Time Requirements:** Half-day workshop and advance preparation
- **Additional Requirements/Notes:** None

Adaptability to Great Lakes Communities

- Provides a forum to discuss climate change issues
- Creates discussion of policy implications
- Enhances awareness of climate change impacts and potential policy solutions

MD DNR/Chesapeake and Coastal Program

Scorecard 101

COAST-SMART COMMUNITIES SCORECARD Minimum 100 points, Maximum 25 $ to qualify	Cost to County	Score
CATEGORY 1: Reducing Vulnerability of the Built Environment (Minimum 25 points)		
Subcategory 1: Remove from harms way		
1. Ban the building of new primary dwellings and prohibit the expansion of footprints on existing developed lots within the 100-year tidal floodplain.	$	10
2. Incorporate elements into the county's comprehensive plan that address and accommodate for sea level rise and an increased storm surge vulnerability zone. This could include provisions such as overlay zones, tiered zoning with increasingly strict regulations within areas of vulnerability, increased buffers in areas of vulnerability, etc.	$	8
3. Establish a transferable development rights (TDR) system to encourage swapping of land in coastal areas vulnerable to sea level rise and storm surge for inland parcels (this is versus a zoning approach)	$$	8
4. Develop a timeline and strategic plan to move or abandon existing infrastructure in areas subject to more frequent storm surge and damage due to sea level rise inundation.	$	9
5. Require mandatory disclosure statements about property's vulnerability to sea-level rise in all real estate transactions	$	7
6. Establish and fund a buy-out program for the purchase of repetitive loss properties within the 100 year floodplain	$$$ - State Match	9
Subcategory 2: Protect in place		
7. Require a 2-foot freeboard elevation above the FEMA requirements for all new and existing buildings in the 100-year tidal floodplain	$$$	8
8. Develop an Infrastructure Improvement Plan that establishes timelines for raising roads and bridges, higher volume stormwater management, etc. based on vulnerability to sea level rise	$$	7
9. Provide tax rebates on investments in adaptation measures for homeowners and small business owners in at risk areas (e.g., elevating houses, upgrading well water and septic systems)	$$ - State Match	6
10. Create a comprehensive local adaptation plan	$$ - State Match	7
11. Enhance federal flood insurance by contributing to a state insurance pool for homeowners and small businesses located in areas vulnerable to sea level rise and storm surge.	$$$$ - State Match	8

"Score" represents the effectiveness of this policy on reducing the impacts of climate change

"Cost" is an approx. of local govt. expense to implement and manage this policy

"State Match" funds would be provided by the state to establish this program. The number of $ signs denotes the cost the city would have to incur.

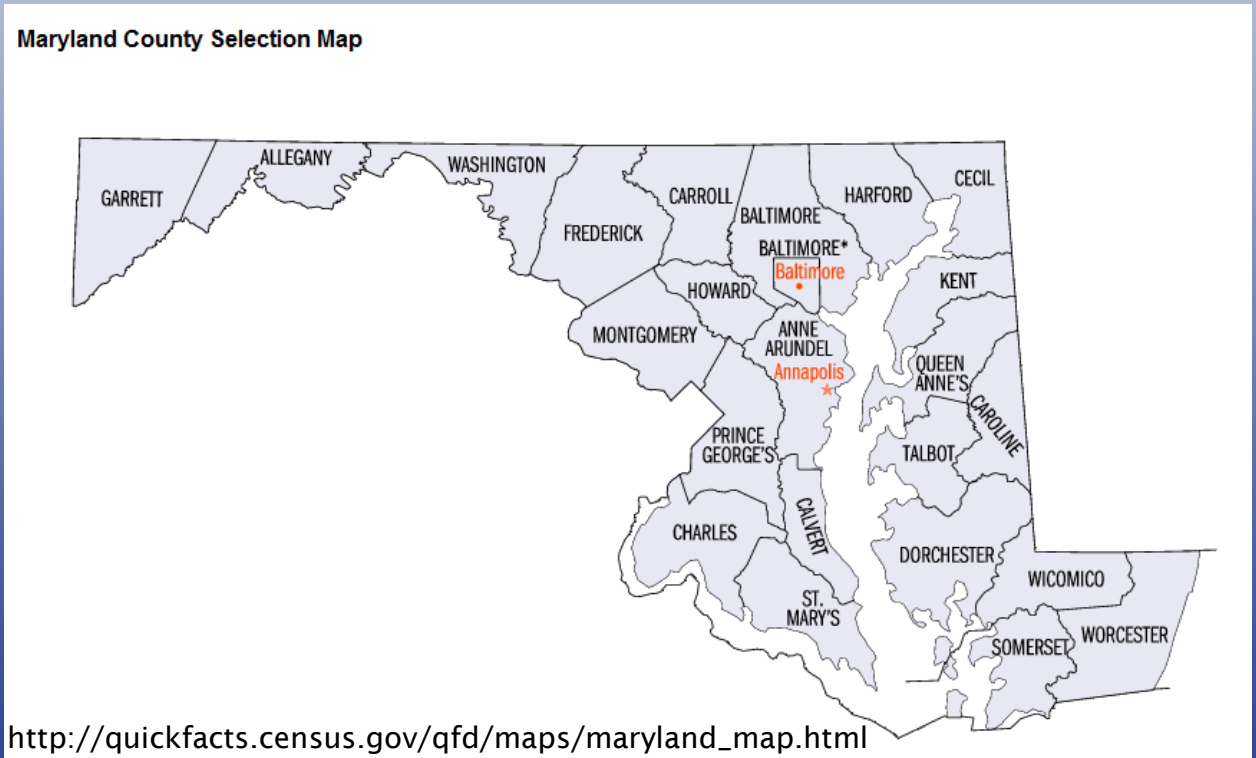
Coast-Smart Communities Adaptation Planning Applications

How can the role-play exercise be incorporated in climate change adaptation planning?

- Community involvement
- Stakeholder participation
- Community discussion

Case Study: Annapolis, MD

The role-play tool was utilized at a climate change summit in Annapolis, Maryland.



http://quickfacts.census.gov/qfd/maps/maryland_map.html

Climate Change on the Maryland Coasts

http://www.aacounty.org/DPW/Highways/InlandCostalFlooding.cfm

Possible climate change impacts for the salty coasts:

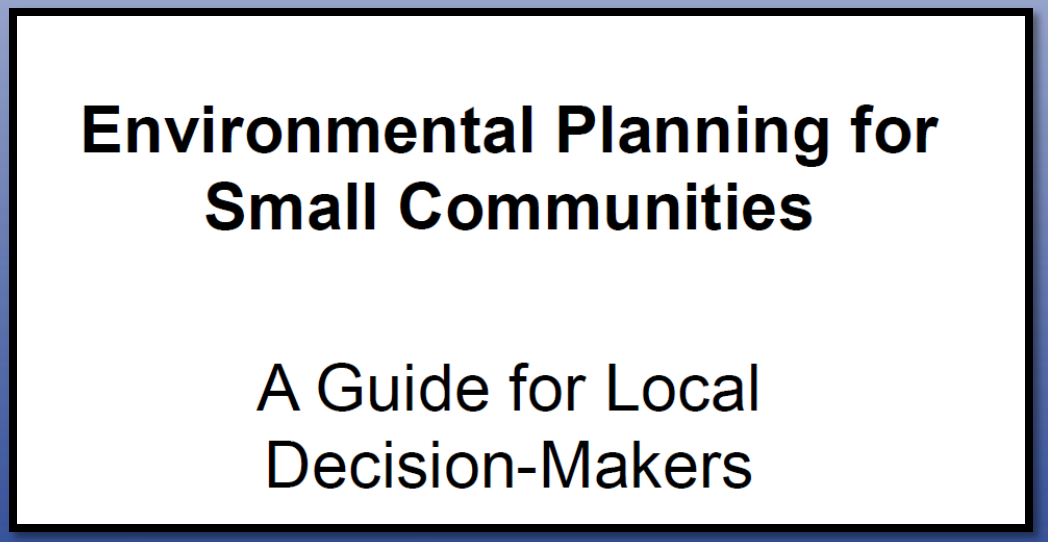
- Flooding increases
- Habitat changes
- Sea level rise
- Heat waves
- Health consequences

Case Study: Annapolis, MD

- Community-based discussion was a top priority at the climate change meeting.
- Participants included:
  - Politicians and office holders
  - Private business owners
  - Environmental activists

Additional Community Outreach Tools

- Environmental Planning for Small Communities (TRIOLOGY)
- Green Communities



http://www.epa.gov/nrmrl/pubs/625r94009/625r94009.pdf

http://www.epa.gov/greenkit/basicinformation.htm

Education, Training, and Support Tools

Tools that help participants find more information on education and outreach, training opportunities, and support tools.

Applications for Climate Change Adaptation Planning for Education, Training, and Support Tools

- Inform public of climate change mechanisms and impacts
- Learn to keep community members involved in adaptation planning
- Learn how to use and find new tools

NOAA Coastal Services Center
National Oceanic and Atmospheric Administration

Search >>

Home | About | Data | Tools | Training | How-To Guides | Publications | Partnerships | Technical Assistance

Training

The NOAA Coastal Services Center provides training to the nation's coastal resource management community. Classes can be taught at the Center's training facility or brought to your organization; the cost is minimal for participants and host organizations. To learn more about the trainings, review the class links below.

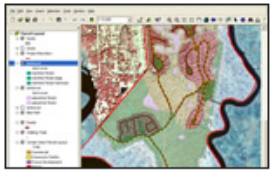
Filter by Category: All Categories Filter by Delivery Type: All Types

Geospatial Training

Classroom-based instruction for core geospatial skills

Assessing GIS for your Organization
Assists organizations in understanding the components needed to establish and use GIS

GIS for Managers
Provides an overview of the basic principles and functionality of ArcGIS



Introduction to Coastal GIS
Provides the fundamentals of ArcGIS software, framed within a coastal management context

Upcoming Training Opportunities

CanVis
Web-based Training
September 15, 2010
1:00 p.m. to 4:00 p.m. (EST)

Habitat Priority Planner
Tool Demonstration
September 27, 2010
2:00 p.m. to 3:00 p.m. (EST)

http://www.csc.noaa.gov/training/

NOAA's Coastal Services Center (CSC) Training Factsheet

- **Description:** Training for Coastal Managers (see http://www.csc.noaa.gov/training/)
- **Cost:** Free; May be nominal fee for in-person classes if held at local venue
- **Training/Time Requirements:** Varies
- **Other Requirements/Notes:** Local host required for trainings not held at CSC facility

CSC Training Examples

- Issue-based
  - Planning for Climate Change
  - Conservation Data Documentation
- Process-based
  - Conducting a Needs Assessment
  - Project Design and Evaluation
- Tool-based

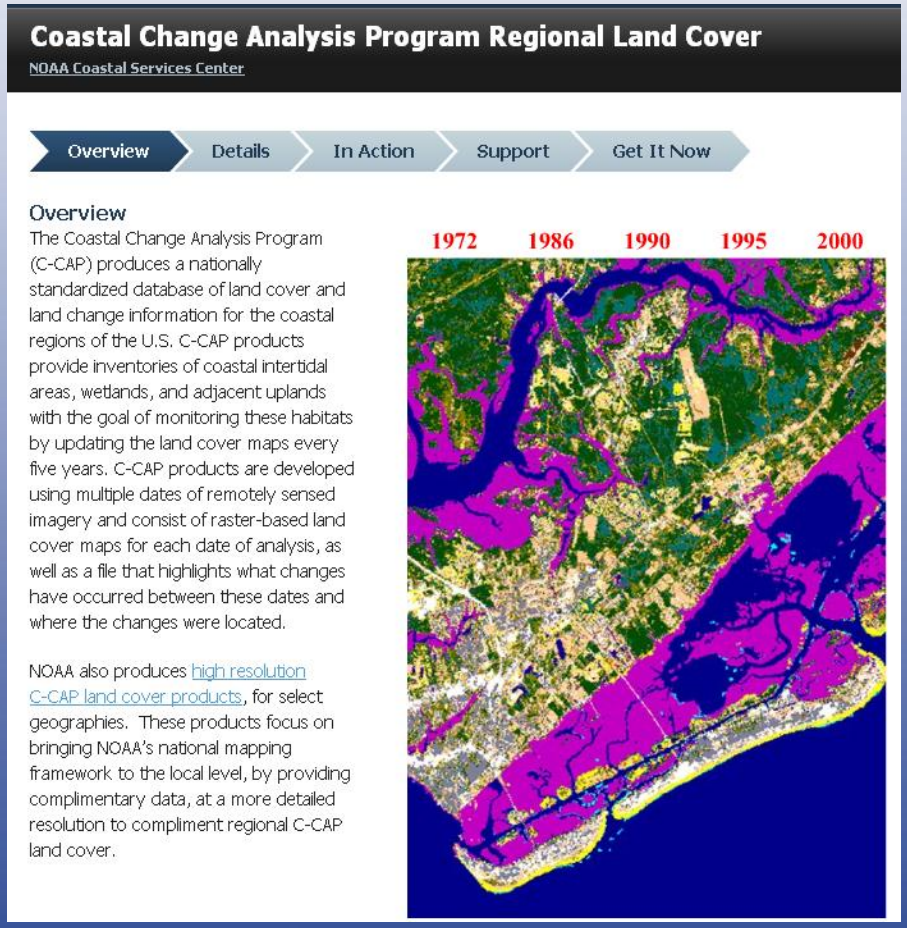
National Estuarine Research Reserve - Planning for Climate Change Workshop Factsheet

- **Description:** Will provide Great Lakes decision makers and professionals with information and skills to plan for climate change in their communities. APA accreditation pending. http://www.nerrs.noaa.gov/Training.aspx
- **Cost:** Varies depending on location
- **Training/Time Requirements:** 1-day course offered May–June 2011 in Duluth, Minnesota; Green Bay, Wisconsin; Cleveland, Ohio, and other location(s) to be determined
- **Other Requirements/Notes:** None

Tool-Based Training

Featured tools include:

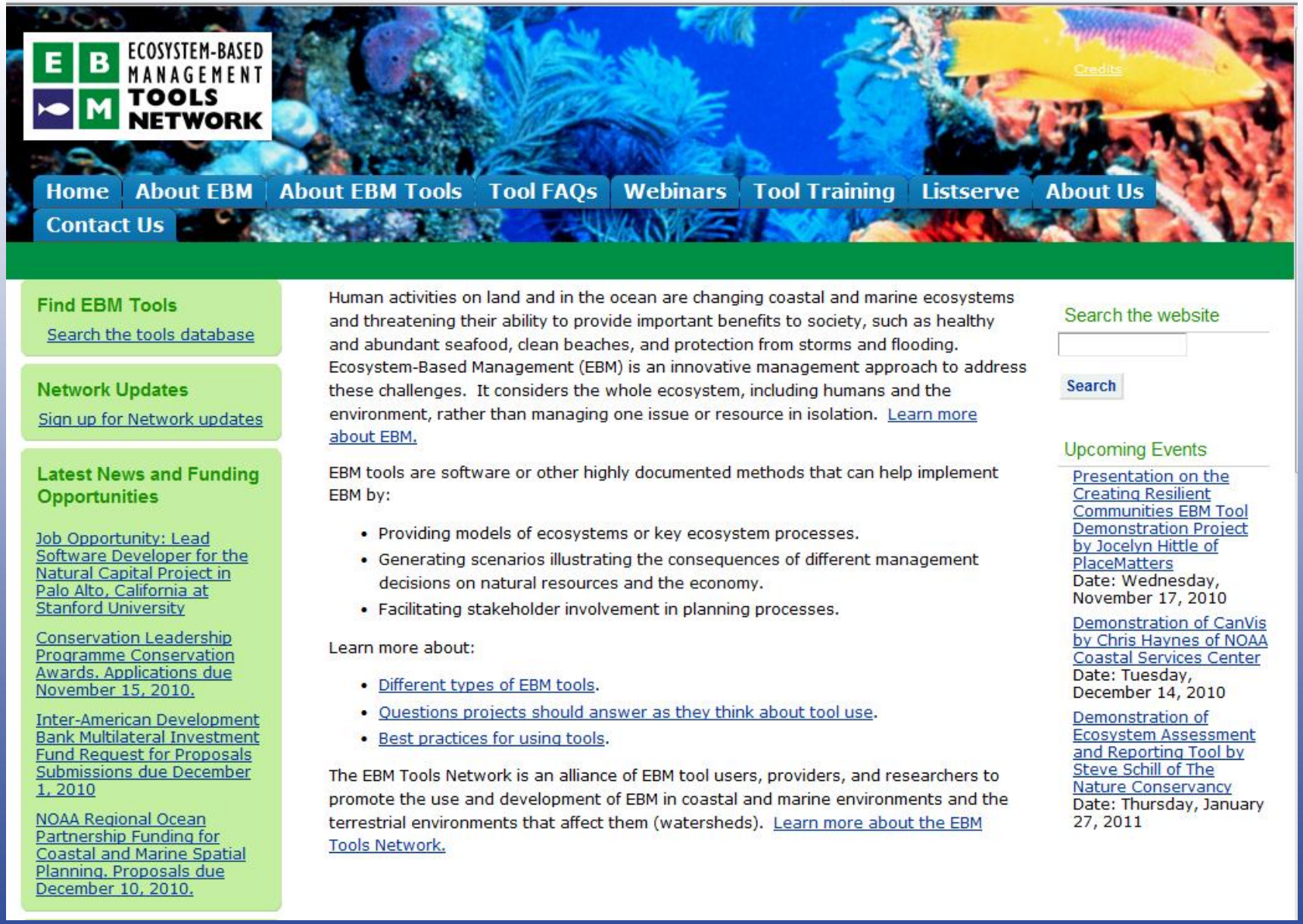
- CanVis
- Habitat Priority Planner
- Nonpoint-Source Pollution and Erosion Comparison Tool (N-SPECT)
- Coastal Change Analysis Program (C-CAP)



http://www.csc.noaa.gov/training/

Applications for Climate Change Adaptation Planning

- Learn about new tools
- Get up to date on coastal management, zoning, local policies, laws, and other topics
- Learn more about climate change and communicating with the public



http://www.ebmtools.org/

Ecosystem-Based Management (EBM) Tools Factsheet

- **Description:** Tool database and training resource
- **Cost:** Free
- **Training/Time Requirements:** None
- **Other Requirements/Notes:** None

EBM Training/Webinars

EBM Tools provides tool training resources:

- Trainings developed by EBM Tools
- Monthly demonstrations of tools featured on the EBM Tools website
- List of trainings created by others

EBM Tools Database

You can search the EBM Tools database by:

- Tool name
- Developer name
- Ecosystem type
- Required expertise
- Transferability

http://www.glerl.noaa.gov/res/Programs/glansis/hemi_brochure.html

Climate Change Adaptation Planning Applications

The EBM Tools site:

- Can be very useful for adaptation planning
- Keeps the database up to date with new tools
- Offers many training sessions on a wide variety of tools

Additional Resources

- Great Lakes Weather and Climate
- National Estuarine Research Reserve Training
- Sea Grant Training
  - Ohio State University Webinars
- Ecosystem-Based Management (EBM) Training
- Climate Adaptation Knowledge Exchange (CAKE)
- Coastal Inundation Toolkit

Sea Grant
Ohio Sea Grant College Program

http://www.ohiodnr.com/ohiocoastaltrainingprogram/tabid/15316/default.aspx

cake
Climate Adaptation Knowledge Exchange

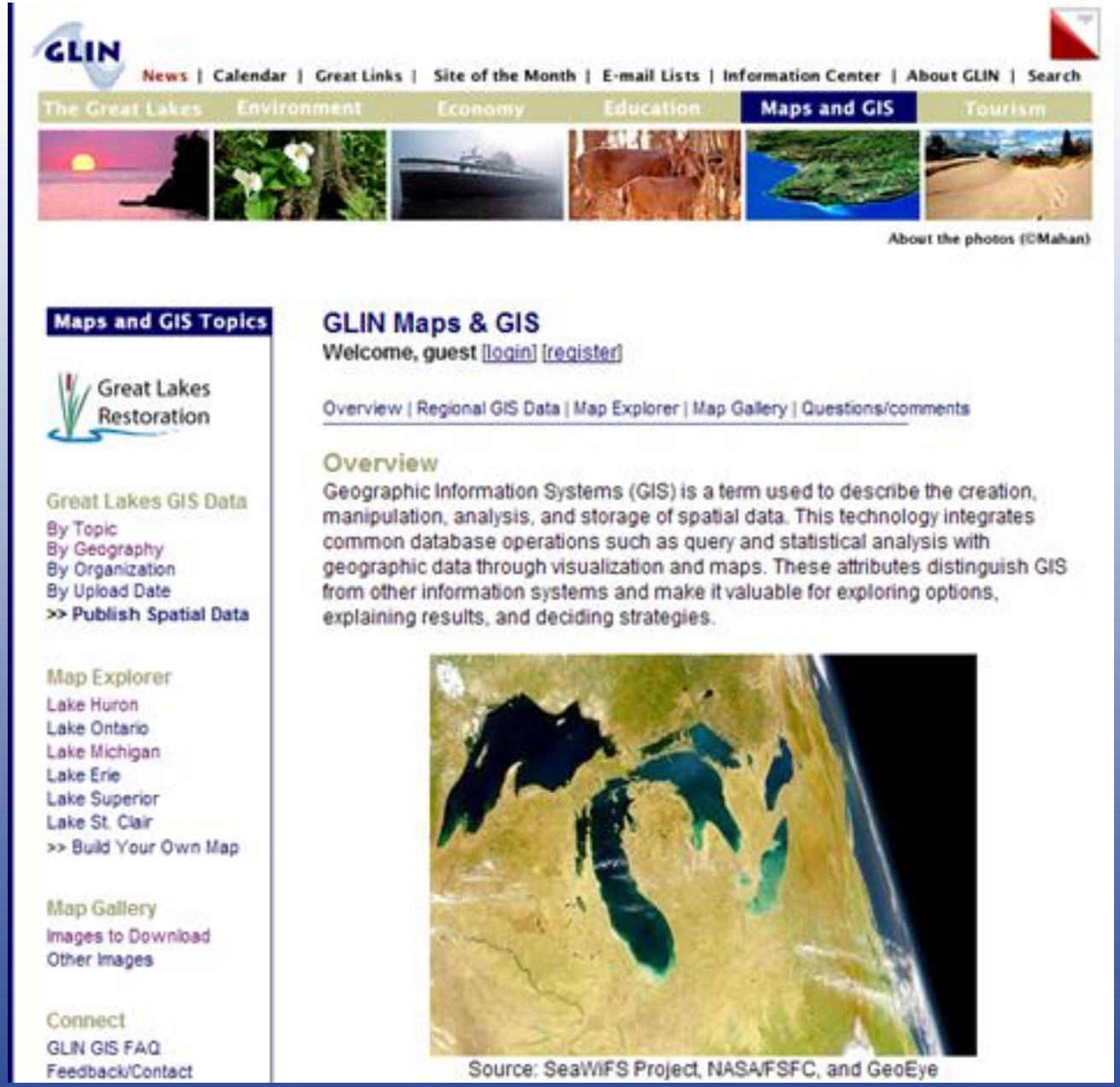
http://www.cakex.org/

Data Websites

Data websites help users find data that can be incorporated into other tools or used for analyses.

Climate Change Adaptation Planning Applications for Data

- Relative, credible data is critical to the project.
- Many projects have specific data needs.
- Availability of data may be limiting.



http://gis.glin.net/maps/

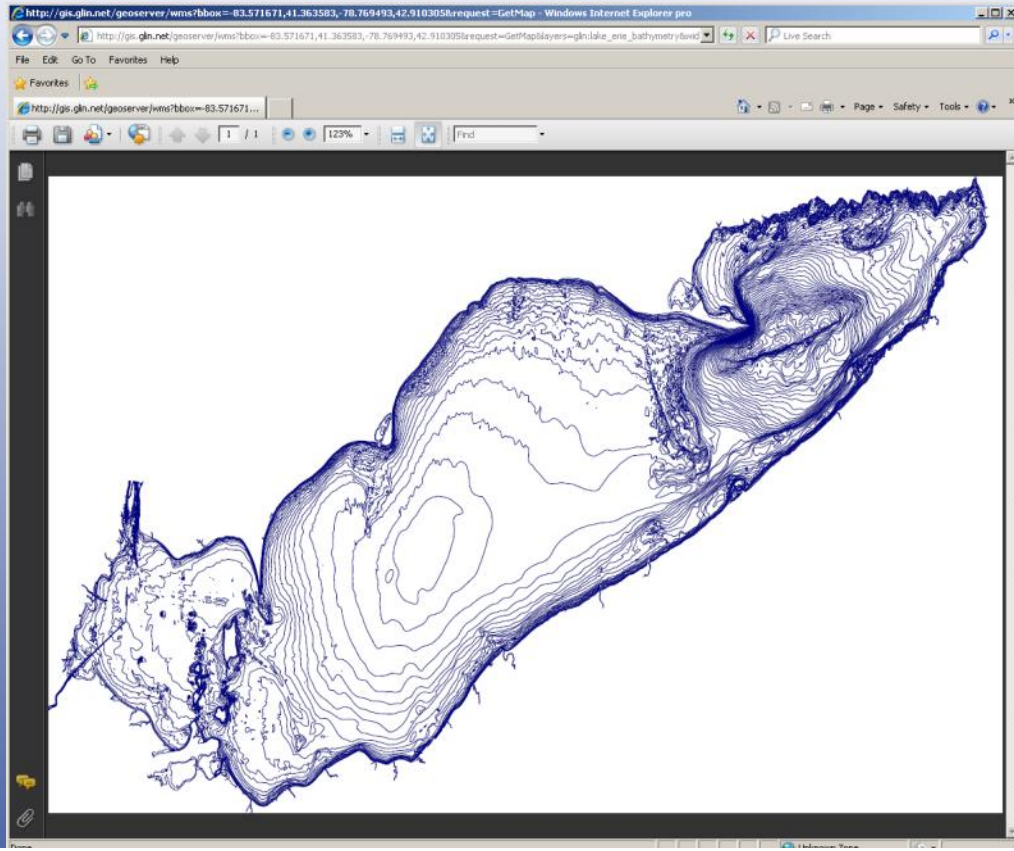
Great Lakes Information Network (GLIN) Factsheet

- **Description:** GIS-based mapping tool specific to the Great Lakes
- **Cost:** Free
- **Time/Training Requirements:** Varies; GIS skills necessary
- **Additional Requirements/Notes:** GLIN provides access to Great Lakes GIS data, an interactive map explorer, and a map gallery that offers downloadable maps of the region.

Great Lakes GIS Data

GIS data can be:

- Categorized by topic, geography, organization, or upload date
- Downloaded in multiple formats (below)



http://gis.glin.net/ogc/services.php?by=topic#lake_erie_bathymetry

Elevation

lake_erie_bathymetry (GLERL) (NGDC)

A bathymetric layer for Lake Erie

Link | Map Preview | Link | Metadata (.html) | Metadata (.txt) | Metadata (.xml)

GeoRSS | PNG | PDF | GML | SVG | JSON | Shapefile (.shp) | Google Earth (.kmz)

Map Explorer

U.S. Army Corps of Engineers, Detroit District

Map Gallery

GLIN Adaptation Planning Applications

GLIN provides data that is:

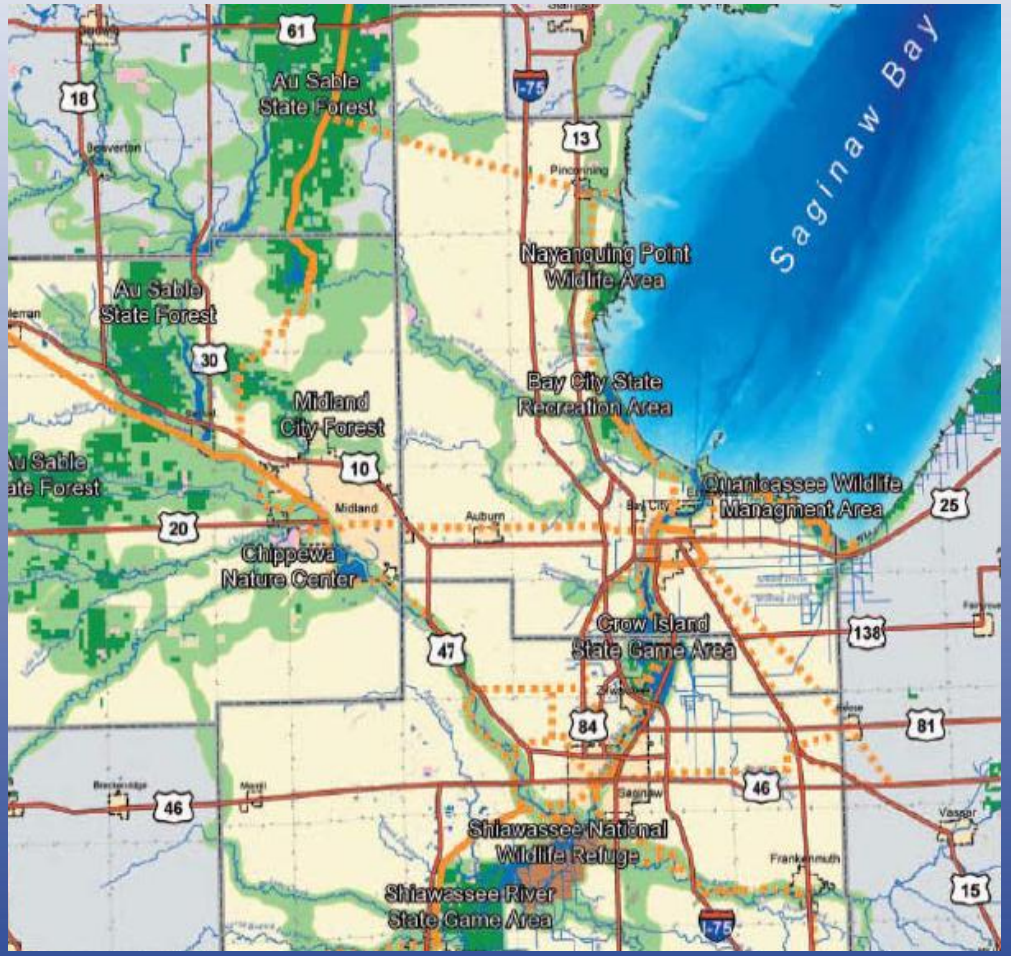
- Trusted
- Reliable
- Specific to the Great Lakes region

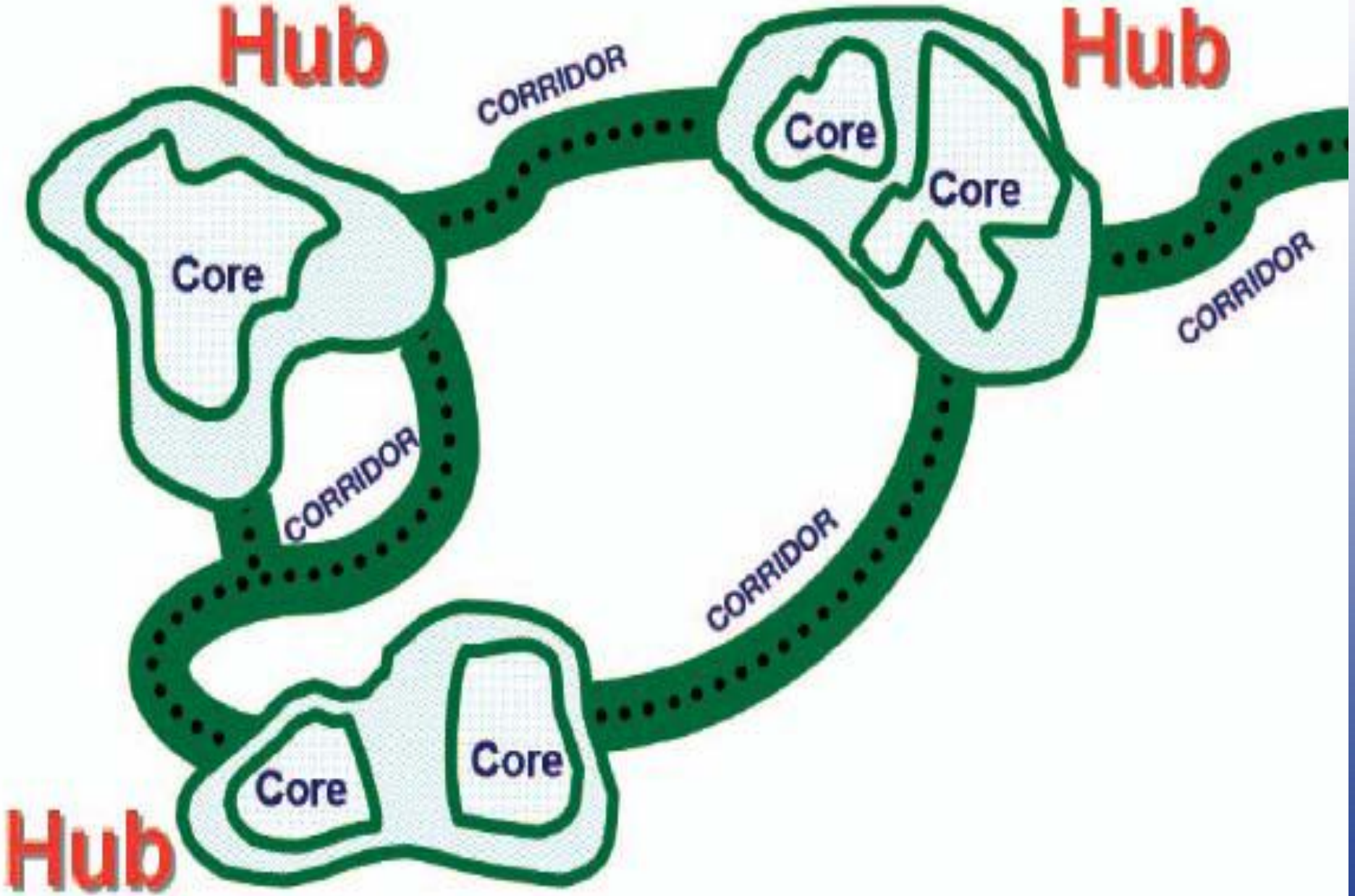
Obtaining good data is critical for future analysis and decision making.

GLIN Case Study: Saginaw Bay, MI

Greenways Collaborative

- Developed green infrastructure plan
- Used GIS analysis

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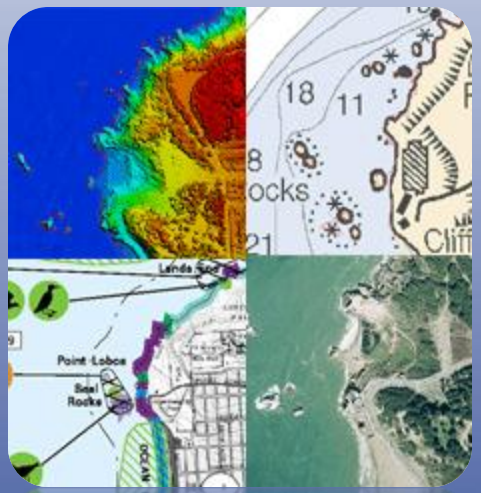
Additional Data Websites

- Coastal Change Analysis Program Regional Land Cover (C-CAP)
- Coastal County Snapshots
- NOAA's Digital Coast
- Historical Maps and Charts
- MyEnvironment
- NOS Data Explorer



Analysis Tools and Systems

Tools that help users determine possible effects of decisions, changes, or hazardous events on communities and/or environmental systems.

Climate Change Adaptation Planning Applications for Analysis Tools and Systems

Use these tools

- Early in the planning process to identify hazards
- Later in the planning process to assist with adaptation strategies

DIGITAL COAST
NOAA Coastal Services Center

Home | Data | Tools | Training | Approaches | In Action

Tools

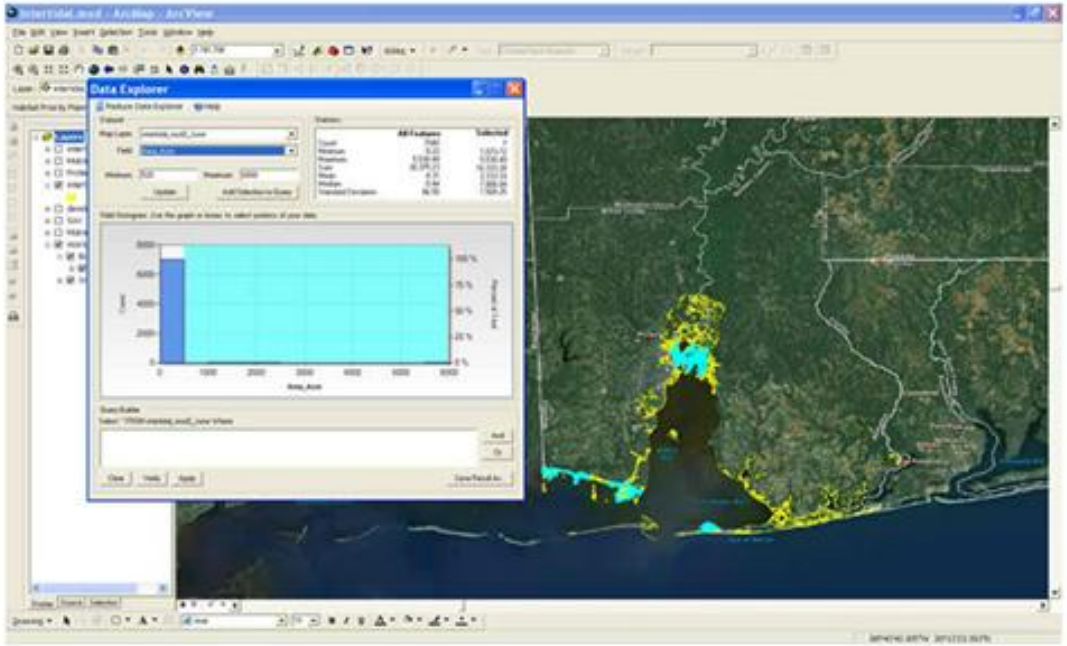
Habitat Priority Planner

NOAA Coastal Services Center

Overview | Requirements | In Action | Training | Support | Get It Now

Overview

This tool aids in making decisions about habitat conservation, restoration, and land use planning. The Habitat Priority Planner takes away much of the subjective nature of the process by providing a means of obtaining critical habitat analyses that are consistent, repeatable, and transparent. The program allows users to easily test various ideas and "what if" scenarios on the fly, making it the perfect tool to use in a group setting.



Features

Inventories specific habitat or land-use types relevant to the site in question

Assesses target habitat or land-use type conditions with a process that automates the pre-packaged spatial analysis metrics

Analyzes "what if" scenarios such as the impact of new development or how restoration might change overall habitat function; participants can quickly and easily set the parameters—and change them as needed

Gets people involved thanks to the fast, interactive environment this easy-to-use system provides

Creates maps, reports, and data tables to enhance communication and the decision-making process

http://www.csc.noaa.gov/digitalcoast/tools/hpp/

Habitat Priority Planner (HPP) Factsheet

- **Description:** Land-use decision tool
- **Cost:** None
- **Training/Time Requirements:** Intermediate GIS experience and a 1-day training course
- **Other Requirements/Notes:**
  - Requires Microsoft .NET and Microsoft .NET support for ArcGIS, ArcMap 9.2 or 9.3, and Spatial Analyst.
  - Raster or vector landcover data and other data layers required.

Climate Change Adaptation Planning Applications for HPP

Use HPP to:

- Identify present habitats and land-use types
- Examine effects of different land-use scenarios

http://www.arborengineering.com/land_use.html

Great Lakes HPP Case Studies

Great Lakes region watersheds selected for restoration projects:

- Buffalo River watershed
- St. Joseph River drainage basin

http://www.glc.org/raptest/clintriv.html

Buffalo River Watershed Management Project

Environmental concerns include:

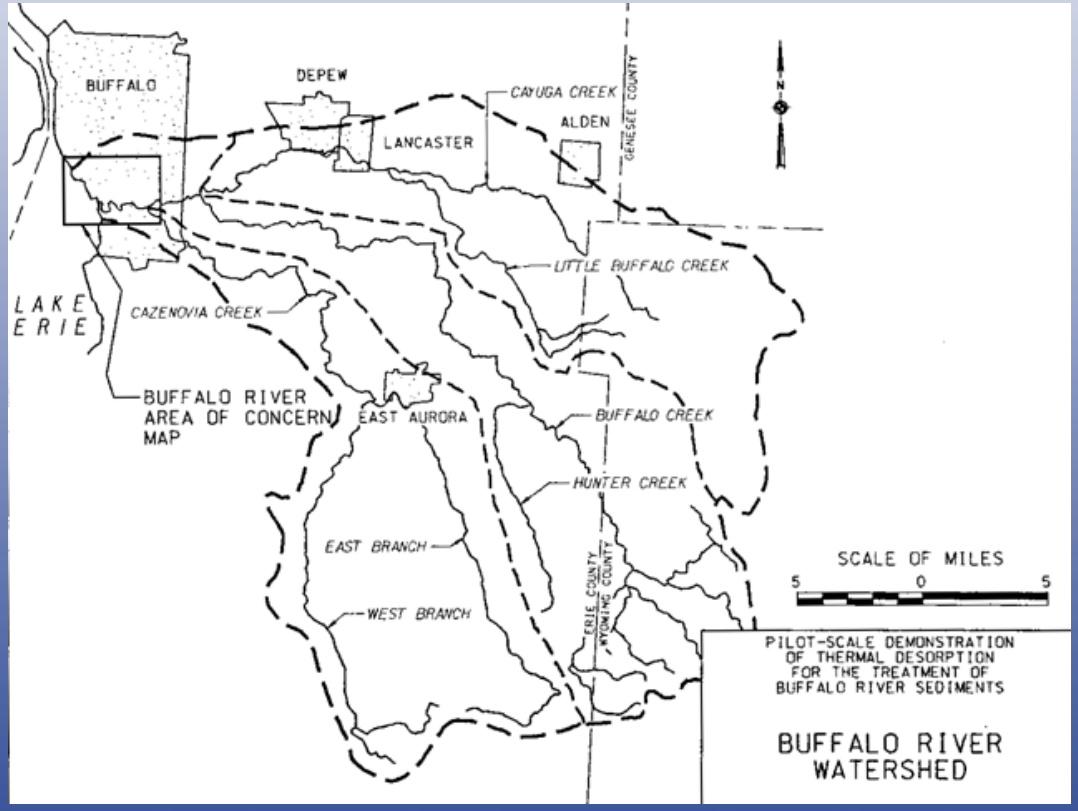
- Water quality
- Pollution
- Habitat degradation

http://bnriverkeeper.org/programs/buffalo-river-remedial-action-plan/issues-affecting-the-aoc/

Buffalo River Watershed Management Project

HPP identified:

- 1,416 acres of land suitable for wetland restoration
- 300 acres that could be converted to green space



http://www.epa.gov/greatlakes/arcs/EPA-905-R93-005/fig1.gif

St. Joseph River Habitat Restoration Project

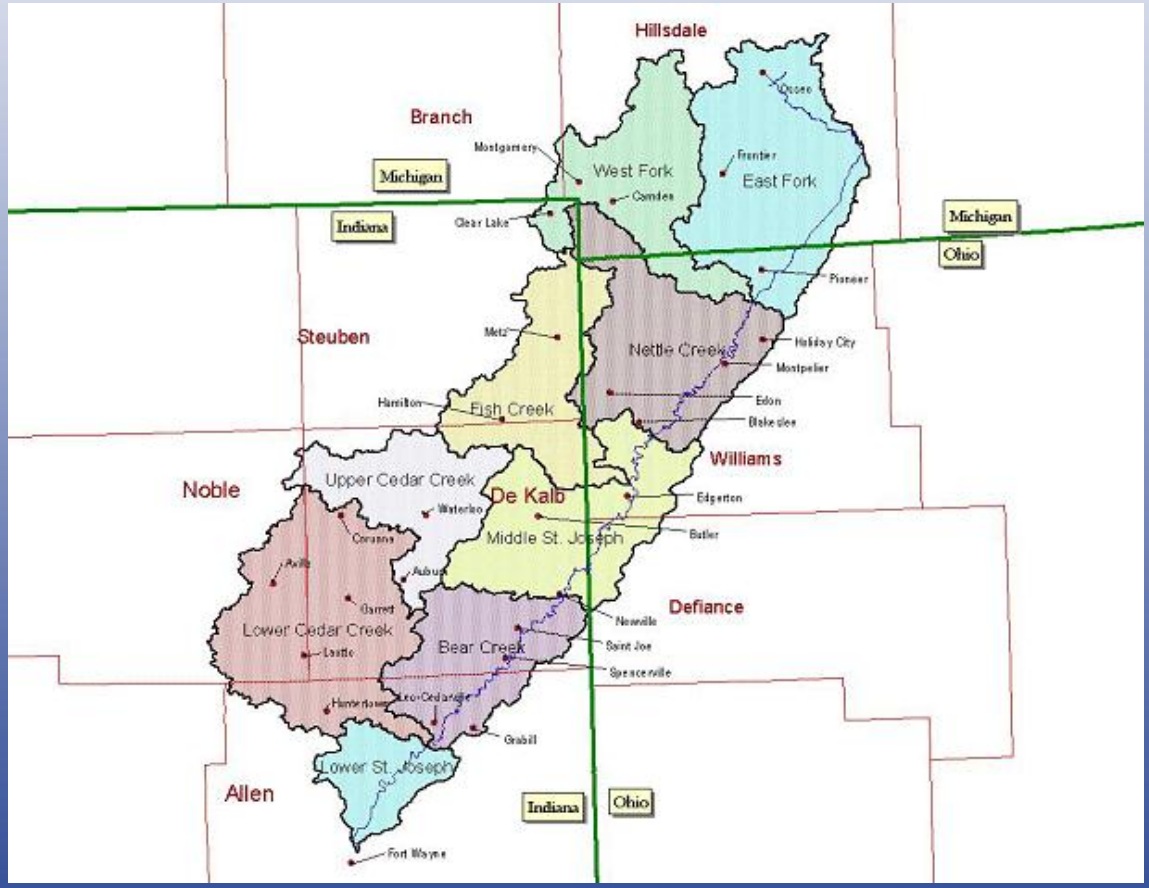
http://oceanservice.noaa.gov/education/kits/pollution/media/supp_pol06a.html

Environmental concerns:

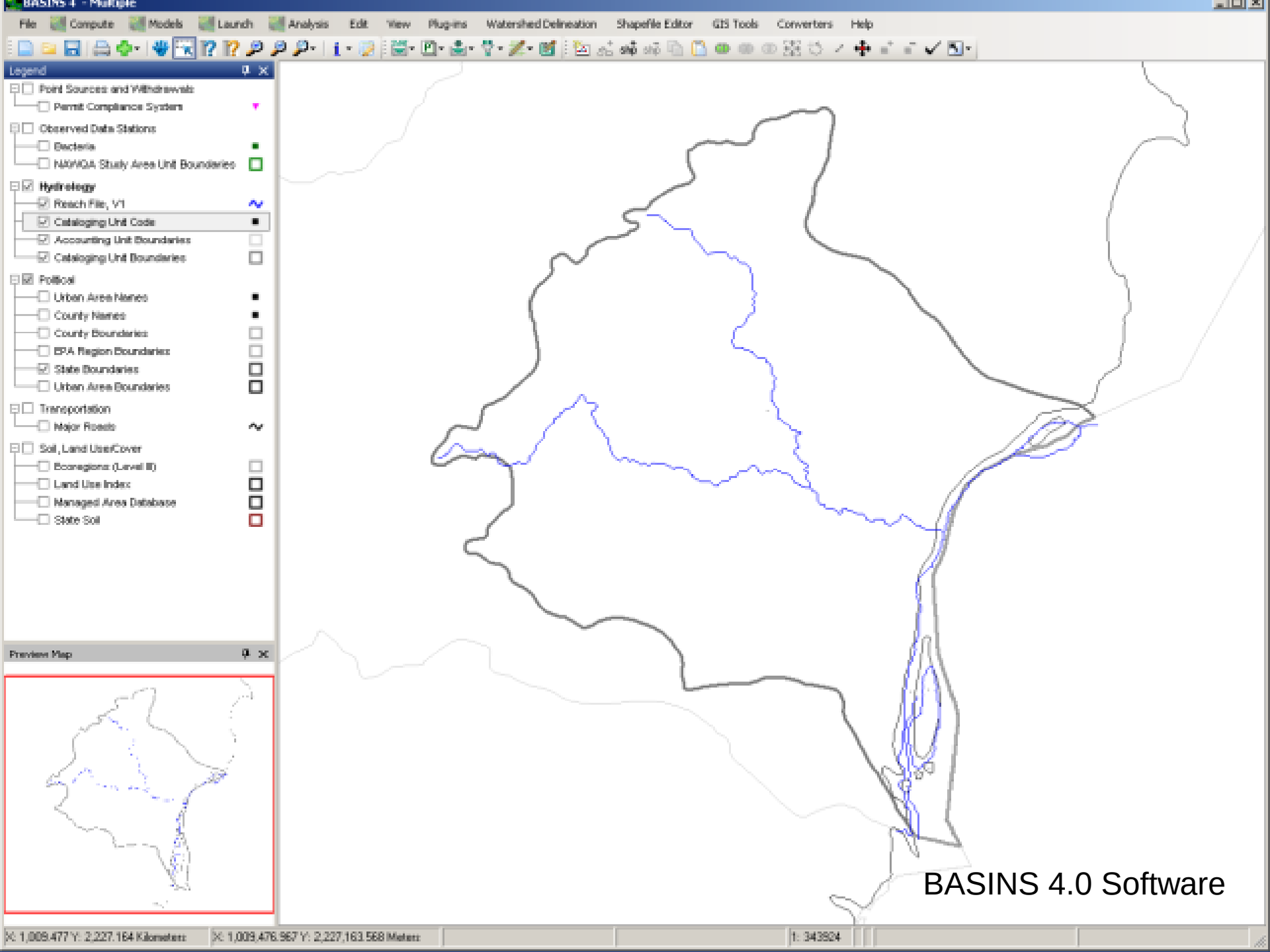
- High concentrations of herbicides
- Agricultural runoff

St. Joseph River Habitat Restoration Project

HPP identified 2,419 acres (out of 23,000) to target for wetland restoration



http://www.sjrwi.org/sites/default/files/images/1.gif


BASINS 4 - Multiple
File
Compute
Models
Launch
Analysis
Edit
View
Plug-ins
Watershed Delineation
Shapefile Editor
GIS Tools
Converters
Help
Legend
Point Sources and Withdrawals
Permit Compliance System
Observed Data Stations
Bacteria
NAWQA Study Area Unit Boundaries
Hydrology
Reach File, V1
Cataloging Unit Code
Accounting Unit Boundaries
Cataloging Unit Boundaries
Political
Urban Area Names
County Names
County Boundaries
EPA Region Boundaries
State Boundaries
Urban Area Boundaries
Transportation
Major Roads
Soil, Land Use/Cover
Ecoregions (Level III)
Land Use Index
Managed Area Database
State Soil
Preview Map
BASINS 4.0 Software

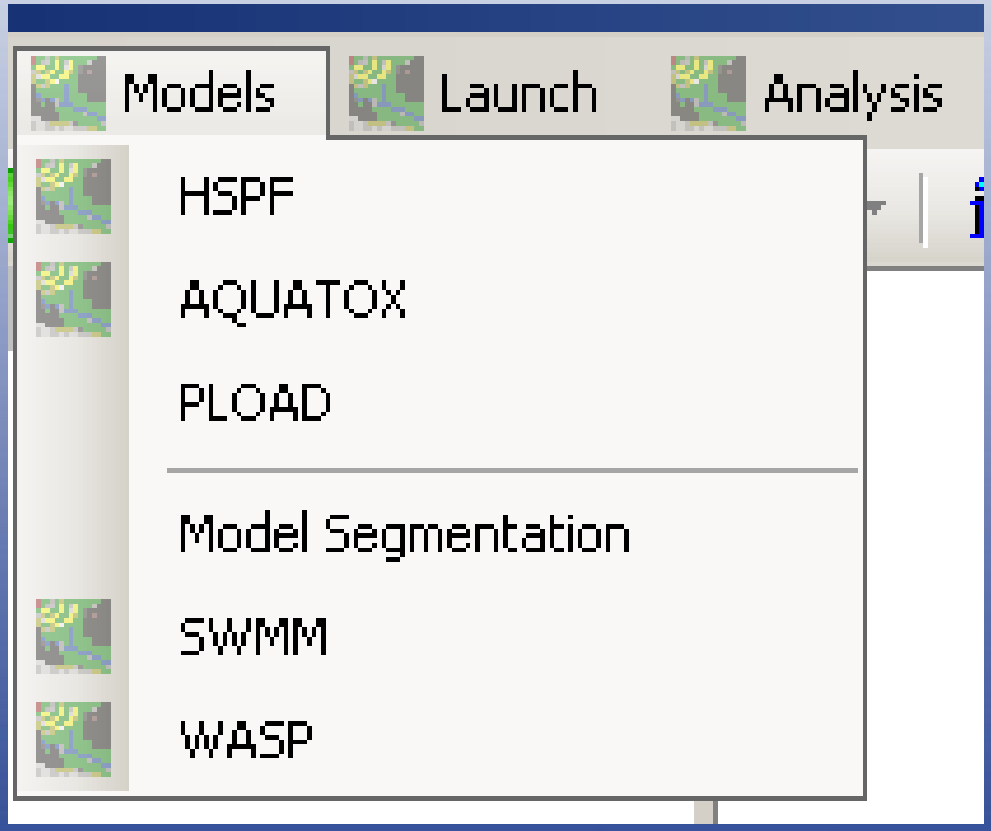
BASINS 4.0 Factsheet

- **Description:** Maps effects of climate change on watersheds
- **Cost:** Free
- **Training/Time:** 4.5-hour training session
- **Other requirements/Notes:**
  - Background experience (watershed hydrology and water quality)
  - ArcGIS experience recommended

BASINS Includes Many Models and Tools

Six watershed-related models:

- HSPF
- AQUATOX
- PLOAD
- SWMM
- WASP
- SWAT



Basins 4.0 Interface

BASINS 4.0
Climate Assessment Tool (CAT)

Use CAT to:

- Map climate change impacts
- Uncover how sensitive water systems may be to climate change

http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=203460

BASINS 4.0 Applications

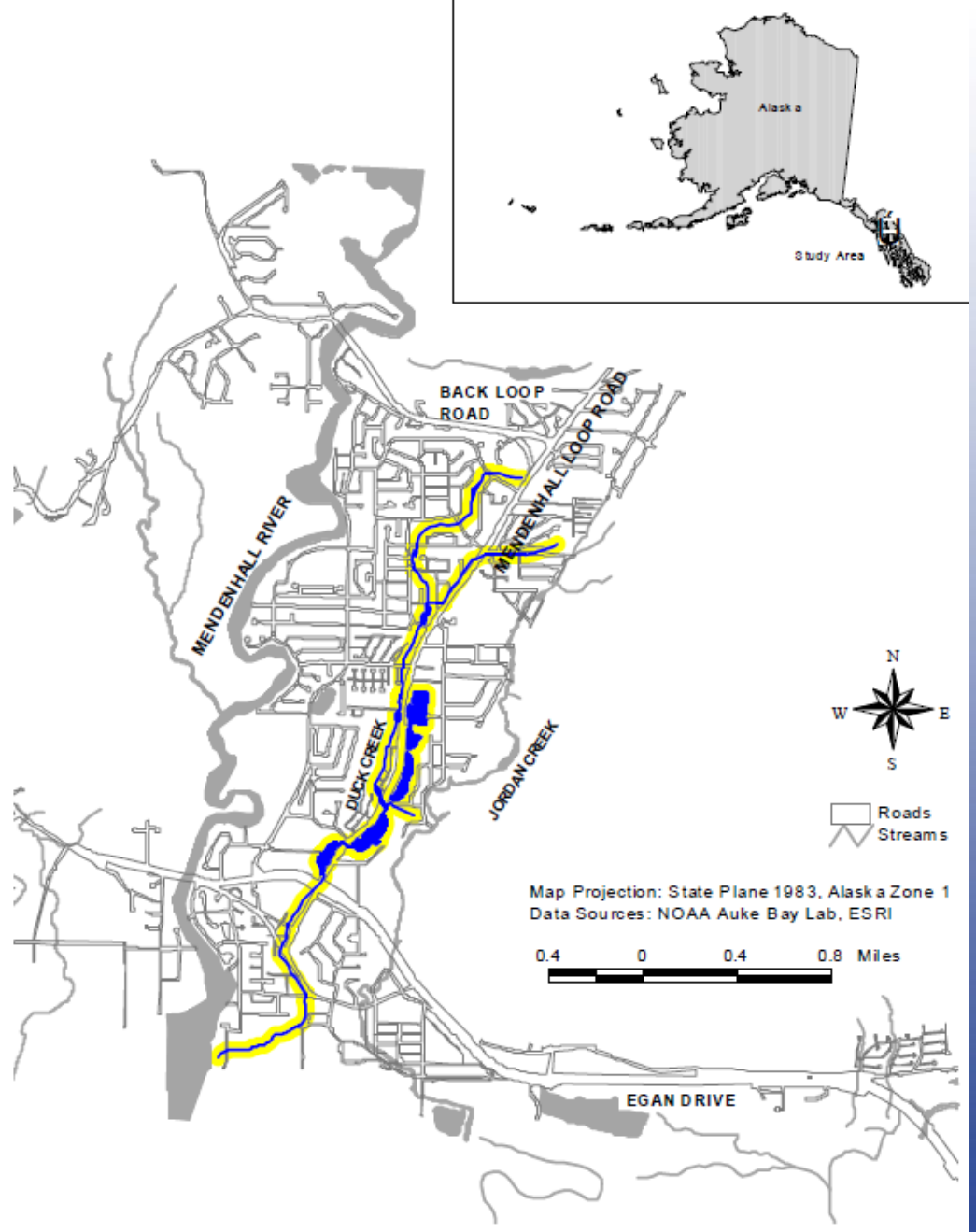
BASINS is applicable to the following categories:

- Stormwater management
- Flood hazard reduction
- Drought
- Air and water quality
- Ecosystem resilience

http://www.eng.auburn.edu/users/doughmp/LULC_tutorials/LULC-outline.htm

Case Study

BASINS's SWMM model was used in an EPA analysis of fecal coliform bacteria near Juneau, Alaska.



http://www.epa.gov/owow/tmdl/examples/pathogens/ak_duckcreek.pdf

Duck Creek

- Duck Creek is located in Juneau, Alaska
- Watershed has a high concentration of fecal coliforms and other pollutants

http://www.photolib.noaa.gov/htmls/r0003034.htm

Effects of Fecal Coliform Bacteria

Fecal coliforms in the water supply can cause:

- Water safety issues
- Increased transmission of diseases to humans

http://www.great-lakes.net/beachcast/bw_waterborne.html

Role of SWMM

- Selected to model urban runoff
- Used to establish a Total Maximum Daily Load (TMDL)

Recommendations

- Reduce fecal coliform levels 38%
- Add a monitoring program
- Implement other recommendations

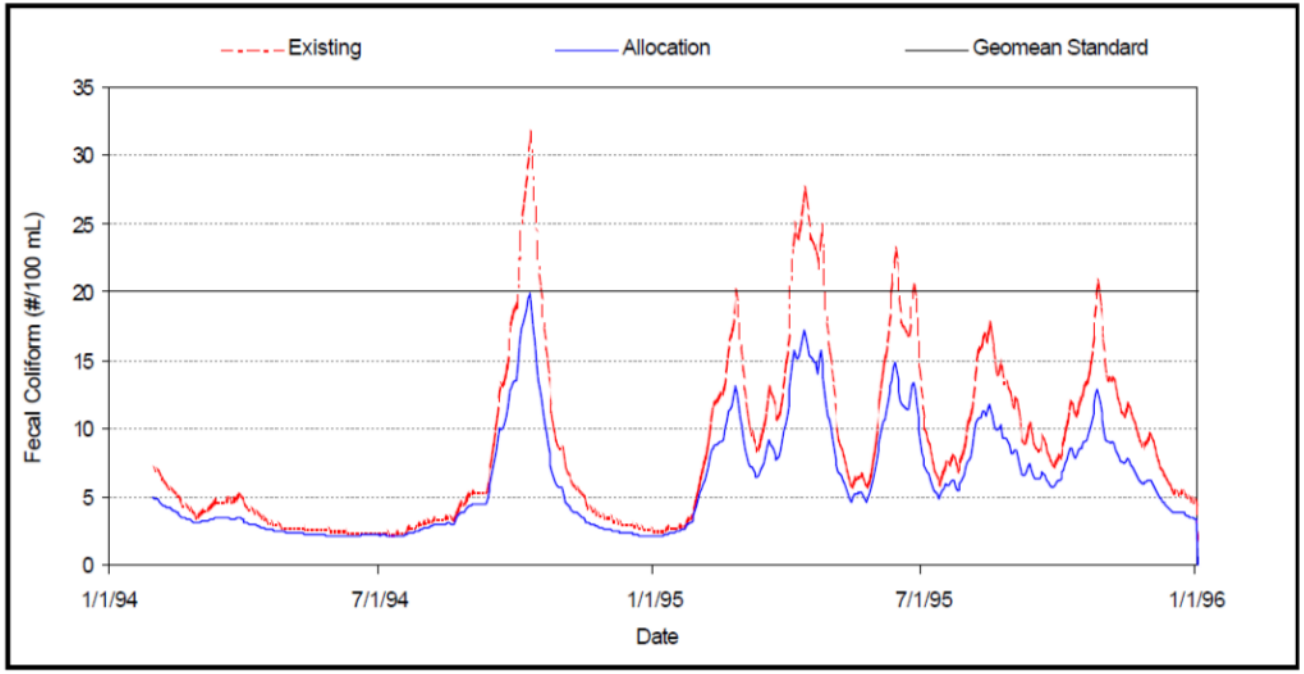


Figure 4. Existing conditions and allocation scenarios for Duck Creek

http://www.epa.gov/owow/tmdl/examples/pathogens/ak_duckcreek.pdf

Additional Analysis Tools and Systems

- CITYgreen
- Coastal Ecosystem Restoration
- Roadmap to Adapting to Coastal Risk
- FEMA HAZUS
- i-Tree v3.0
- Impervious Surface Analysis Tool
- NatureServe Vista
- Nonpoint-Source Pollution and Erosion Comparison Tool (N-SPECT)

http://www.itreetools.org/

http://www.natureserve.org/

Other Informational Websites

This category includes a wide variety of websites—ranging in topic from hydrology to endangered species to climate information.

Applications for Climate Change Adaptation Planning

Informational websites:

- Provide supplementary information throughout the process
- Supply background information

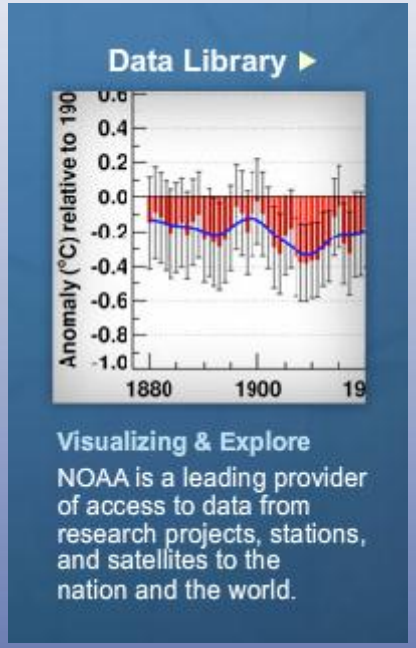
NOAA Climate Services Portal

http://www.climate.gov/#climateWatch

NOAA Climate Services Portal Factsheet

- **Description:** Website provides information related to climate change
- **Cost:** None
- **Training/Time Requirements:** None
- **Other Requirements/Notes:** None

Data and Services



http://www.climate.gov/#dataServices

Data & Services tab has information on:

- Past, present, and possible future climates
- Climate-related data
- NOAA partners
- Climate data usage

Understanding Climate

http://www.climate.gov/#understandingClimate

Climate Education

Education Sections

Teaching Resources

Student activities, interactive tools, labs and lesson plans present climate science. Lessons are correlated to education standards.

Professional Development

Professional development opportunities to support educators in learning about climate.

Multimedia

Movies, visualizations, multimedia galleries, interactive media and educational games about climate science.

Education Purpose

"To protect fragile ecosystems and to build sustainable communities that are resilient to climate change - including extreme weather and climate events - a climate-literate citizenry is essential"

- Climate Literacy, 2009

http://www.climate.gov/#education

Climate Change Adaptation Planning Applications

How is the NOAA Climate Services Portal useful for climate change adaptation planning? It will help you:

- Find information on climate change
- Get in touch with human resources

Additional Informational Websites

- LakeSuperiorDuluthStreams.org
- NatureServe
- NOAA State of the Coast
- NOAA Coastal Climate Adaptation

http://oceanservice.noaa.gov/websites/retiredsites/supp_sotc_retired.html

http://www.lakesuperiorstreams.org/

Visualization Tools

Tools that help users envision how decisions or changes may affect the environment, climate, or other factors.

Climate Change Adaptation Planning Applications

- Visualize scenarios and alternatives
- Communicate development and construction plans
- Assist with training
- Market new programs
- Assist designers in making decisions

CanVis 2.3 - [Wetland]

File Edit View Area Object Tools Library Window Training Help

NOAA Coastal Services Center

LINKING PEOPLE, INFORMATION, AND TECHNOLOGY

NUM

CanVis 2.3 Factsheet

- **Description:** Software that creates a visual of landscape changes
- **Cost:** Free
- **Training/Time Requirements:** 3-hour virtual training seminar
- **Other Requirements/Notes:** None

CanVis: User Friendly

- Users can upload photos or use the image gallery.
- Coastal object library is easily downloaded.
- Training and help videos are free and easy to understand.

Caveats about CanVis

- Mark altered photos
- Be aware that this is not a modeling program
- Use credible images and information
- Keep photos in larger context

Climate Change Adaptation Planning for CanVis

Many scenarios can be visualized, including:

- Fluctuations in lake levels
- Movement of invasive plants (as a result of temperature increases)
- Changes to infrastructure (e.g., buildings, green spaces, walking and biking areas)

CanVis: Visualization Tool

AFTER

Wendy Park (Cleveland, Ohio)

http://www.csc.noaa.gov/digitalcoast/tools/canvis/

http://www.csc.noaa.gov/digitalcoast/tools/canvis/

Additional Visualization Tools

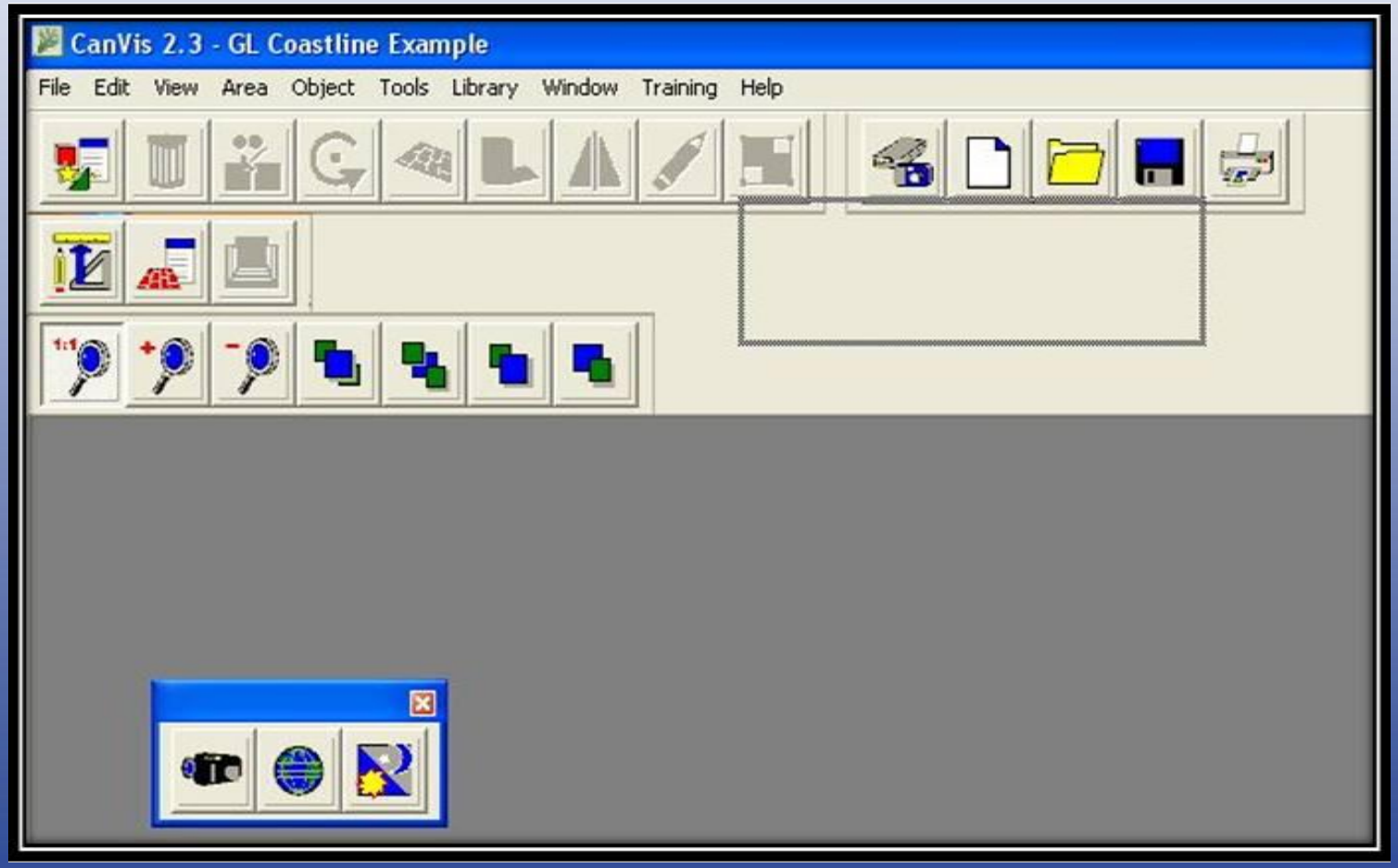
- Visualizing coastal erosion
- Climate Wizard

ClimateWizard

CanVis 2.3

Tool Demonstration

Getting Started: First View of Program



Selecting an Image

http://www.epa.gov/greatlakes/image

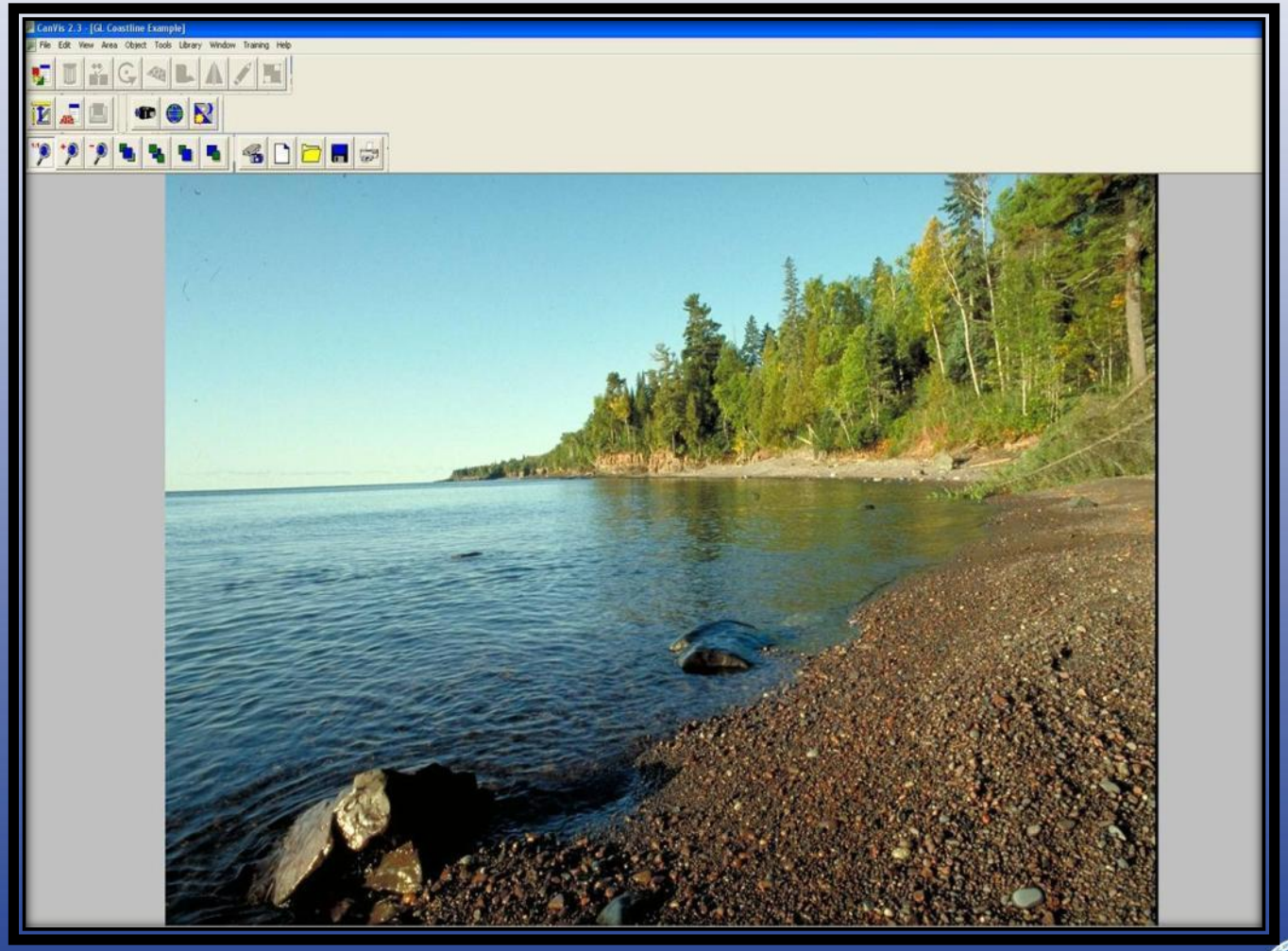
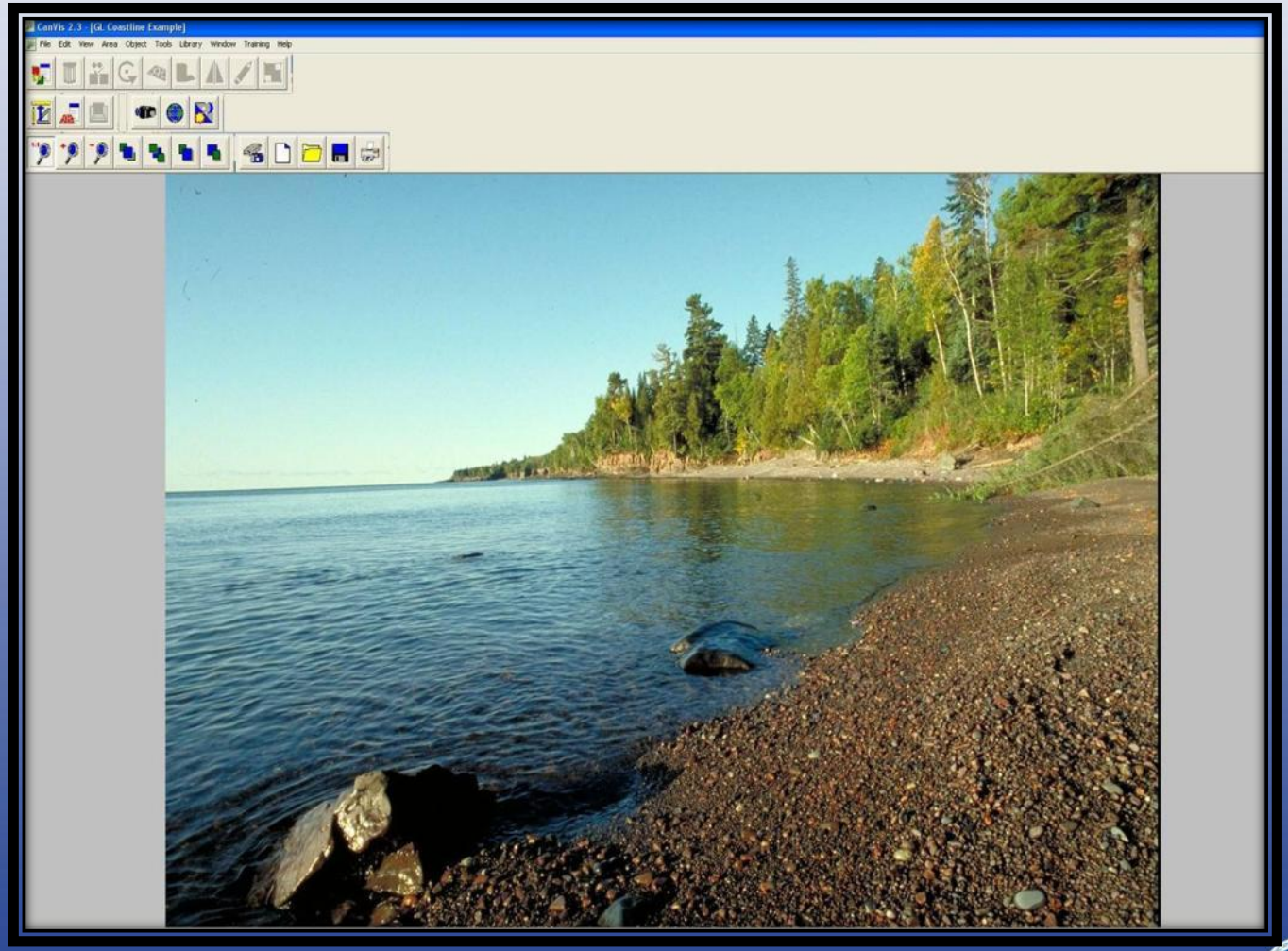
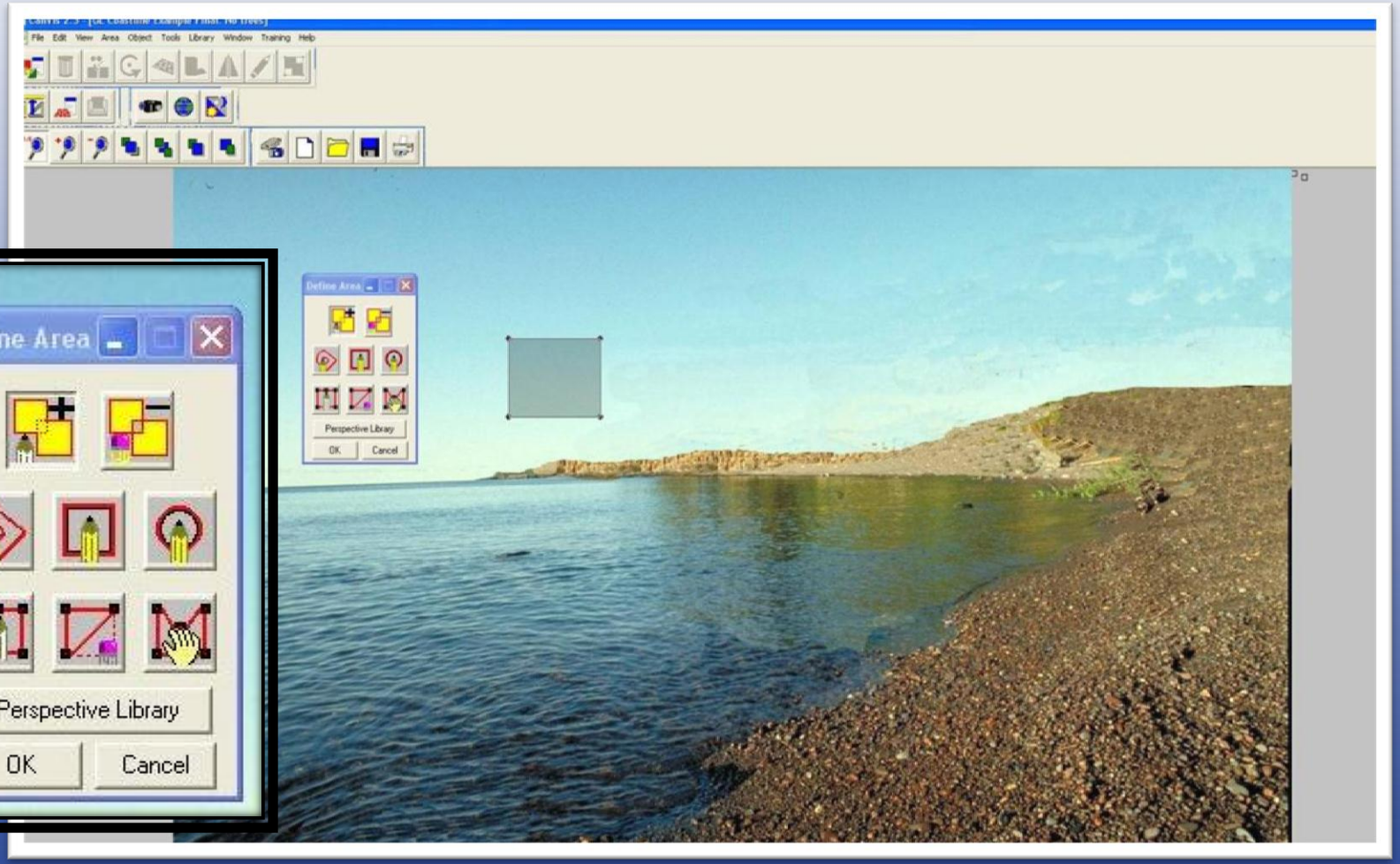


Photo Alterations



Background Photo with Rocks Removed: Clone Box Displayed

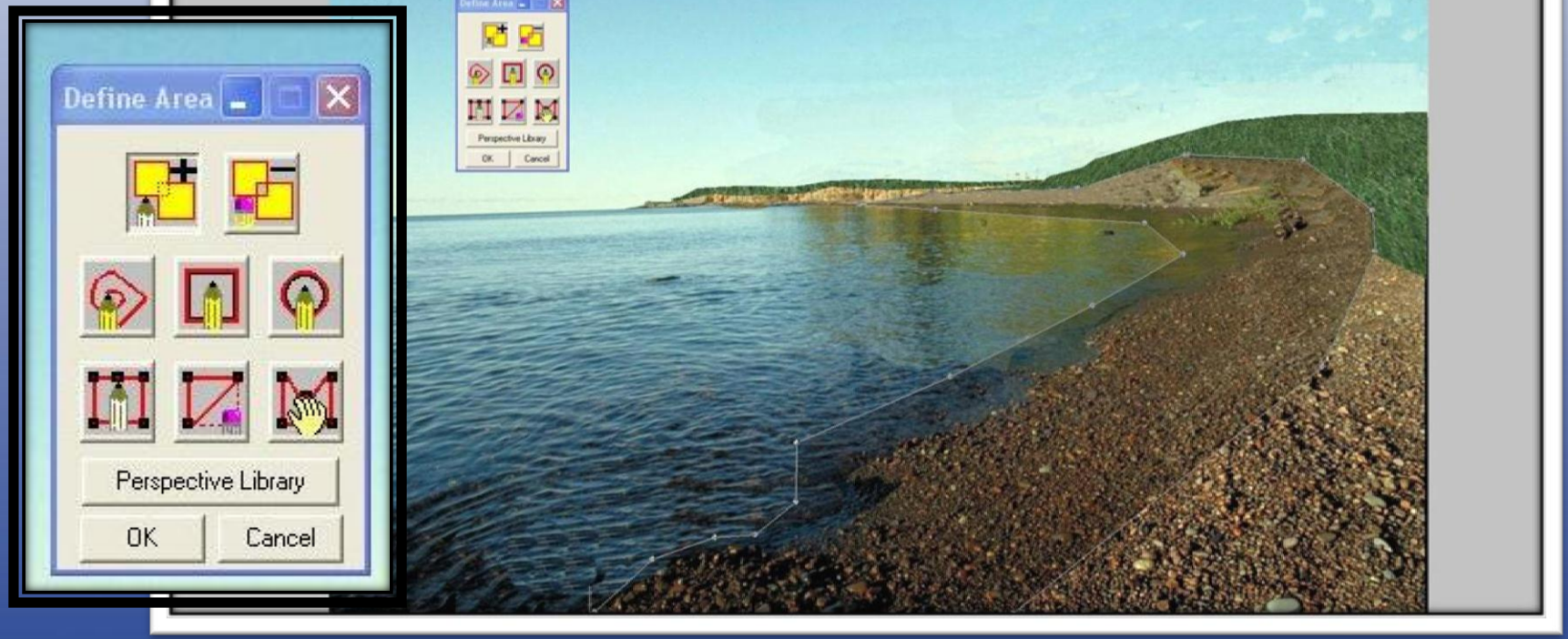
Define Area Tool



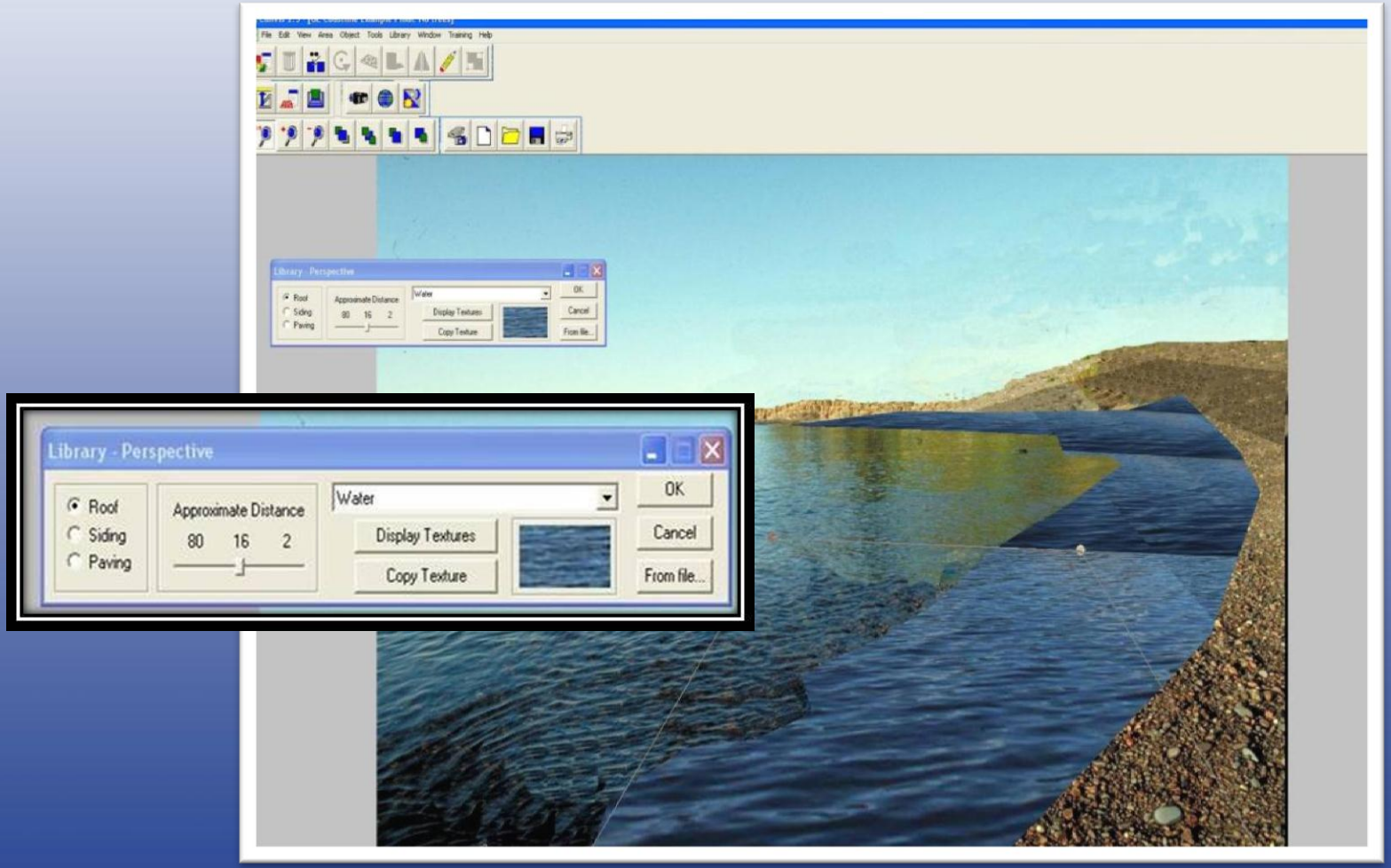
Textures

1. Identify the areas that need to be a different texture (such as pavers, groundcover, and sod)
2. Complete four steps in CanVis:
   - Define an area
   - Fill with texture
   - Add perspective
   - Adjust scale

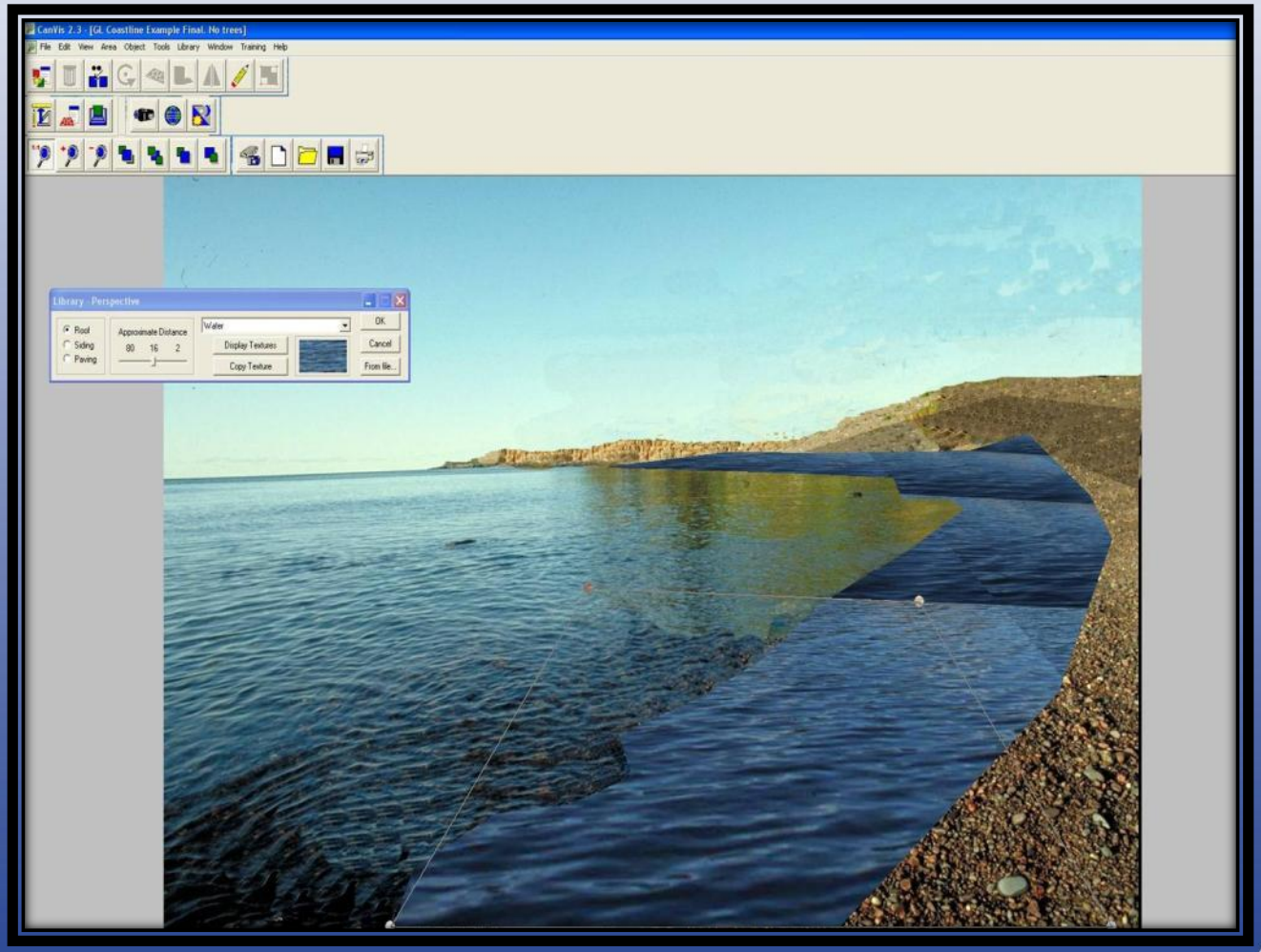
Define Area



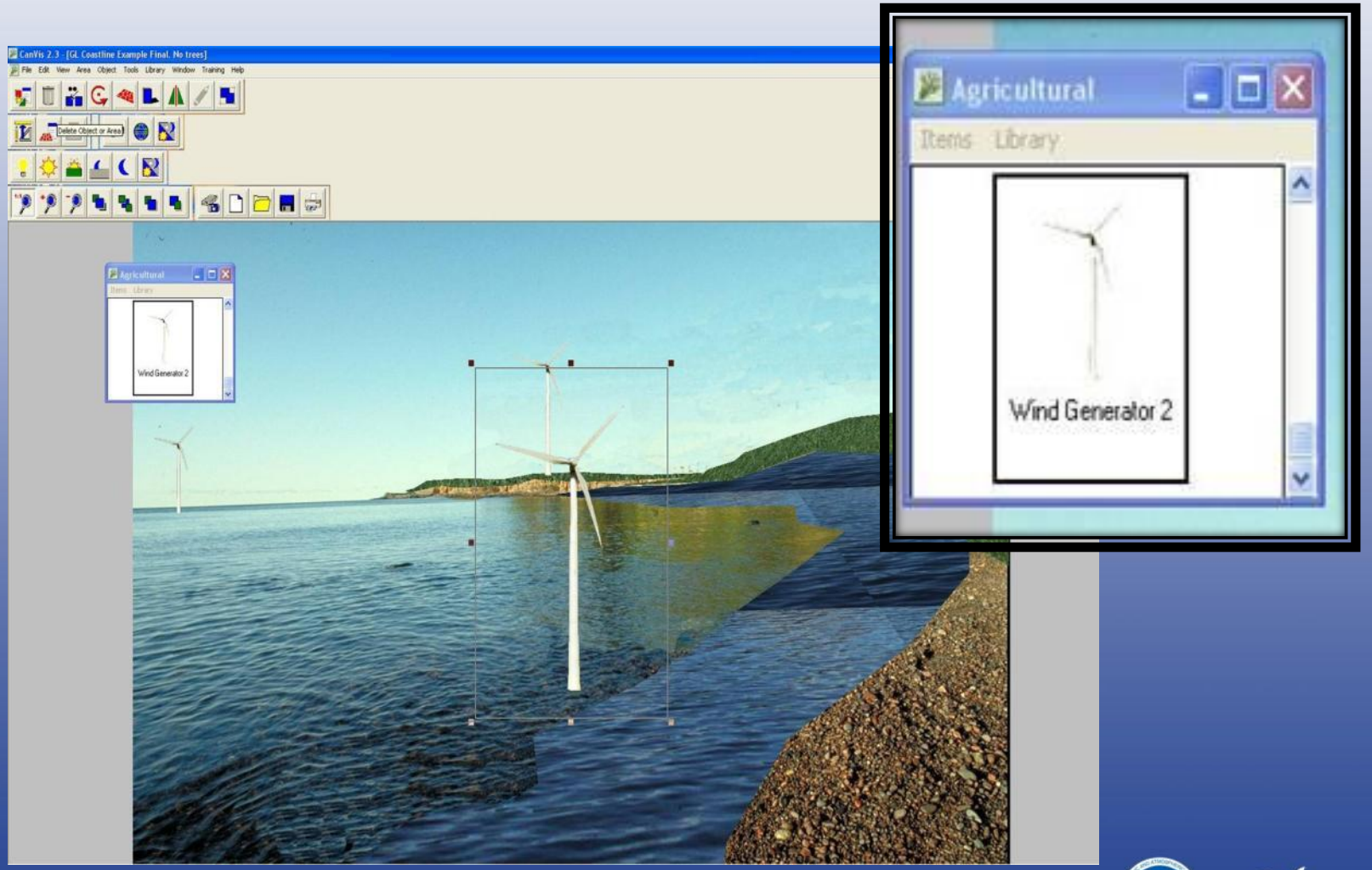
Add Texture

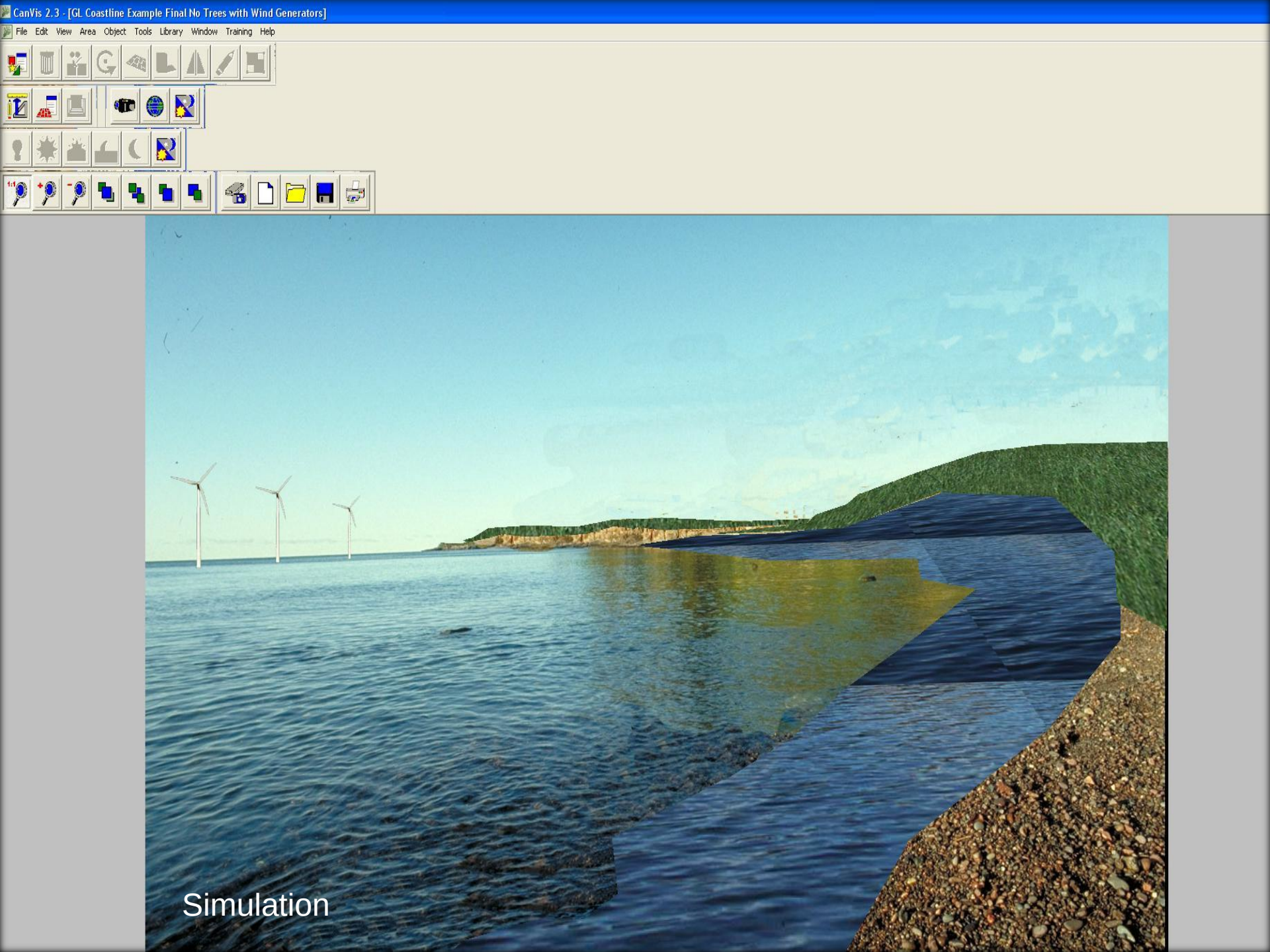

Library - Perspective
Roof
Siding
Paving
Approximate Distance
80 16 2
Water
Display Textures
Copy Texture
OK
Cancel
From file...

Perspective and Scale



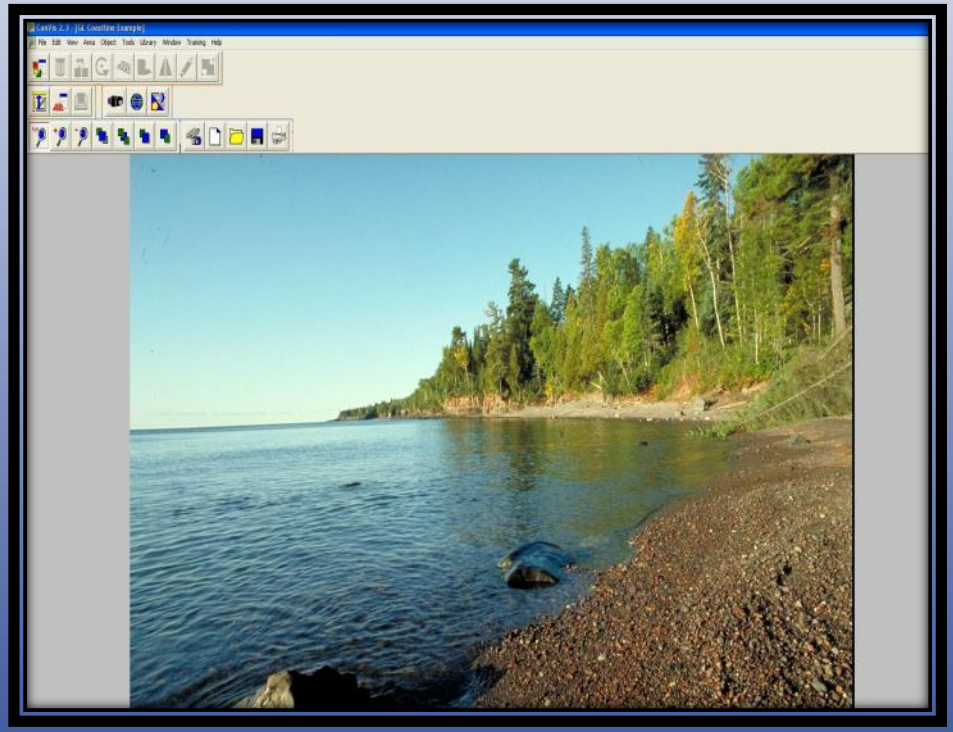
Adding Objects

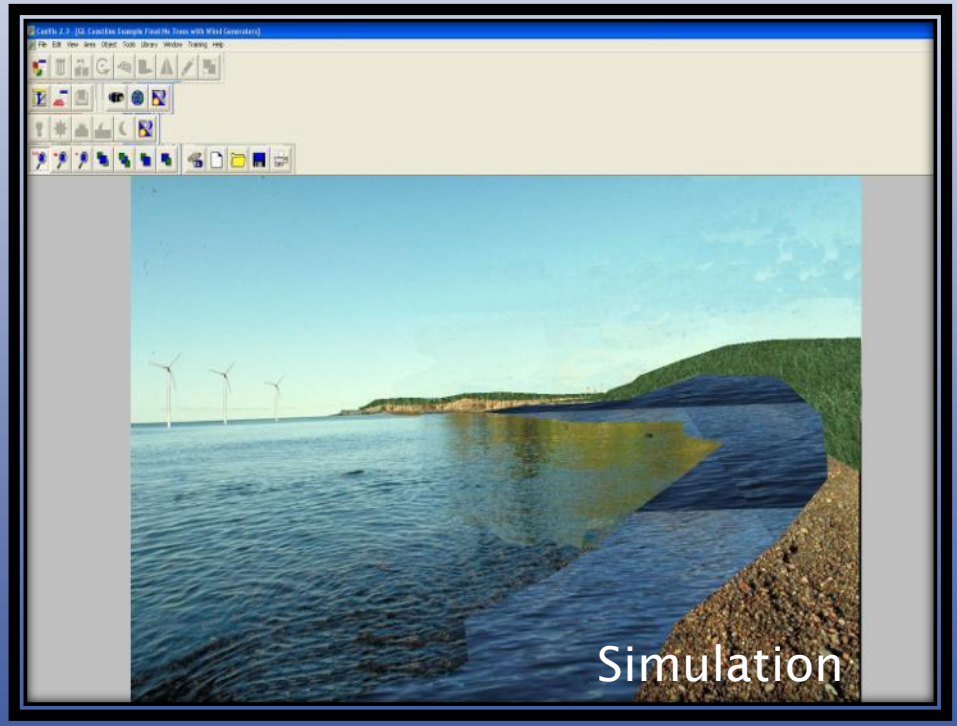



CanVis 2.3 - [GL Coastline Example Final No Trees with Wind Generators]
File Edit View Area Object Tools Library Window Training Help
Simulation

Original Image

New Image





Apply What You've Learned

Module 3 Take Away Points

http://www.epa.gov/greatlakes/image/vbig/8.jpg

Recap

- Choosing a tool
- Using tools effectively
- Reviewing available tools

Climate Ready Great Lakes Module 3:
How do I choose the right tool?

1. Define the Goal/objective that you are trying to achieve. Below write an adaptation goal that is relevant to your specific locality. How does this relate to other adaptation efforts in your city?

   Goal:

   Relation to other adaptation efforts:

2. Review the climate impacts spreadsheet. Write down the tools that can assist with the climate impact that you are trying to mitigate. List the category next to each tool. Later, you will be able to determine the appropriate use for the tools that you selected.

Climate Impact	Tool Name

Tool Selection Worksheet

Choosing a tool to fit your needs:

- Define your goal
- Identify climate impacts
- Determine required resources