

# Climate Ready Great Lakes



## 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



# Climate Ready Great Lakes

## 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.

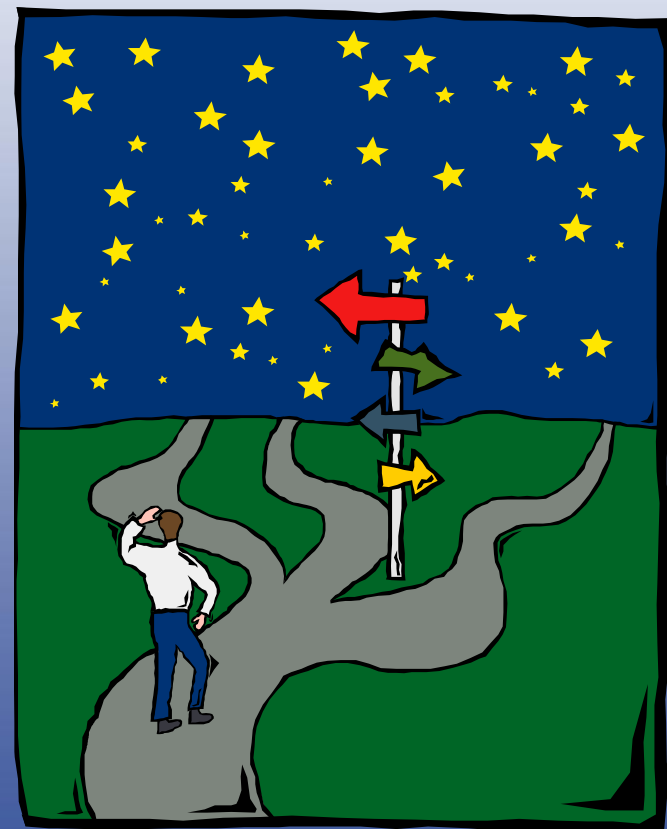


# Why use tools for adaptation planning?

- 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

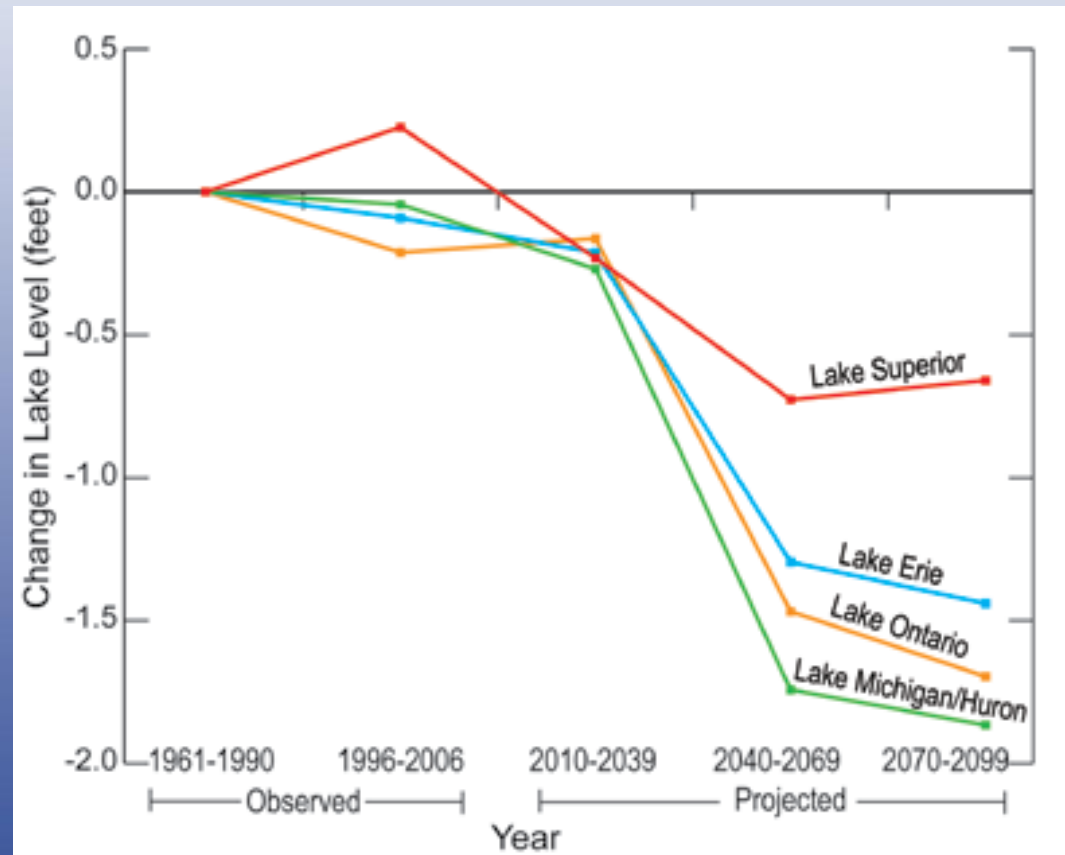


- What outcome are you trying to achieve?
- How does this goal fit into existing plans and objectives for your area?

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

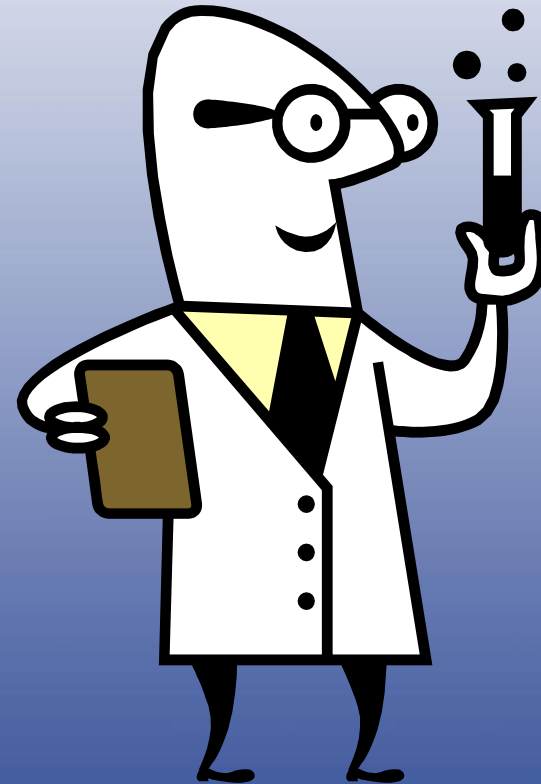




# Using Tools Effectively

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

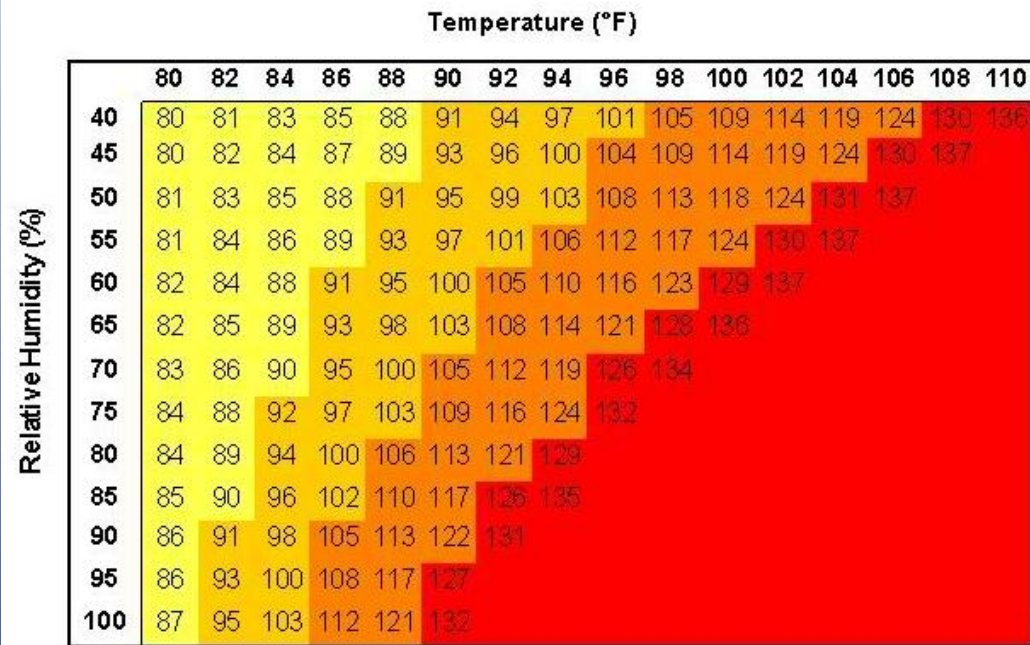
1. Read the user manual
2. Consider additional resources, including:
  - Training on the tool creator's website
  - Training that may accompany software
  - Training offered through other organizations
  - Getting in touch with contacts listed on the website

# 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

## NOAA's National Weather Service Heat Index



Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution Extreme Caution Danger Extreme Danger

<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





# Climate Ready Great Lakes

## 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.

# NEIGHBORHOOD CLIMATE ACTION PLANNING

PSU urban planning graduate students are partnering with Southeast Uplift to create a climate action planning guide for SE Portland neighborhoods.

The guide will include recommendations for ways different types of neighborhoods can develop and implement carbon reduction strategies. Join the process!



## SHARE IDEAS OPEN HOUSE

Only you know what works best in your community!



Can you help us think of strategies to address climate change in your neighborhood?



For more information, contact Erica at ejtim16@gmail.com

**THURSDAY, APRIL 23, 2009**

**DROP IN: 6-9 P.M.  
PRESENT: 7 P.M.**

**SOUTHEAST UPLIFT  
3534 SE MAIN ST**

## Community Outreach Adaptation Planning Applications

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

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





### 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://wta.com/local/sea-level-2-925686.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*



<http://maryland.coastsmart.org/>



# 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

### 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

Cost to County

Score

"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

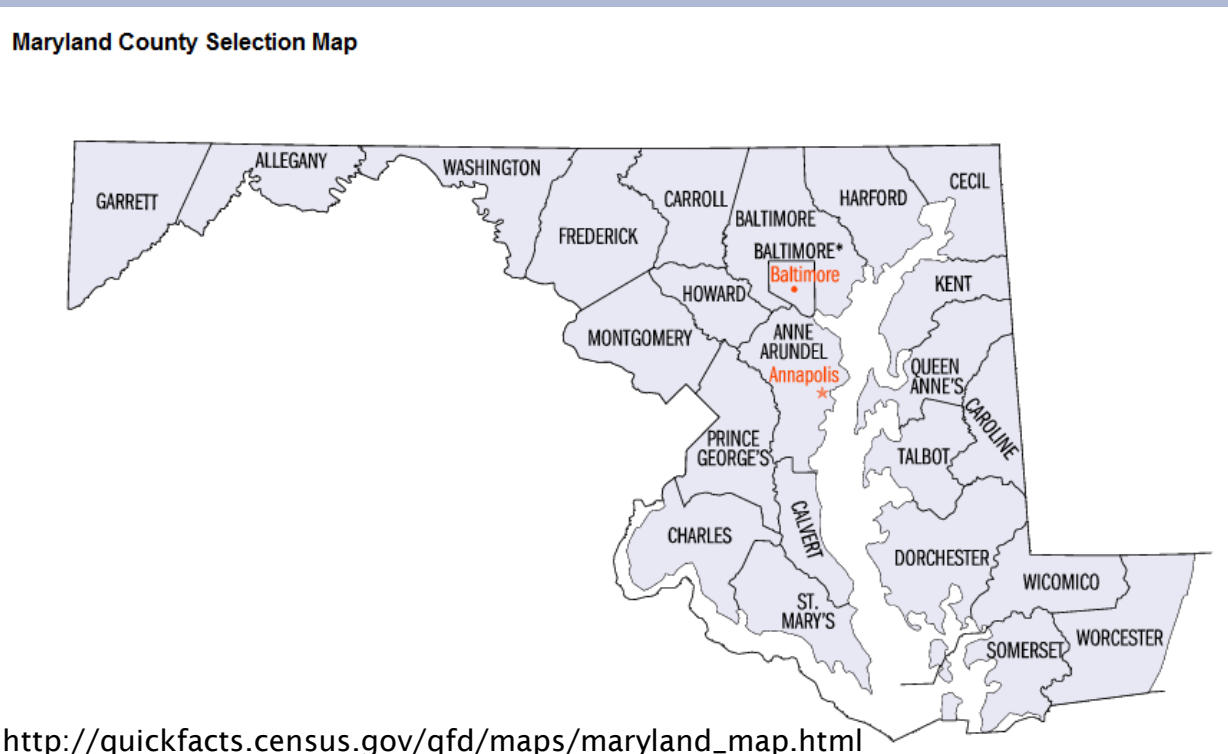
How can the role-play exercise be incorporated in climate change adaptation planning?

- Community involvement
- Stakeholder participation
- Community discussion



# Case Study: Annapolis, MD

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





# Climate Change on the Maryland Coasts



Possible climate change impacts for the salty coasts:

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

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

# 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

## Environmental Planning for Small Communities

A Guide for Local Decision-Makers

<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







## 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:  Filter by Delivery Type:

### Geospatial Training

Classroom-based instruction for core geospatial skills



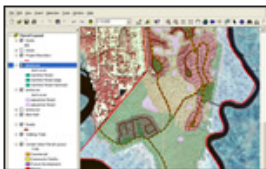
#### [Assessing GIS for your Organization](#)

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)


**Coastal Change Analysis Program Regional Land Cover**  
NOAA Coastal Services Center

Overview Details In Action Support Get It Now

**Overview**  
The Coastal Change Analysis Program (C-CAP) produces a nationally standardized database of land cover and land change information for the coastal regions of the U.S. C-CAP products provide inventories of coastal intertidal areas, wetlands, and adjacent uplands with the goal of monitoring these habitats by updating the land cover maps every five years. C-CAP products are developed using multiple dates of remotely sensed imagery and consist of raster-based land cover maps for each date of analysis, as well as a file that highlights what changes have occurred between these dates and where the changes were located.

NOAA also produces [high resolution C-CAP land cover products](#), for select geographies. These products focus on bringing NOAA's national mapping framework to the local level, by providing complimentary data, at a more detailed resolution to complement regional C-CAP land cover.

1972 1986 1990 1995 2000

An aerial photograph of a coastal area with various land cover overlays. The overlays are color-coded: green for forest, yellow for agriculture, blue for water, and purple for urban/developed areas. The map shows a coastline with a river or estuary system. The overlays indicate changes in land cover over time, with the most recent data (2000) showing significant urban development along the coast.

<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





[Home](#) [About EBM](#) [About EBM Tools](#) [Tool FAQs](#) [Webinars](#) [Tool Training](#) [Listserve](#) [About Us](#)  
[Contact Us](#)

### Find EBM Tools

[Search the tools database](#)

### Network Updates

[Sign up for Network updates](#)

### Latest News and Funding Opportunities

[Job Opportunity: Lead Software Developer for the Natural Capital Project in Palo Alto, California at Stanford University](#)

[Conservation Leadership Programme Conservation Awards. Applications due November 15, 2010.](#)

[Inter-American Development Bank Multilateral Investment Fund Request for Proposals Submissions due December 1, 2010](#)

[NOAA Regional Ocean Partnership Funding for Coastal and Marine Spatial Planning. Proposals due December 10, 2010.](#)

Human activities on land and in the ocean are changing coastal and marine ecosystems and threatening their ability to provide important benefits to society, such as healthy and abundant seafood, clean beaches, and protection from storms and flooding. Ecosystem-Based Management (EBM) is an innovative management approach to address these challenges. It considers the whole ecosystem, including humans and the environment, rather than managing one issue or resource in isolation. [Learn more about EBM.](#)

EBM tools are software or other highly documented methods that can help implement EBM by:

- Providing models of ecosystems or key ecosystem processes.
- Generating scenarios illustrating the consequences of different management decisions on natural resources and the economy.
- Facilitating stakeholder involvement in planning processes.

Learn more about:

- [Different types of EBM tools.](#)
- [Questions projects should answer as they think about tool use.](#)
- [Best practices for using tools.](#)

The EBM Tools Network is an alliance of EBM tool users, providers, and researchers to promote the use and development of EBM in coastal and marine environments and the terrestrial environments that affect them (watersheds). [Learn more about the EBM Tools Network.](#)

### Search the website

[Search](#)

### Upcoming Events

[Presentation on the Creating Resilient Communities EBM Tool Demonstration Project by Jocelyn Hittle of PlaceMatters](#)

Date: Wednesday, November 17, 2010

[Demonstration of CanVis by Chris Haynes of NOAA Coastal Services Center](#)

Date: Tuesday, December 14, 2010

[Demonstration of Ecosystem Assessment and Reporting Tool by Steve Schill of The Nature Conservancy](#)

Date: Thursday, January 27, 2011

<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](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



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



<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.





About the photos (©Mahan)

## Maps and GIS Topics



### Great Lakes GIS Data

[By Topic](#)

[By Geography](#)

[By Organization](#)

[By Upload Date](#)

[>> Publish Spatial Data](#)

### Map Explorer

[Lake Huron](#)

[Lake Ontario](#)

[Lake Michigan](#)

[Lake Erie](#)

[Lake Superior](#)

[Lake St. Clair](#)

[>> Build Your Own Map](#)

### Map Gallery

[Images to Download](#)

[Other Images](#)

### Connect

[GLIN GIS FAQ](#)

[Feedback/Contact](#)

## GLIN Maps & GIS

Welcome, guest [\[login\]](#) [\[register\]](#)

[Overview](#) | [Regional GIS Data](#) | [Map Explorer](#) | [Map Gallery](#) | [Questions/comments](#)

### Overview

Geographic Information Systems (GIS) is a term used to describe the creation, manipulation, analysis, and storage of spatial data. This technology integrates common database operations such as query and statistical analysis with geographic data through visualization and maps. These attributes distinguish GIS from other information systems and make it valuable for exploring options, explaining results, and deciding strategies.



Source: SeaWiFS Project, NASA/FSFC, and GeoEye

<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.

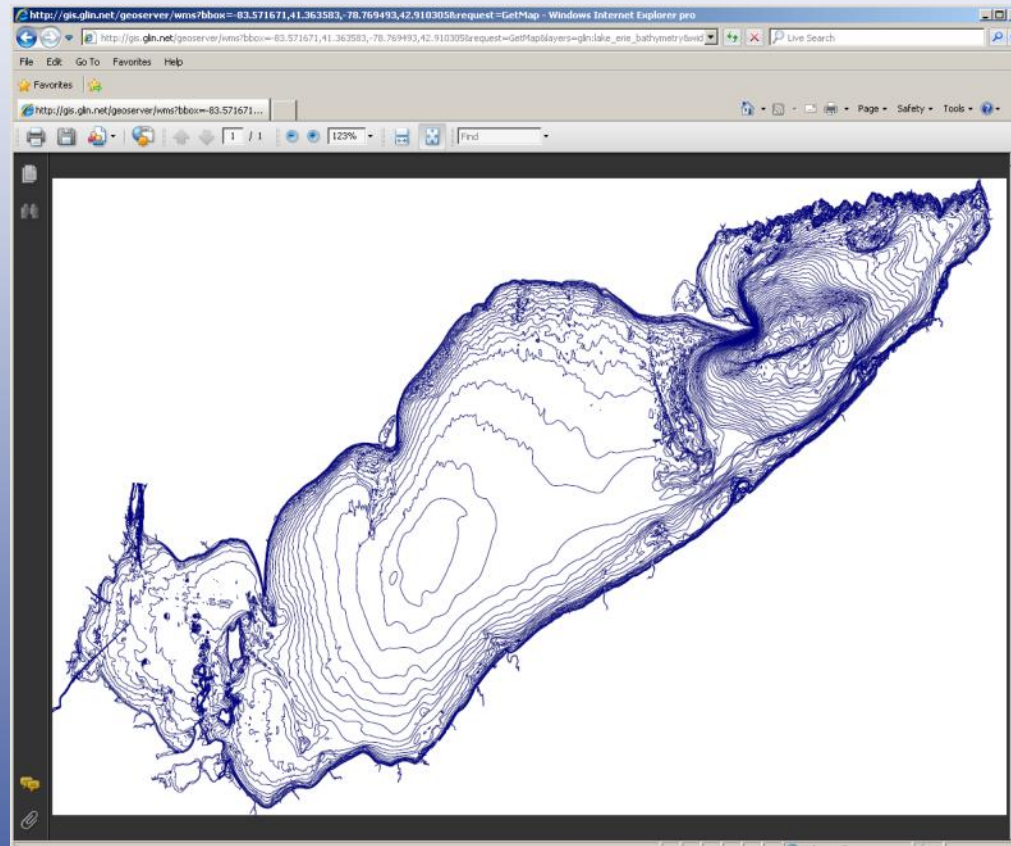




# Great Lakes GIS Data

GIS data can be:

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



## 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 \(.kmz\)](#)

[http://gis.glin.net/ogc/services.php?by=topic#lake\\_erie\\_bathymetry](http://gis.glin.net/ogc/services.php?by=topic#lake_erie_bathymetry)

# Map Explorer



# Map Gallery





# GLIN Adaptation Planning Applications

GLIN provides data that is:

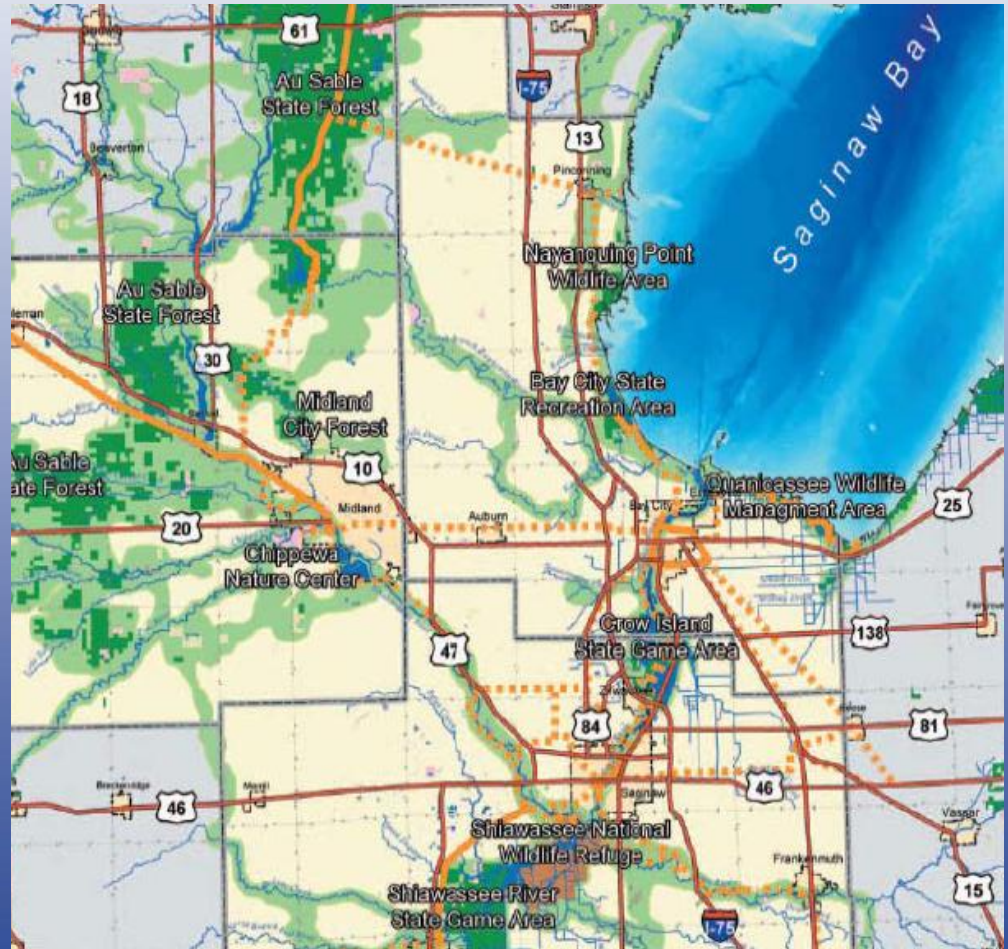
- Trusted
- Reliable
- Specific to the Great Lakes region

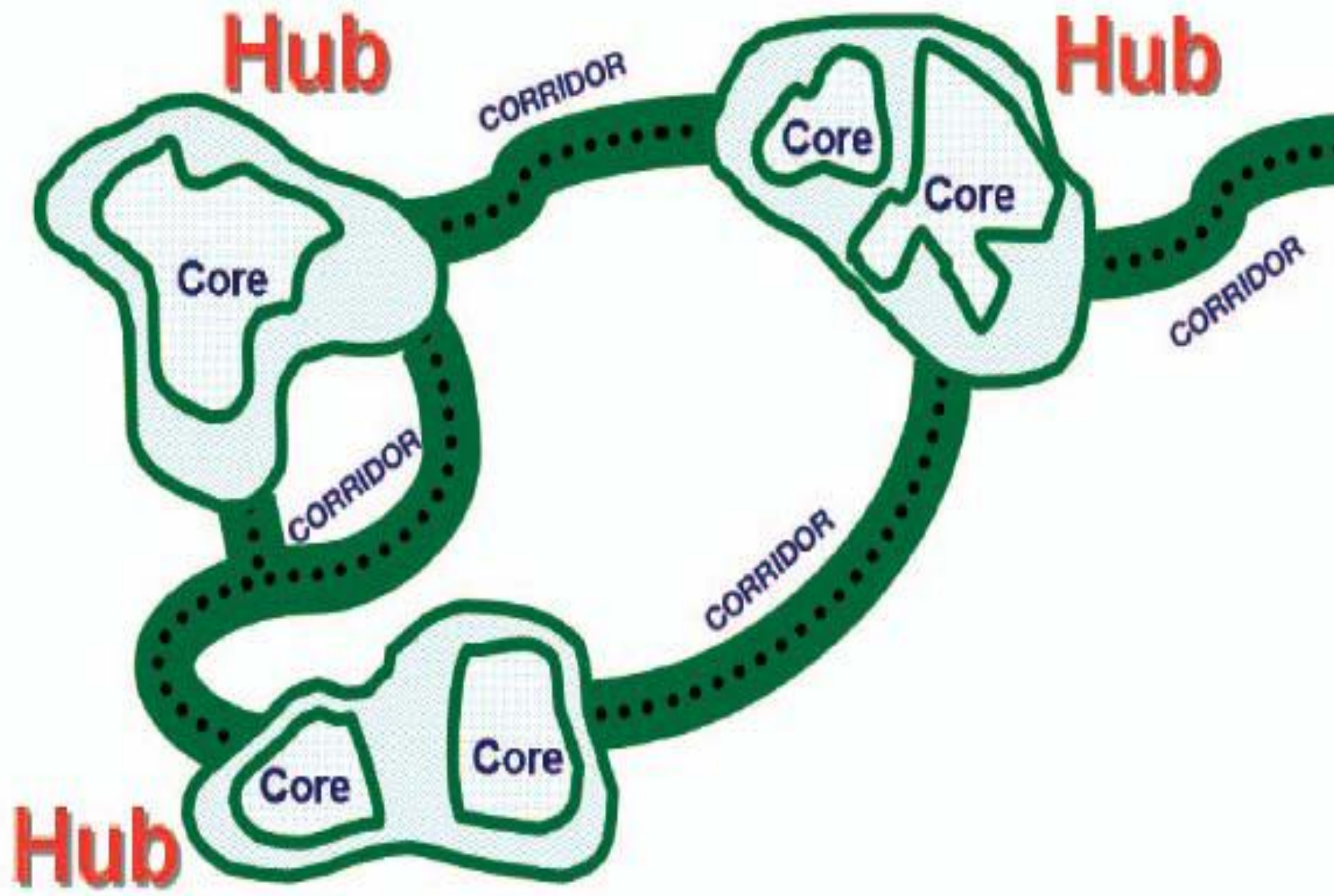
Obtaining good data is critical for future analysis and decision making.

# GLIN Case Study: Saginaw Bay, MI

## Greenways Collaborative

- Developed green infrastructure plan
- Used GIS analysis

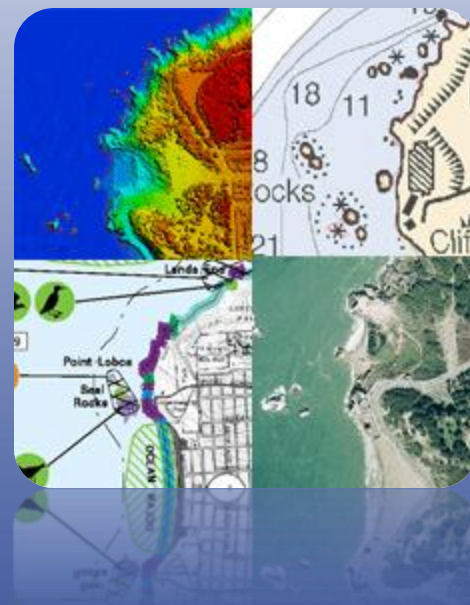






# Additional Data Websites

- 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

## Tools

# Habitat Priority Planner

NOAA Coastal Services Center

Overview

Requirements

In Action

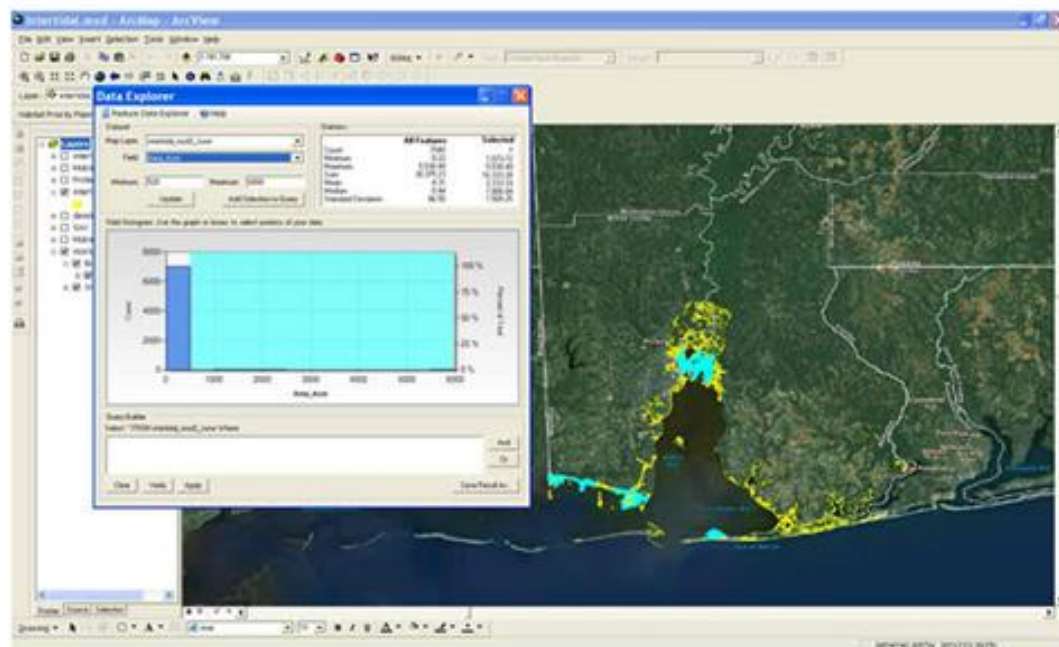
Training

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](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

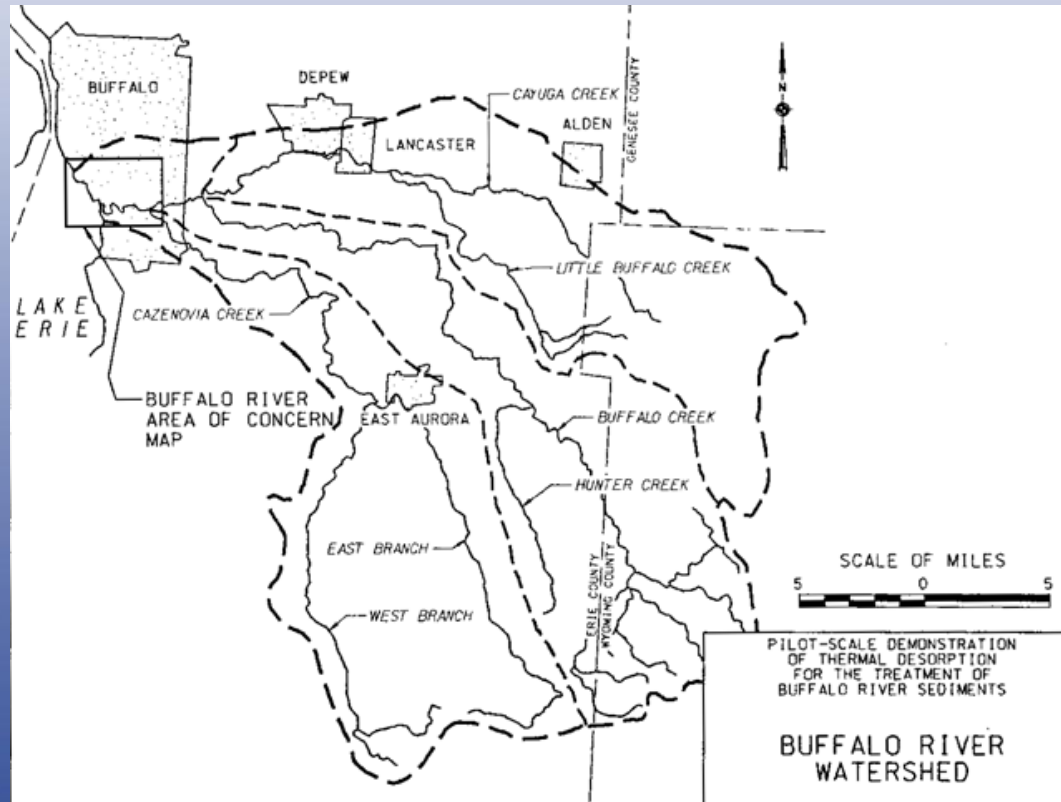


<http://bnriverkeeper.org/programs/buffalo-river-remedial-action-plan/issues-affecting-the-aoc/>

# 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](http://oceanservice.noaa.gov/education/kits/pollution/media/supp_pol06a.html)

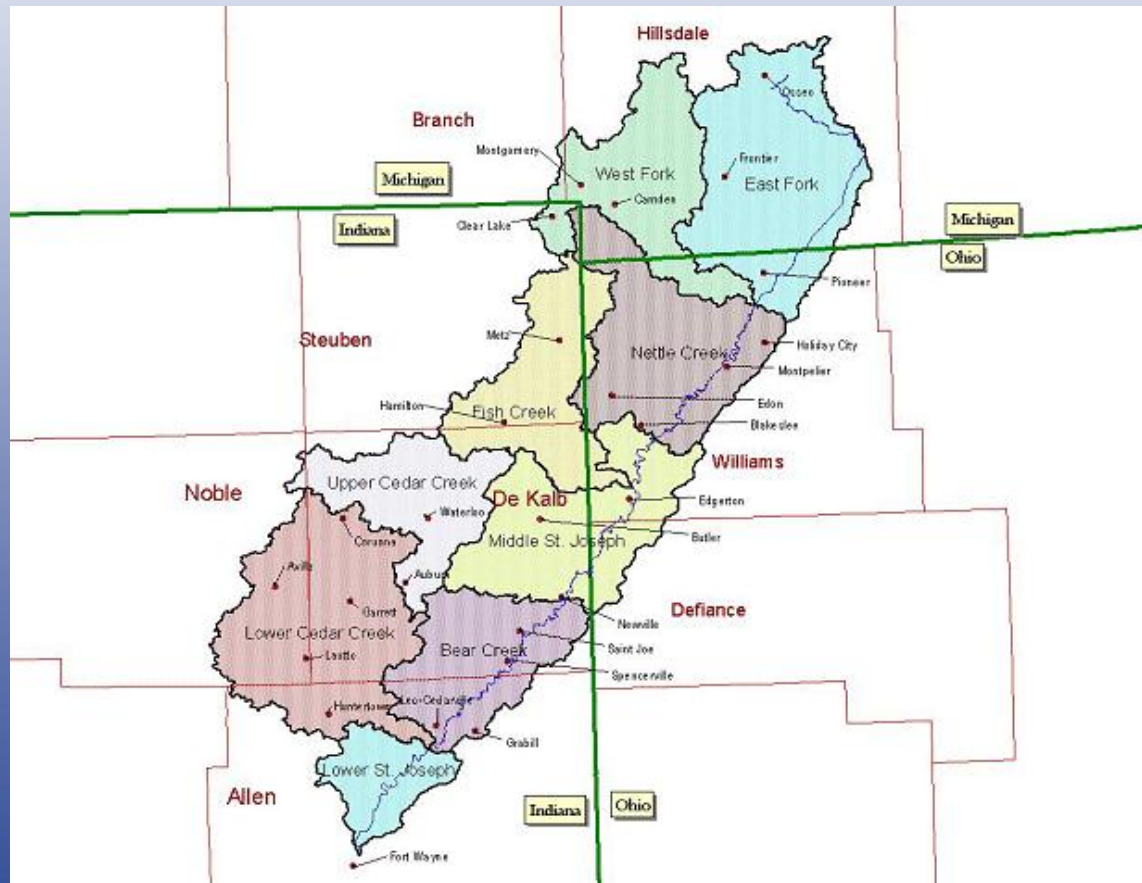
## Environmental concerns:

- High concentrations of herbicides
- Agricultural runoff

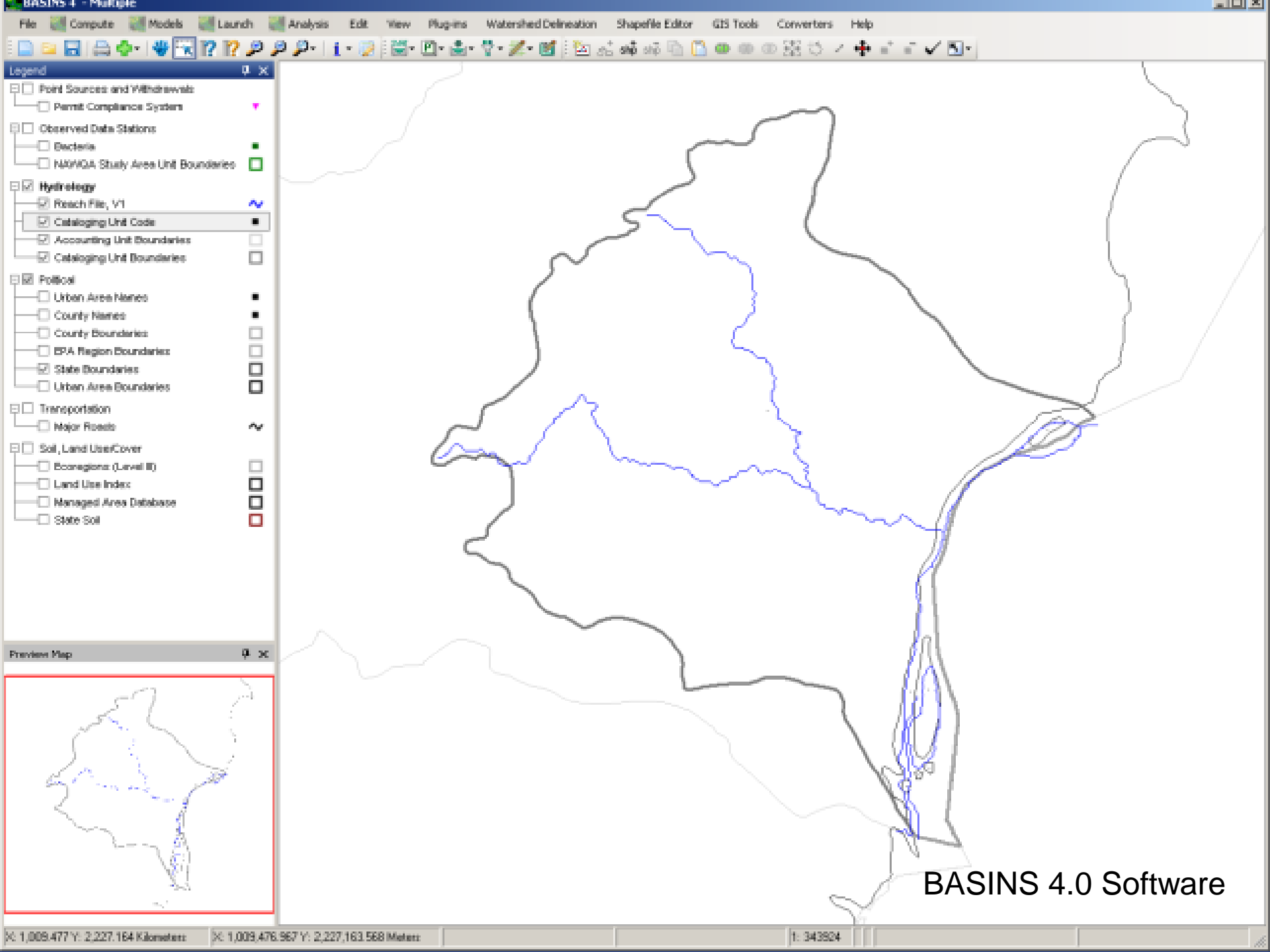


# St. Joseph River Habitat Restoration Project

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 4.0 Software



# BASINS 4.0 Factsheet

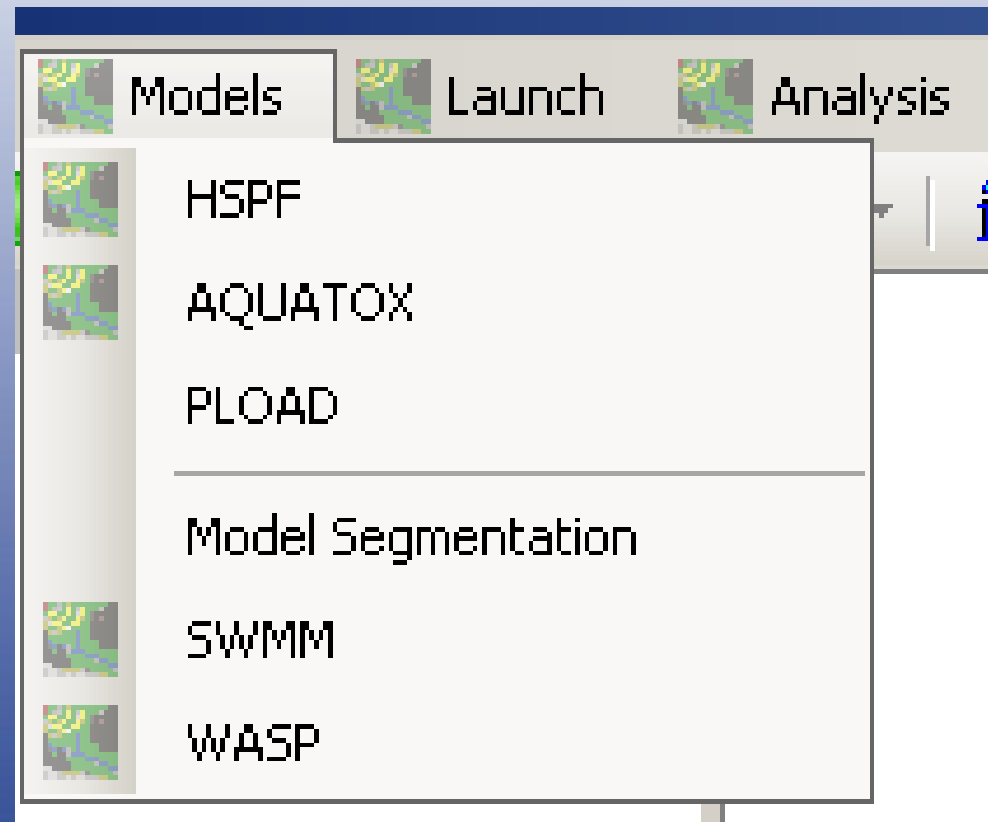
- **Description:** Maps effects of climate change on watersheds
- **Cost:** Free
- **Training/Time:** 4.5-hour training session
- **Other requirements/Notes:**
  - Background experience (watershed hydrology and water quality)
  - ArcGIS experience recommended



# BASINS Includes Many Models and Tools

Six watershed-related models:

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



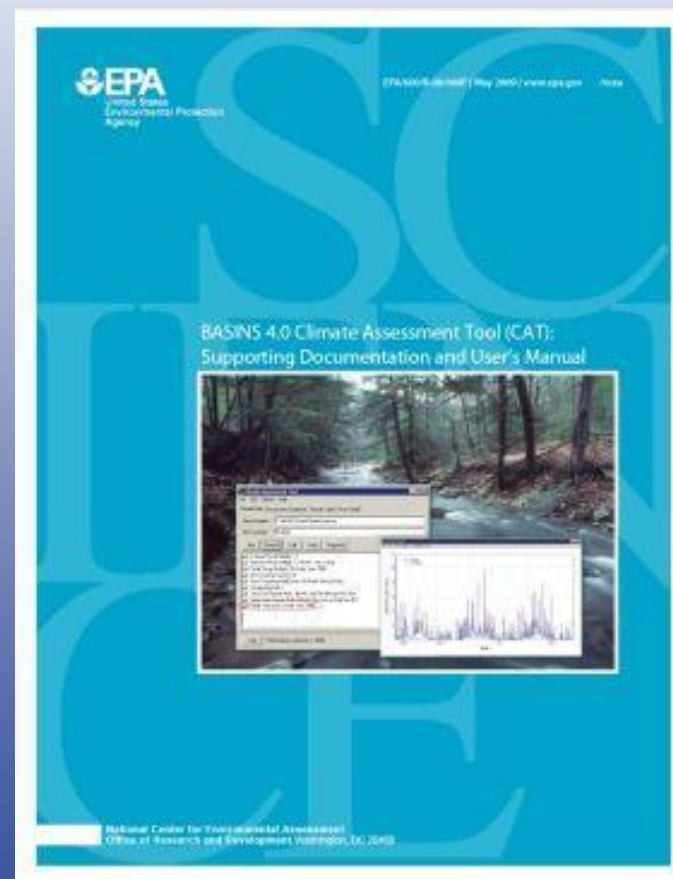
Basins 4.0 Interface

# 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:

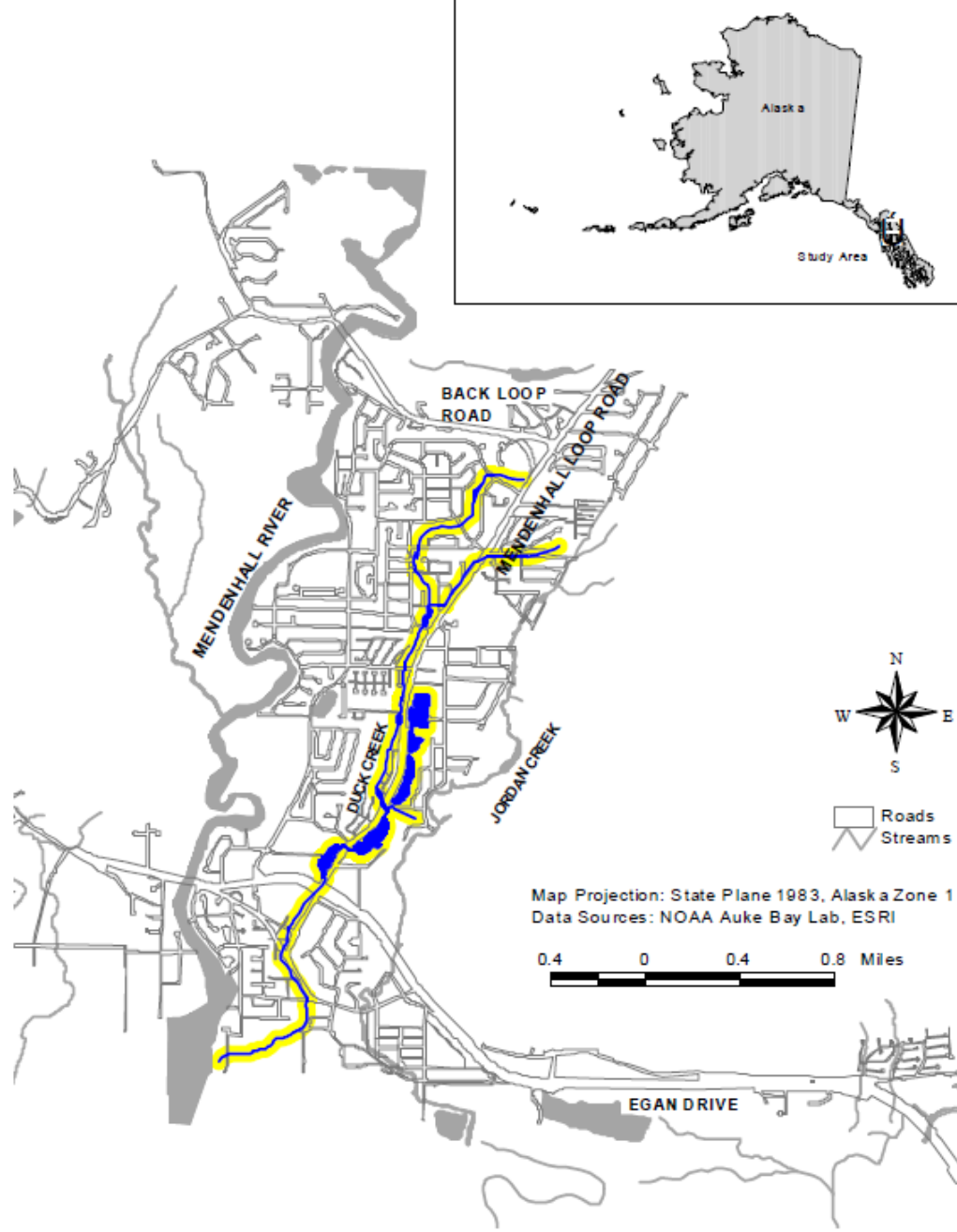
- Stormwater management
- Flood hazard reduction
- Drought
- Air and water quality
- Ecosystem resilience



[http://www.eng.auburn.edu/users/doughmp/LULC\\_tutorials/LULC-outline.htm](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](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



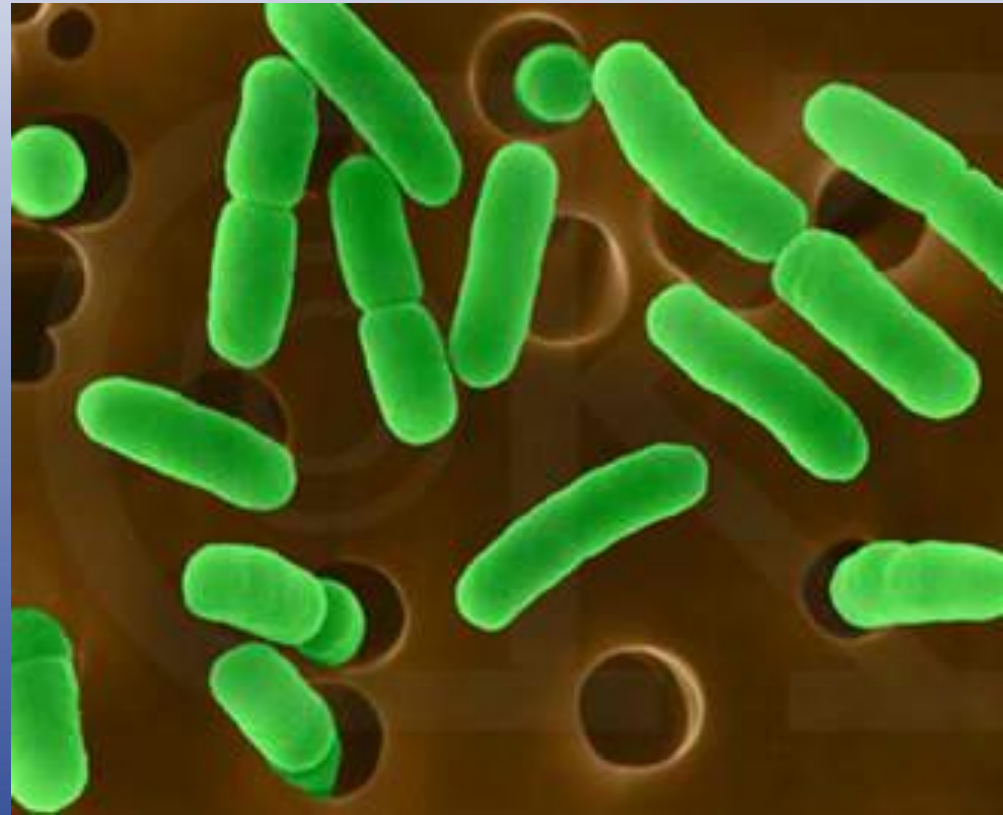
<http://www.photolib.noaa.gov/htmls/r0003034.htm>



# 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](http://www.great-lakes.net/beachcast/bw_waterborne.html)

# Role of SWMM

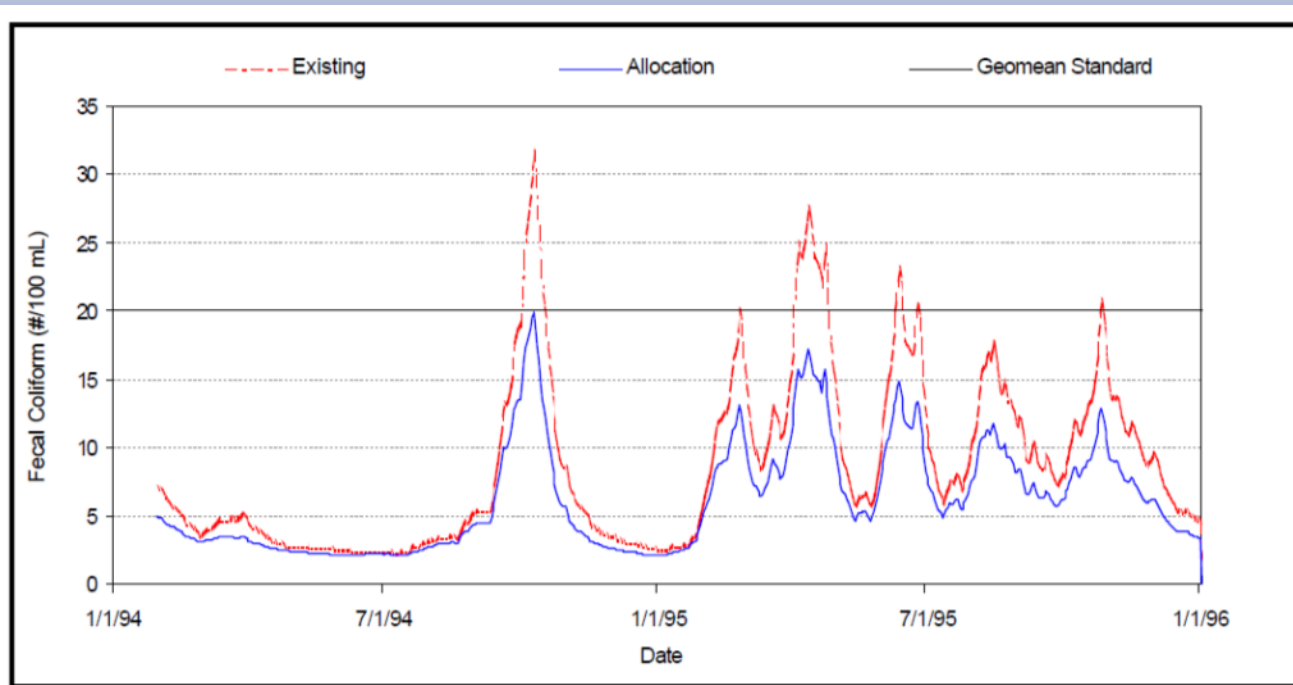
- Selected to model urban runoff
- Used to establish a Total Maximum Daily Load (TMDL)



[http://www.riversides.org/rainguide/riversides\\_hgr.php?cat=1&page=38](http://www.riversides.org/rainguide/riversides_hgr.php?cat=1&page=38)

# 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](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

NOAA HOME WEATHER OCEANS FISHERIES CHARTING SATELLITES CLIMATE RESEARCH COASTS CAREERS

 **NOAA CLIMATE SERVICES**  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Prototype 

Explore: [ClimateWatch Magazine](#) [Data & Services](#) [Understanding Climate](#) [Education](#)  

### Spotlight: Regional Climate Service Directors



Six Climate Service Regions  
Six New Directors

On September 14, 2010, NOAA announced the appointment of six new regional climate services directors. Their job will be to provide climate data and information designed for distinct needs within six regions of the United States and its territories. These regional climate services directors will help leaders make well-informed decisions using climate information such as long-term forecasts, drought assessments, or flood risk maps. The directors will work with their partners from other federal agencies, state, local and tribal governments, universities, businesses, and non-governmental organizations. [Read More](#)

### Climate Science Assessment Reports

Documenting the current state of climate science knowledge.



#### State of the Climate in 2009

This comprehensive appraisal of Earth's climate by more than 300 authors from 48 countries establishes the last decade as the warmest on record. Less sea ice, glacier volume, snow cover, other detailed observations show effects of rising global average temperature and many other climate phenomena.

[Press release](#) | [Full report and more](#)

### Presentation Library

Interactive slide sets about climate science, climate impacts, and adaptation strategies.

### Fact Sheets

Short summaries on the state of knowledge about Earth's climate system.

### Calendar of Climate-Related Events

When and where NOAA personnel will be attending climate-related public engagements.

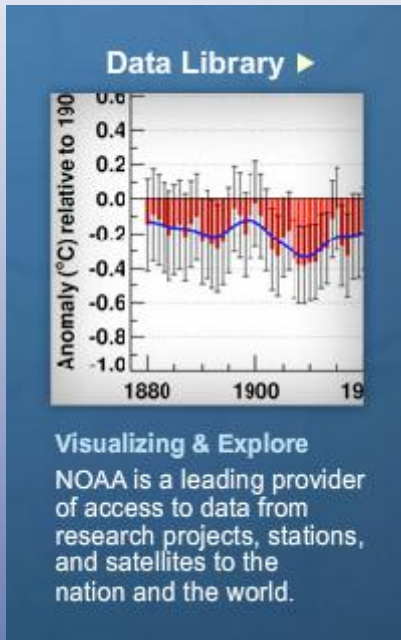
<http://www.climate.gov/#climateWatch>

# NOAA Climate Services Portal Factsheet

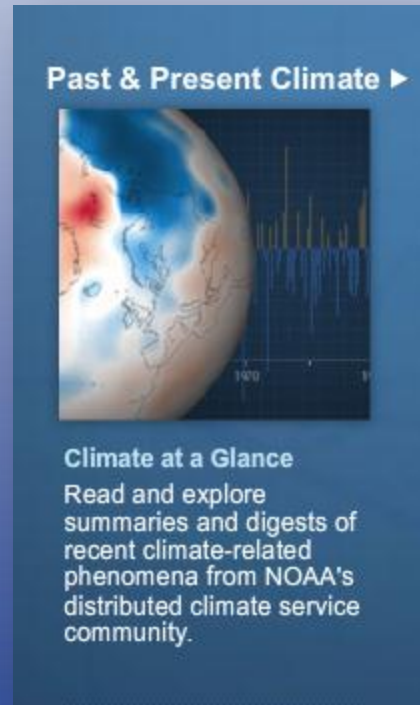
- **Description:** Website provides information related to climate change
- **Cost:** None
- **Training/Time Requirements:** None
- **Other Requirements/Notes:** None



# 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://oceanservice.noaa.gov/websites/retiredsites/supp_sotc_retired.html)



<http://www.lakesuperiorstreams.org/>

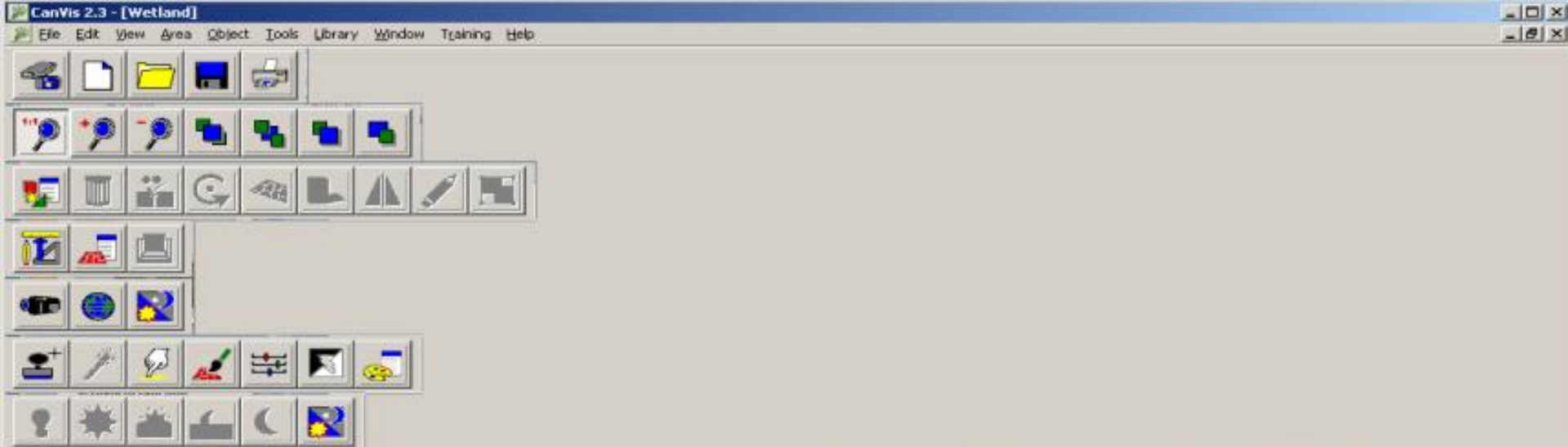
## Visualization Tools

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





**NOAA Coastal Services Center**  
LINKING PEOPLE, INFORMATION, AND TECHNOLOGY



# 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.



Simulation

# 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



## Wendy Park (Cleveland, Ohio)

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



Overview - CanVis - Digital Coast - Mozilla Firefox

File Edit View History Bookmarks Tools Help

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

Most Visited Getting Started Latest Headlines NOAA Messenger Exp...

Overview - CanVis - Digital Coast

**DIGITAL COAST**  
NOAA Coastal Services Center

Home Data Tools Training Approaches In Action

**Tools**

**CanVis**  
USDA National Agroforestry Center and NOAA Coastal Services Center

Overview In Action Training Support Get It Now

**Overview**  
CanVis is a visualization program used to "see" potential impacts from coastal development or sea level rise. Users can download background pictures and insert the objects (hotel, house, marina, or other objects) of their choosing. The software is used by municipalities to brainstorm new ideas and policies, undertake project planning, and make presentations.

**Before**

**After**

**Click to play**

**Simulation**

**Features**

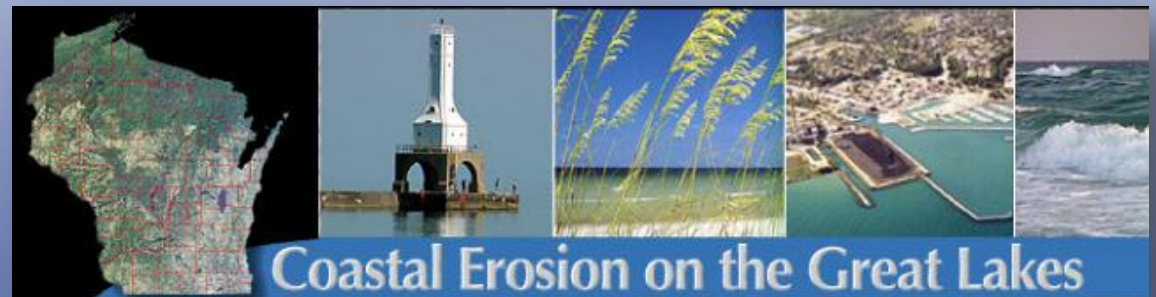
- Incorporates** docks, buildings, rising waters, and other objects into user photographs to see potential scenarios
- Allows** users to quickly brainstorm "what if" scenarios with this easy-to-use tool
- Requires** minimal computer knowledge and is easy to use

Done

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

# Additional Visualization Tools

- Visualizing coastal erosion
- Climate Wizard

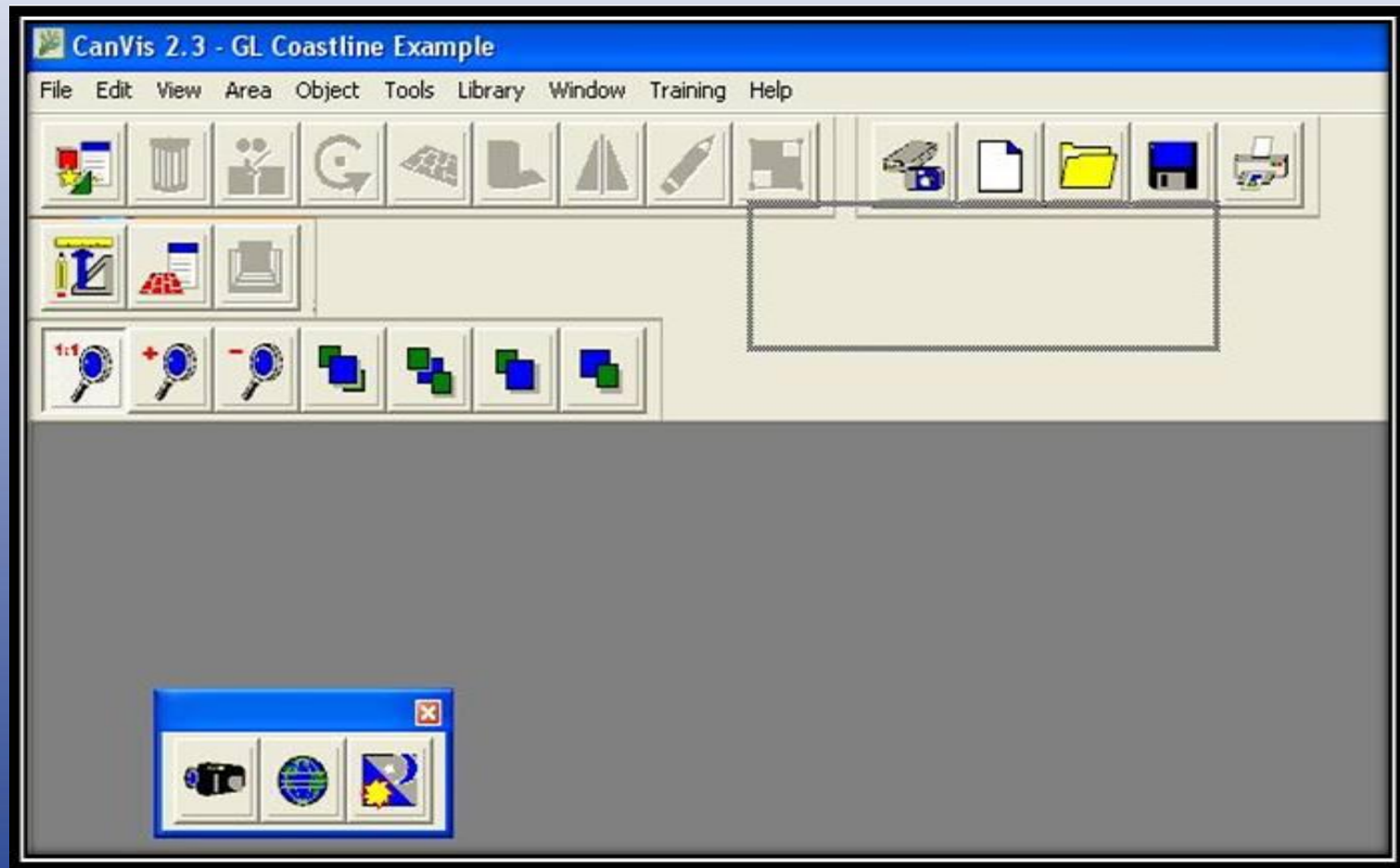


ClimateWizard

## CanVis 2.3

# Tool Demonstration

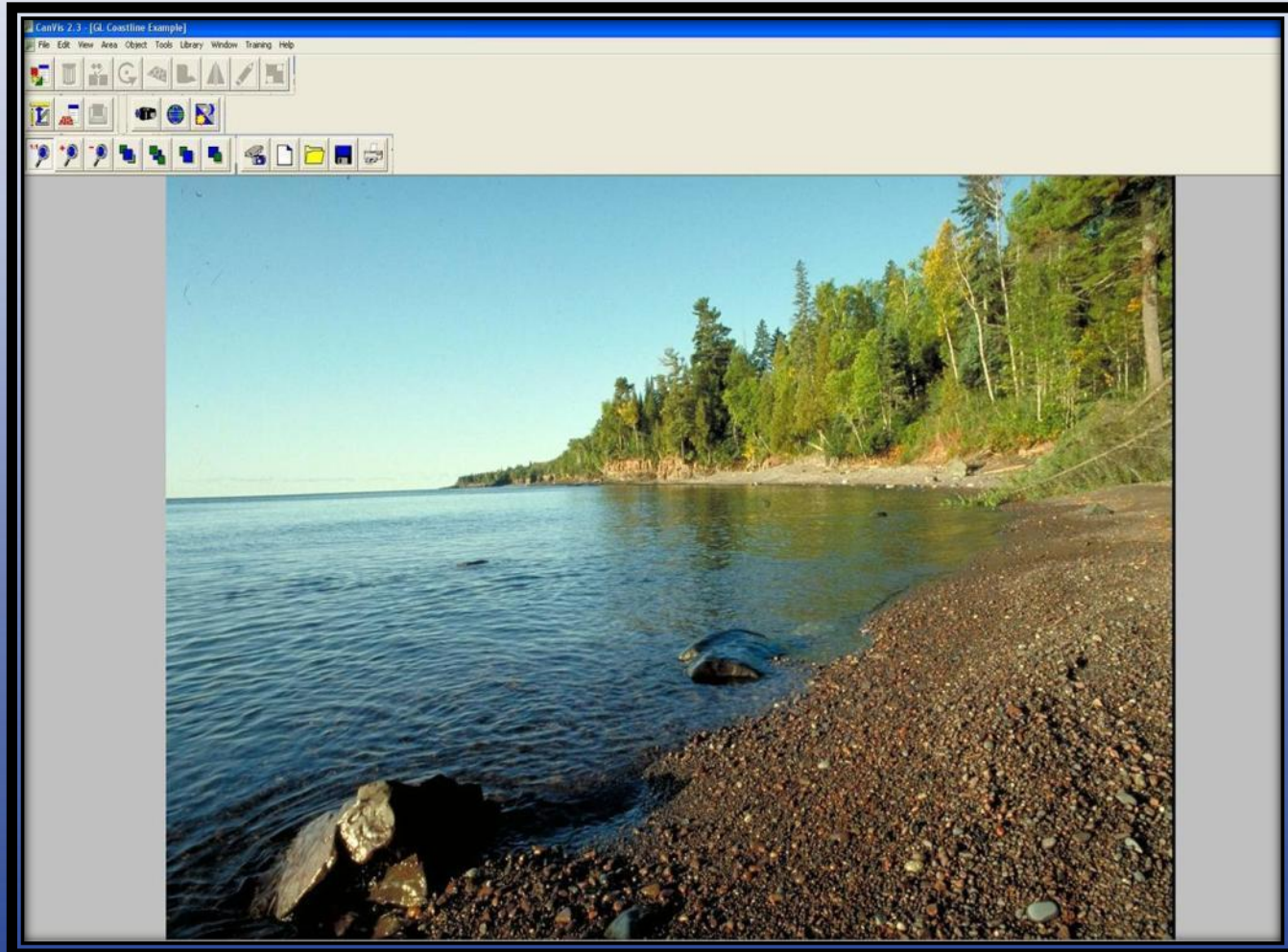
# Getting Started: First View of Program





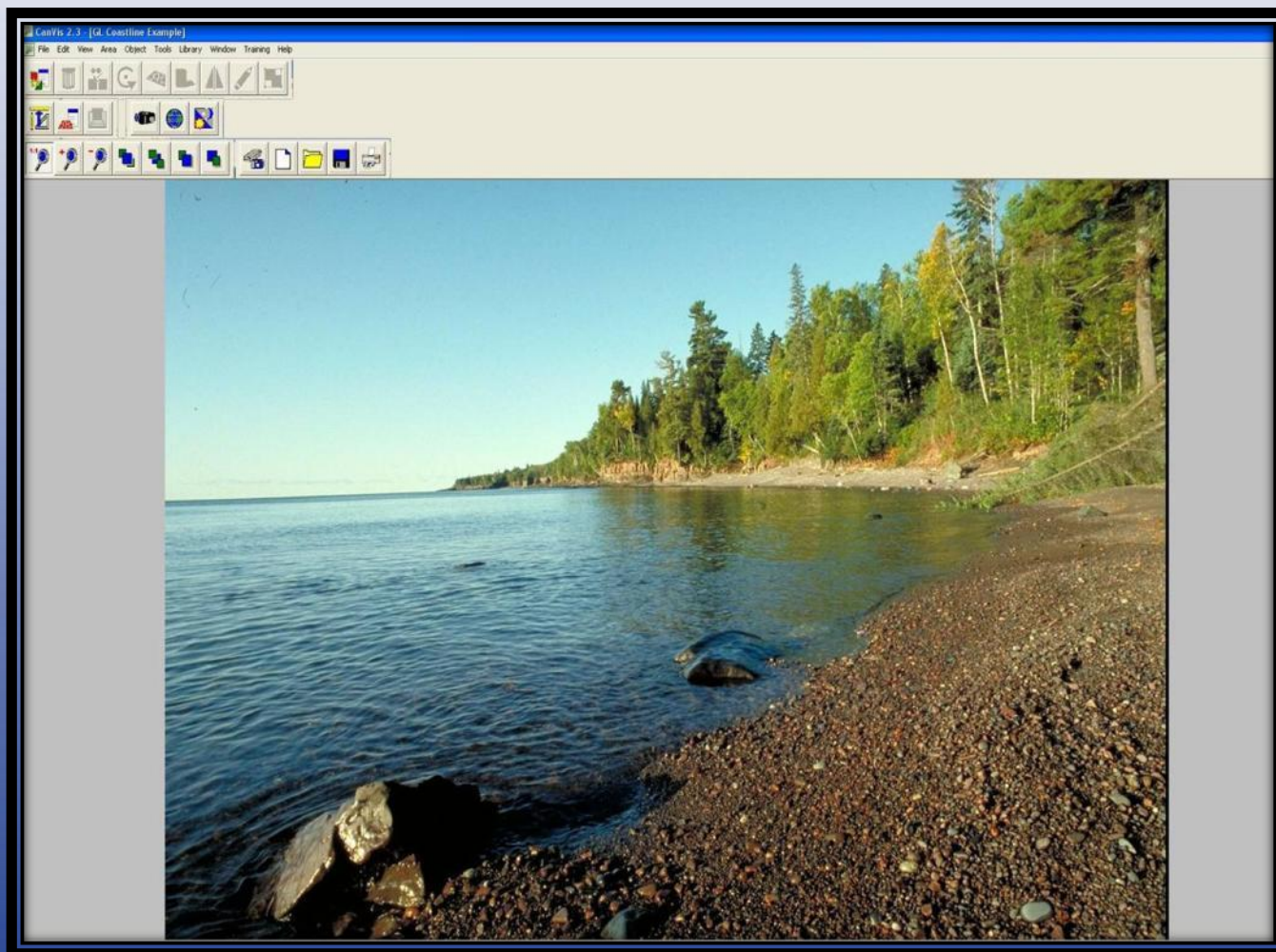
# Selecting an Image

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

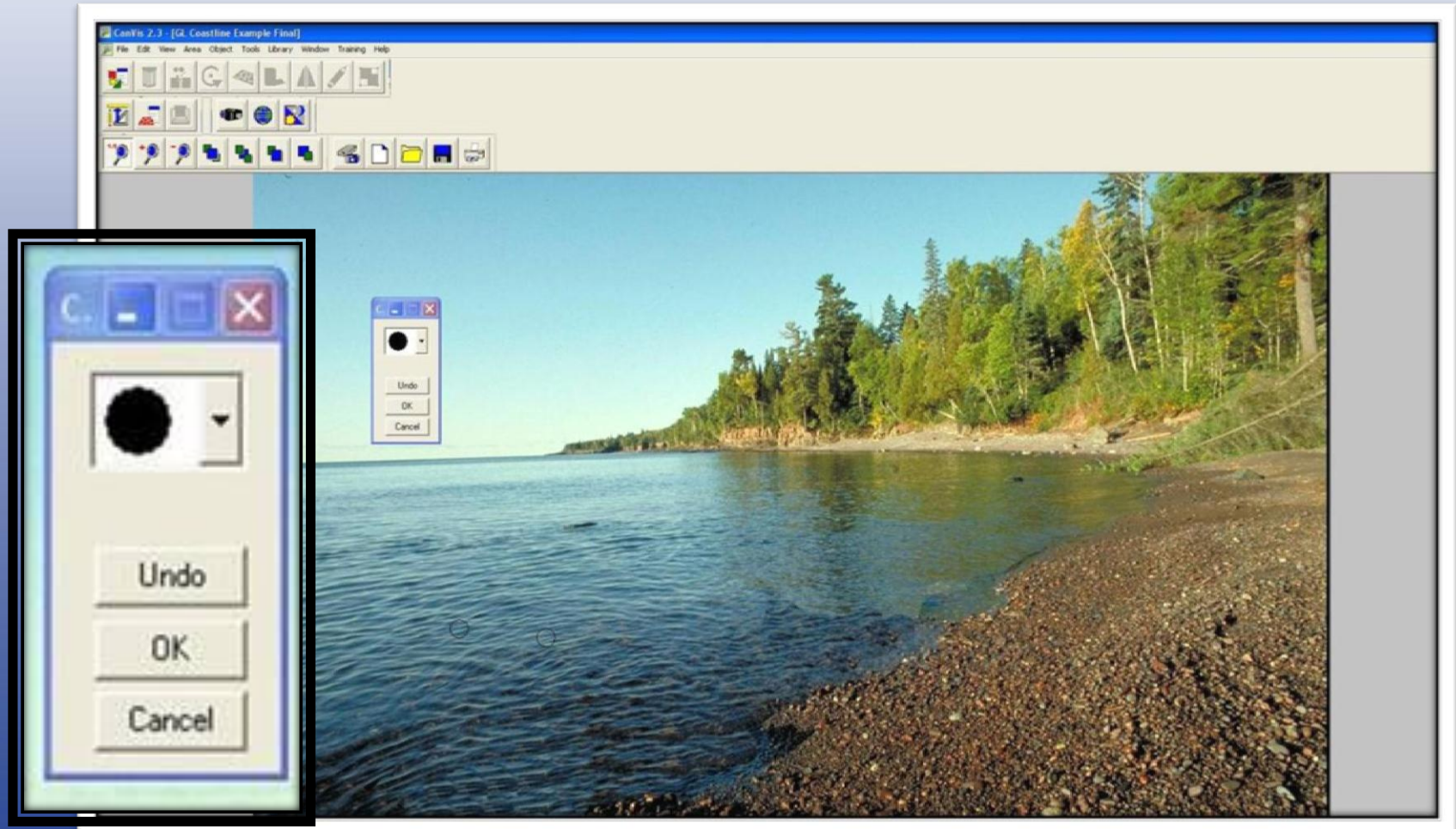




# Photo Alterations

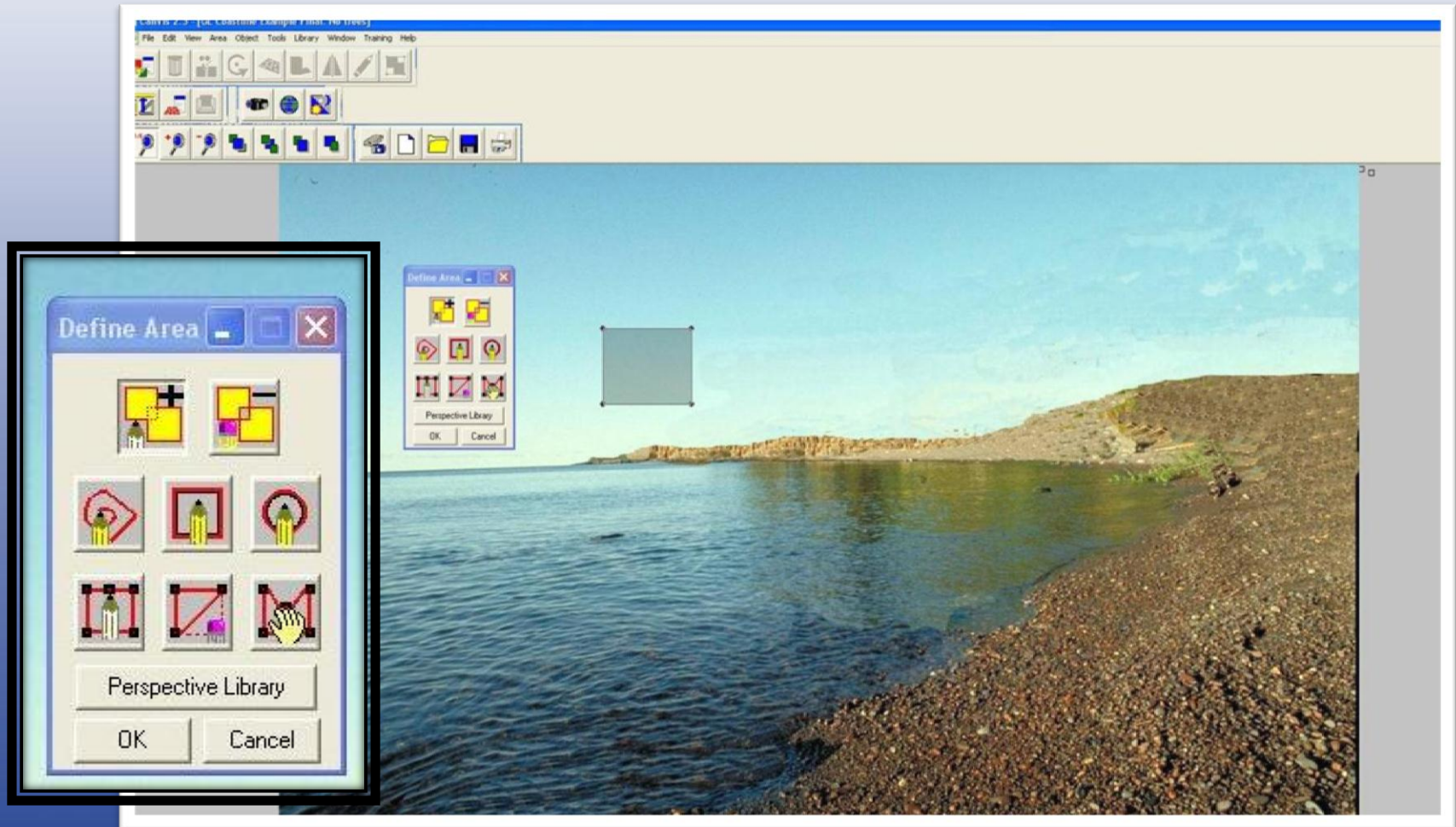


# Background Photo with Rocks Removed: Clone Box Displayed





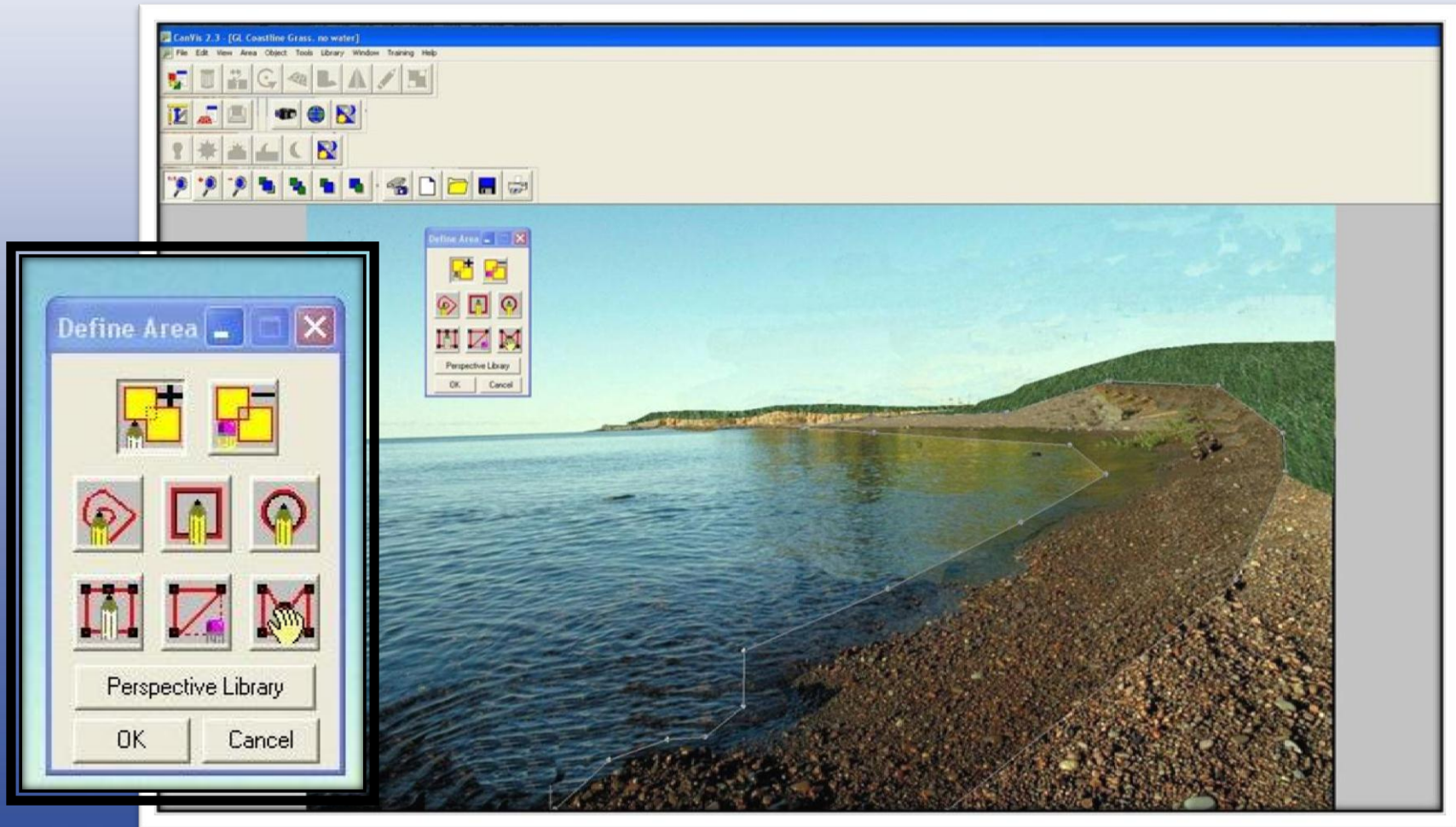
# Define Area Tool



# Textures

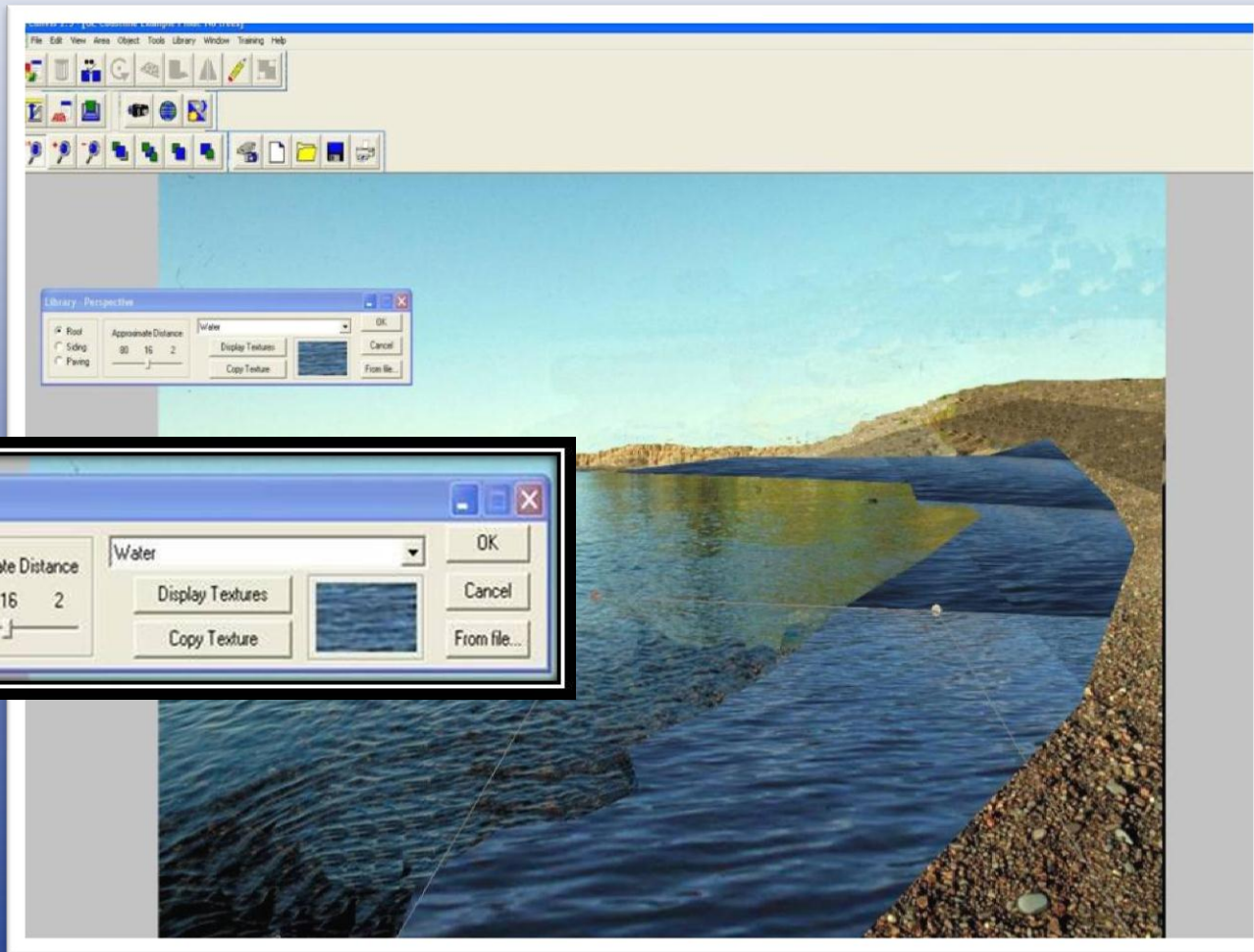
1. Identify the areas that need to be a different texture (such as pavers, groundcover, and sod)
2. Complete four steps in CanVis:
  - Define an area
  - Fill with texture
  - Add perspective
  - Adjust scale

# Define Area

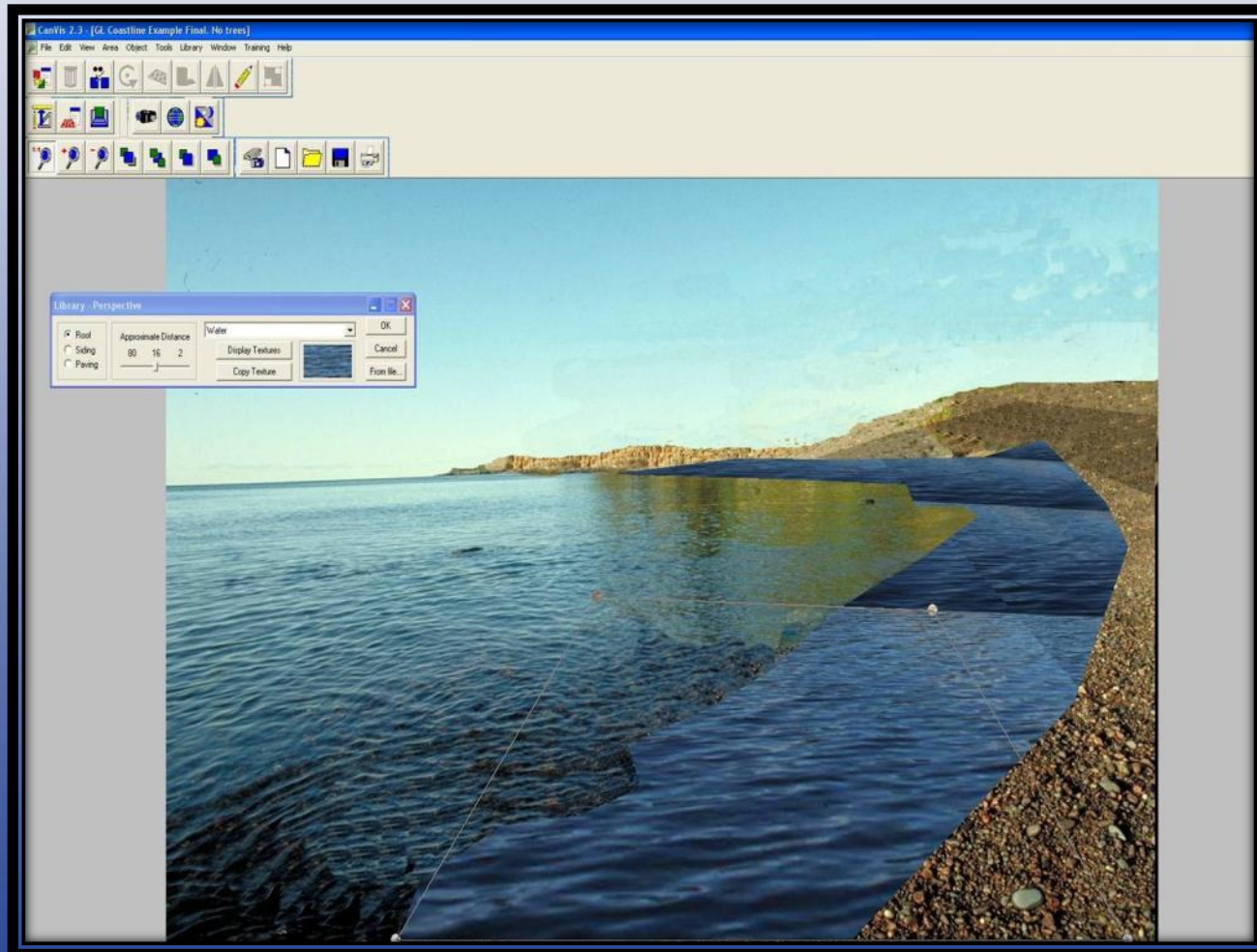




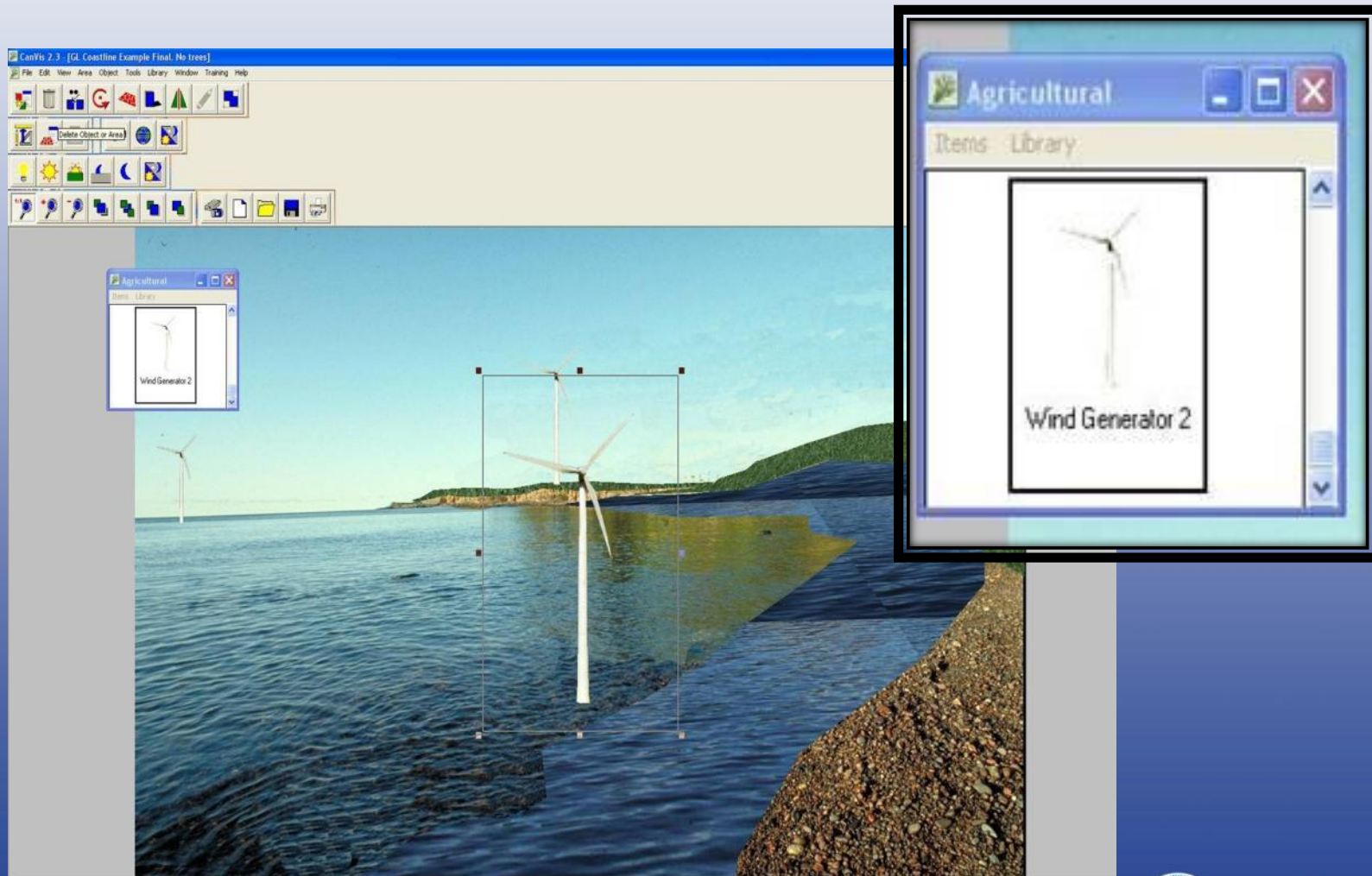
# Add Texture



# Perspective and Scale



# Adding Objects



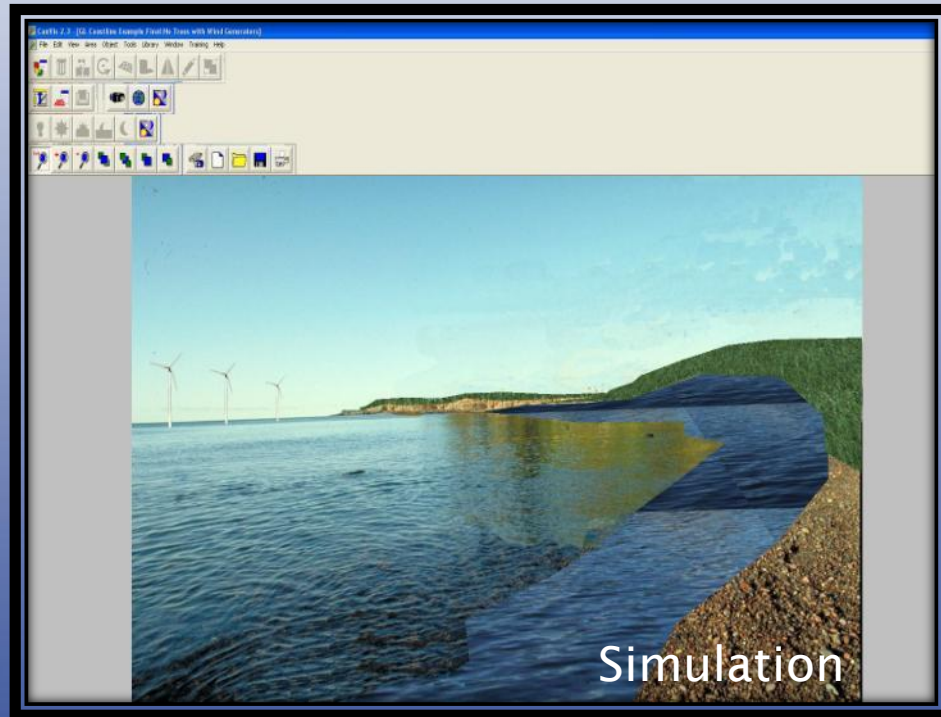
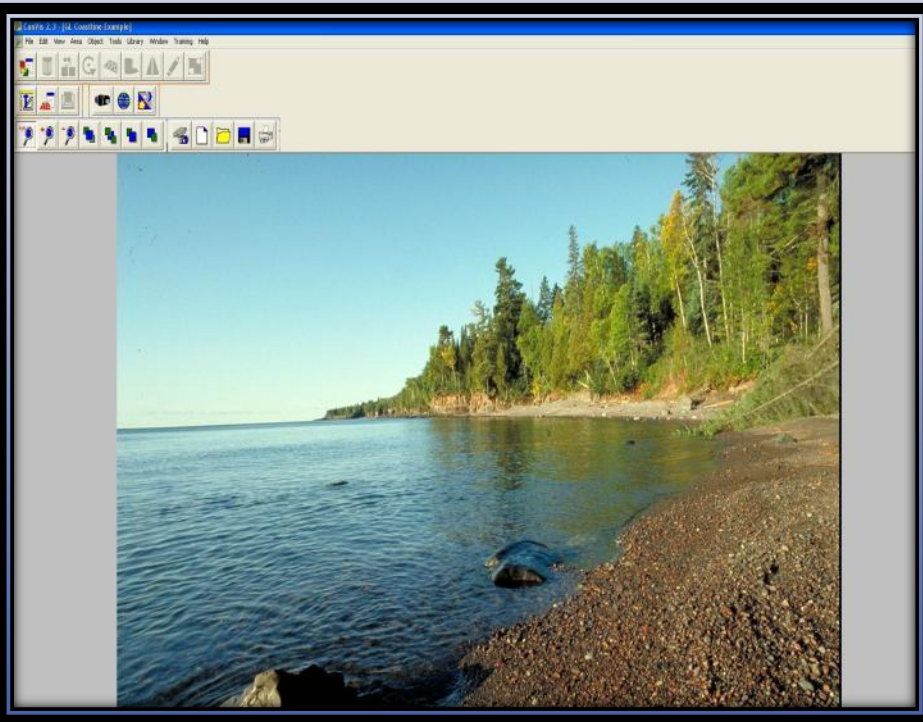




Simulation

# Original Image

# New Image





## Apply What You've Learned

### Module 3 Take Away Points

# Recap

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



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

## 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