

# Internet-based GIS (and more) in pre-collegiate science education

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# Why GIS in K-12?

- Allows students/teachers a new, powerful way of analyzing and exploring data.
- Technology for Integration
- School-to-Career
- School-to-Community
- Fun and Interesting
- Directly supports standards-based inquiry and Project Based Learning

# What is Internet-based GIS?

- Any digital mapping system capable of displaying data and/or analysis results from across a network, most typically via a web browser.

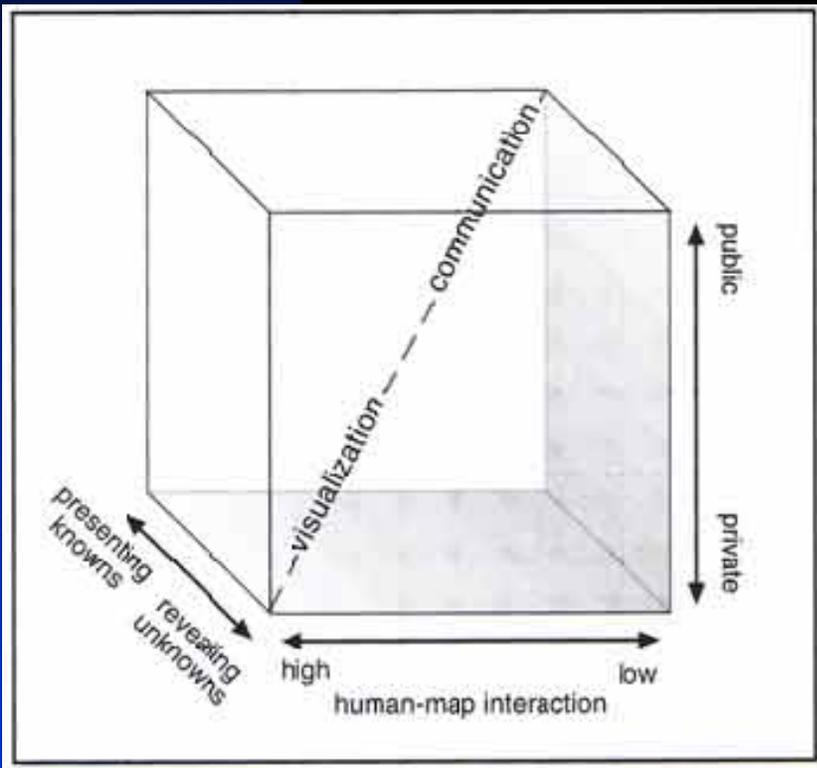
## **Advantages:**

- Relatively small learning curve
- No data storage issues (lab available, assigned seating, etc).
- Few tech barriers (security, network, OS, etc)
- Very efficient for collaborative data collection & display

## **Disadvantages:**

- The network may go down
- Tools not as technically powerful
- Base data not always customizable
- Functionality and interface may vary across websites.

# Training educators to integrate geotechnologies: A Sequence for Integrating



McEachren's Cartography Cubed.

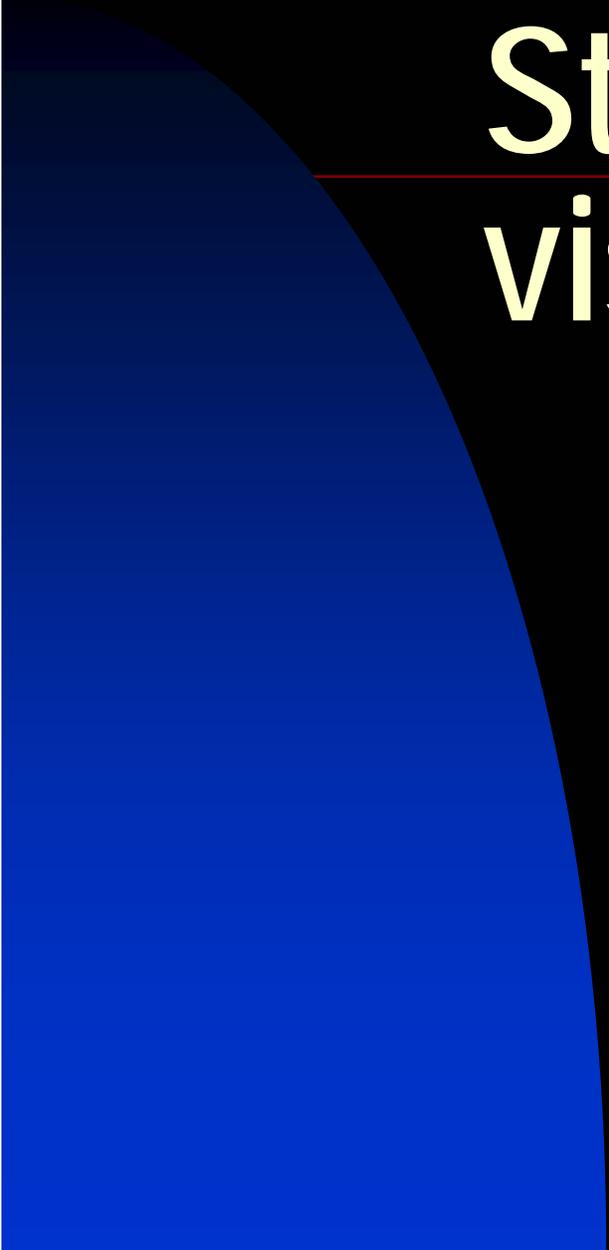
**Presentation** - the display of a static map or GIS output, usually for an audience

**Exploration** - a simple examination or addition to data presented in the GIS

**Analysis** - selection of features based upon criteria

**Synthesis** - recombination of existing data or creating one's own data into a new map

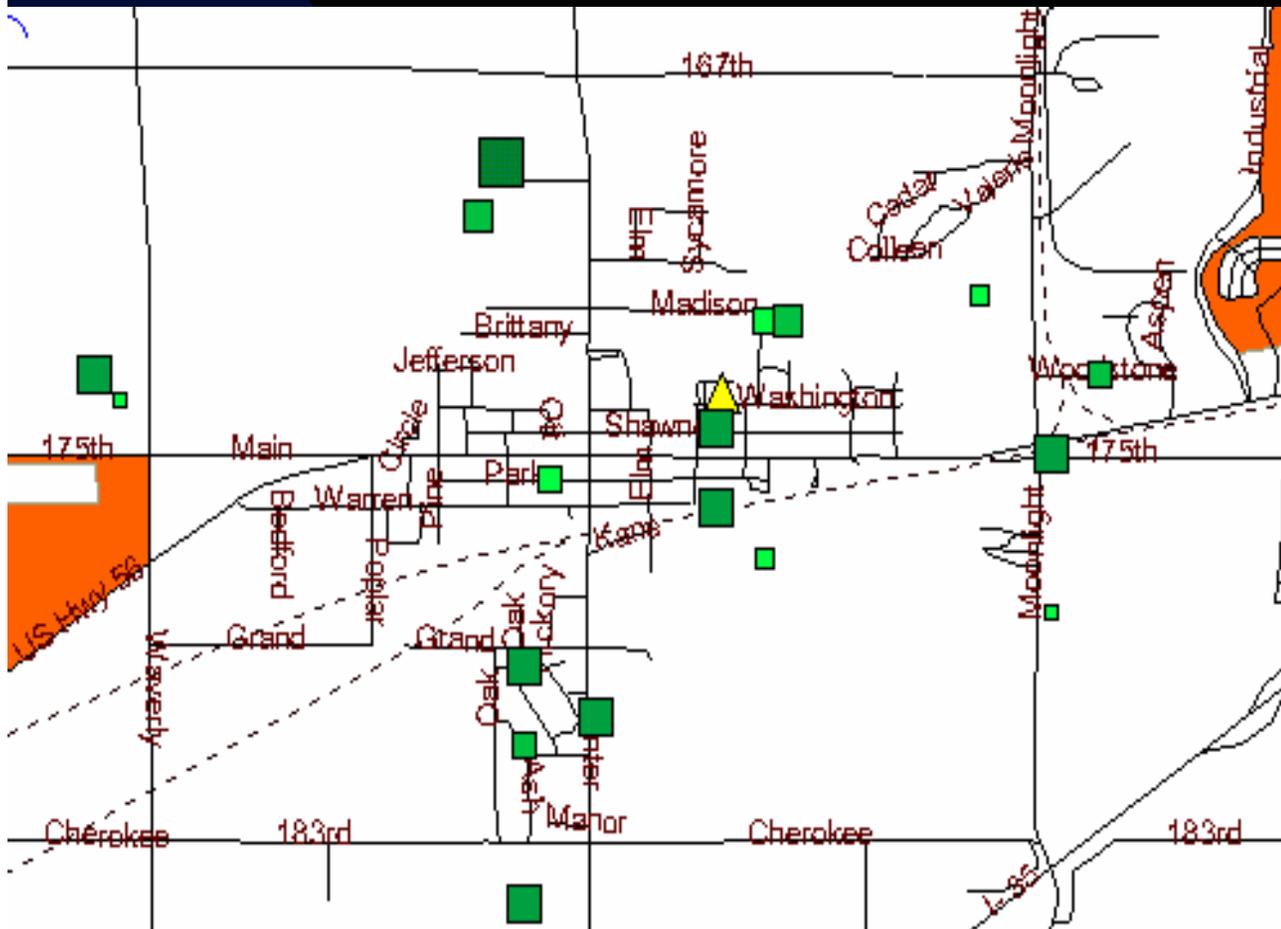
**Visualization** - a dynamic process of searching for new spatial patterns by altering the way the data is represented or perceived.



# Student-created visuals

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# Biomonitoring

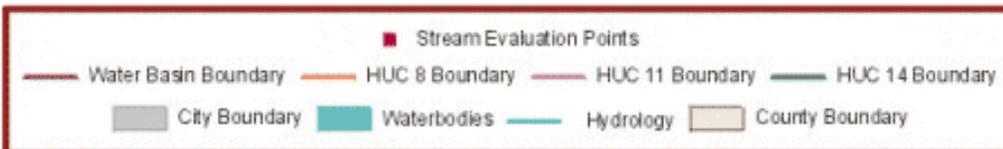
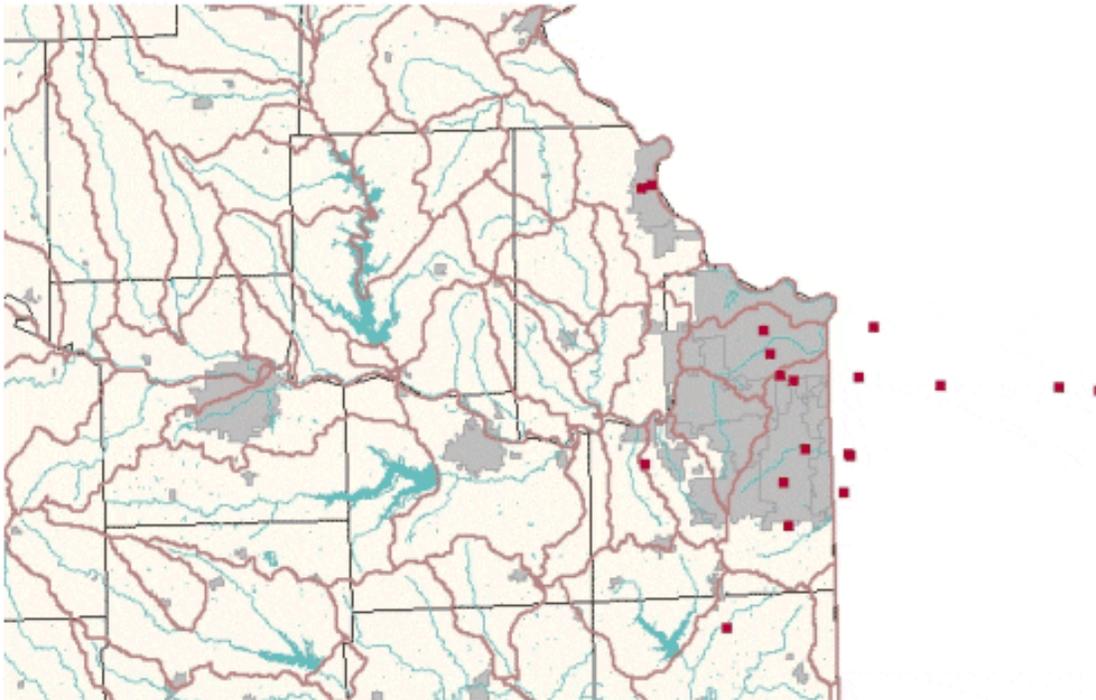


- Middle School Earth Science
- Using lichen as a bioindicator of relative sulphur dioxide levels.
- Mapped with ESRI's ArcExplorer 2
- Key: Darker green and larger green squares represent greater lichen coverage.

# Stream Monitoring

## KanCRN Streams Evaluation Application Visual Survey

Click to...  Zoom In  Zoom Out  Pan  Identify  
Reset Map

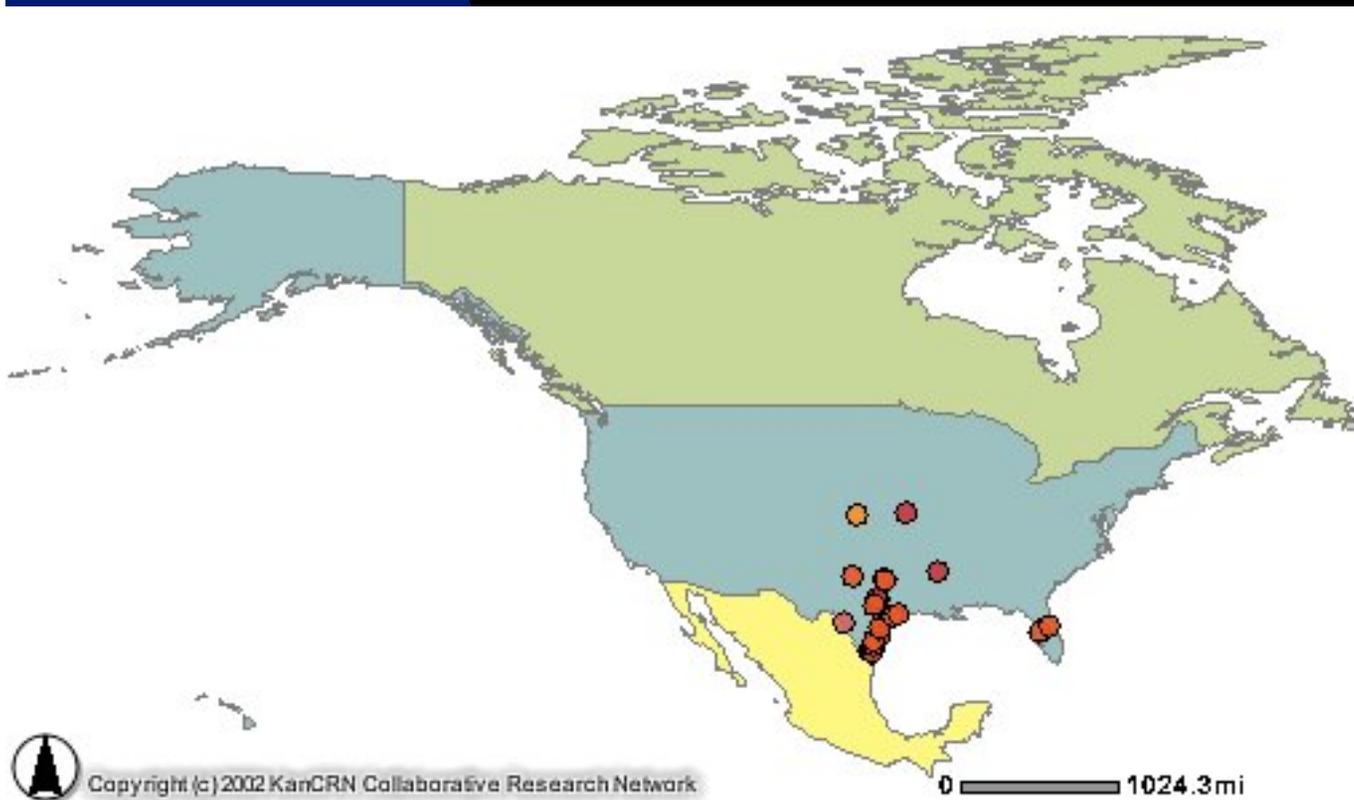


- Cross-disciplinary middle school
- Using Internet-based mapping to track stream quality around town.
- Ongoing.
- Key: Points map sampling locations. No specific attribute.



# Digital Monarch Watch

- Citizens and students identify and submit first sighting of monarch migration.
- Across the nation. Ongoing. [[Live](#)]



•Key: Color ramp, darker colors represent reports of initial migratory “wave” by week.



# ESIC Animation Research

- Approximately 600 students from grades 6 to 12 in U.S, representing about 20 teachers.
- All students from one teacher were randomly assigned to a treatment group:
  - ◆ *static*, in which a list of links is presented, where the student is free to click through each at his/her own pace, and in any particular order
  - ◆ *animated with controls*, same as *animation* but with “buttons” that allow for the stopping, pausing, playing, reversing and fast-forward/fast-reverse of the sequential program
  - ◆ *animated*, in which each month-by-month display is presented in a sequential fashion.

# ESIC Animation Research

An example similar to that used in the *animation* treatment.

United States Tornadoes  
Displayed by month, 1950-1990



ESRI Schools and Library CD vs 5.1  
KanCRN/Baker (<http://kancrn.org/gis>)  
1 dot = 1 tornado

# Online toolkit for contextualized K-12 GIS

- The Student Data Mapper (<http://kangis.org/mapping/sdm>) allows publication of teacher ideas that require collaborative data collection and representation by students.

