Geospatial Tools for Learning in the Social and Natural Sciences

Pat McDowell
Department of Geography

Symposium on Computers in Teaching and Learning in Higher Education
University of Oregon
April 27, 2007

Revolution in geospatial technology
Revolution in geospatial technology

Importance of spatial thinking

- Two recent reports from the National Research Council
Why is spatial thinking important?

- “Spatial thinking... uses space to structure problems, find answers, and express solutions. It is powerful and pervasive in science, the workplace, and everyday life.” (NRC, 2005)
- Spatial thinking, including critical spatial thinking and analysis, is an essential intellectual skill in the tool kit of an educated citizen.
- “Spatial thinking [is] a basic and essential skill that can be learned, [and] that can be taught formally to all students.” (NRC, 2005)
- It is imperative to teach spatial thinking in K-12 education, and the university has a responsibility to continue this teaching and to support the K-12 component.

The continuum of geospatial tools

- Expensive, steep learning curve
  - GIS, remote sensing image analysis
  - Consumer GPS and map data
  - Digital/virtual earths
  - On-line mapping applications
GEOG 360: Watershed Science and Policy

- Term project report on a watershed in the U.S.
- Collect, synthesize and analyze information on
  - Watershed characteristics: topography, river network
  - Watershed health: water quality, aquatic ecosystem, etc.
  - Controls of watershed health: population, land use, etc.
- Primarily on-line data sources

US EPA’s Surf Your Watershed

http://www.epa.gov/surf/ 4/26/07
US Geol. Survey’s Science in Your Watershed

US Geological Survey's National Map
US Geol. Survey’s National Map

http://nationalmap.gov/, 4/26/07

US Census Bureau American Fact Finder

http://factfinder.census.gov/, 4/26/07
ESRI ArcReader Map for GEOG 360

- ArcReader is similar to Acrobat Reader
  - Freeware to allow viewing of ArcMap GIS files
- ArcReader capabilities: zoom, print, find, identify, etc.
  - Not measure, at this time
Other On-line Maps
What is a digital earth?

- A virtual representation of the Earth on the Internet that is spatially referenced and interconnected with the world’s digital knowledge archives (A. Gore, 1998)

- Examples:
  - Google Earth, NASA World Wind, Norkart Virtual Globe, etc.
  - yahoo.com maps, msn.com maps

- For more information:
  http://www.isde5.org/history.htm
Teaching applications of Google Earth

- Map view
- Terrain view and fly-over
- Plotting information (placemarks)
- Virtual field trips
- More coming soon...

Measuring distances and areas on Google Earth

http://earth.google.com/, 4/24/07

http://earth.google.com/userguide/v4/, 4/25/07
EarthPlot Software

- a data analysis and visualization tool for Google Earth

http://www.earthplotsoftware.com/, 4/24/07

Web page on Darfur crisis with a GE tour

Questions?