Photo by E.C. Stanley

Section 9B: Ways of knowing: Displaying and presenting data to build knowledge and guide decision making

Geographic Information Systems (GIS) and Watershed Planning

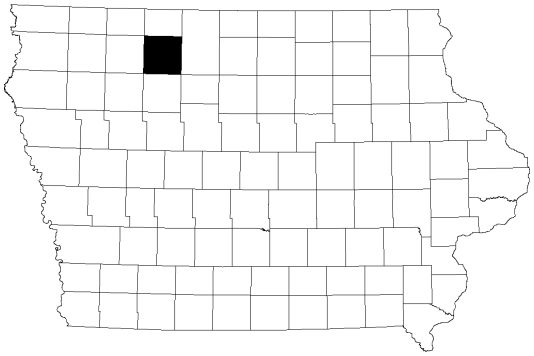
Using Computer Power to Visualize Your Watershed

"A picture is worth a thousand words."

"Draw me a picture."

For many of us looking at rows and columns of data on spreadsheets, or reading reports with no illustrations only tends to shorten our attention spans and do us eye damage! Images and pictures help us to visualize what the information is and helps us understand what it means.

If you were told about a place, say Palo Alto County in northwest Iowa, it is much easier to picture it if some sort of visual reference is given as in the following image.

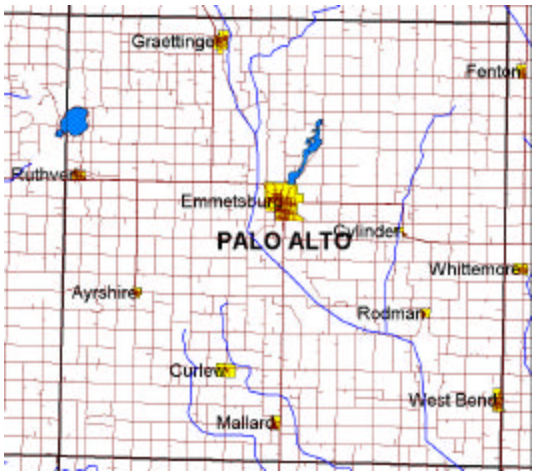


The classic quotes above exactly describe the power of Geographic information systems (GIS). Over the last 2 decades GIS has emerged as a powerful computer tool for land planning and management. Not only has it become a powerful tool for planning and management professionals, but also over the past few years especially, this tool has begun to show its value in citizen participation.

<u>Put It on the Map</u>

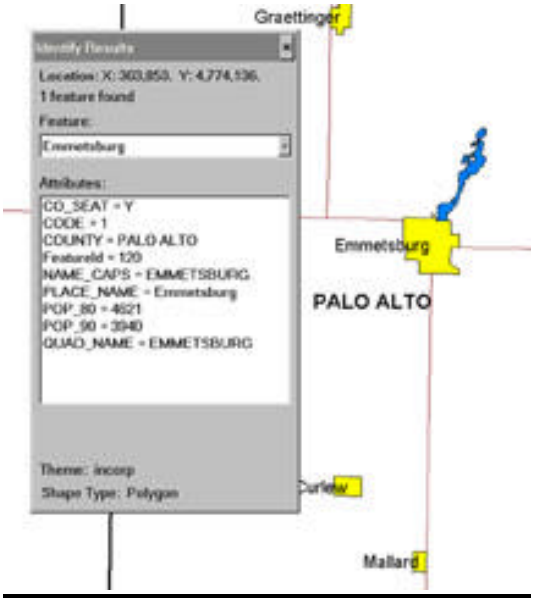
Most of what we talk about is connected to specific location. Such things as where our home is, where we go to work, where our farm is, where our schools are, hat the surrounding cities are, where our grocery store is, where our favorite stores are, the roads we travel, where we recreate, our favorite fishing spot, and the list goes on.

If we look closer at Palo Alto County, we find and identify specific places on the map. This helps to get our bearings about the place and its surroundings.



After we locate these places on the map, the computer can take it a step further. It can "attach", or link, information about the places to the location on the map. So, not only do you have the name of the place and its location, you have information **about** that place**.**

With most GIS software it is possible to see this attached information by simply "clicking" on the screen on the place of interest, as seen in the image below which shows that by clicking on the city of Emmetsburg we find that it is located in Palo Alto County, that its 1980 population was 4621 and that the 1990 population was 3940.



Ask the Computer

Once the place on the map is linked to information about it, we can then ask the computer questions about these places and find out much more.

Depending on what kind of information we have linked to the places on the map, we can ask the GIS such questions as:

- What is the population of my hometown?
- What kind of pavement does this highway have?
- How many people over 60 years old live in my county?
- How many acres are within the city limits?

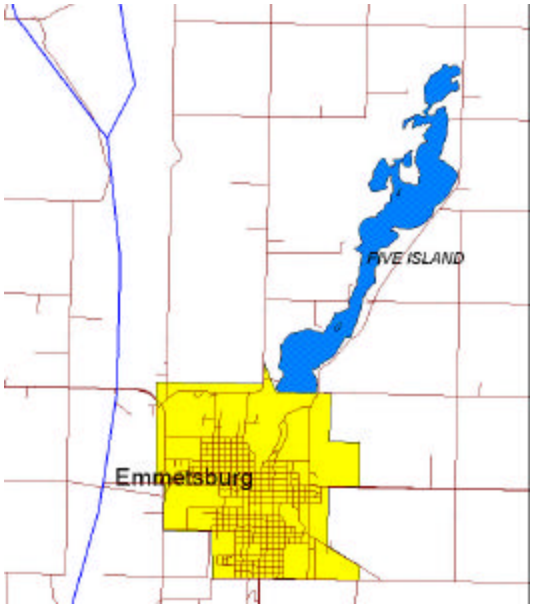
But it doesn't stop there. We can begin to ask more analytical questions like:

- Show me which townships in this watershed have the most people under 5 years old.
- How many acres of forest are within 100 feet of a particular stream?
- Show us the most agriculturally productive soils in the watershed area.

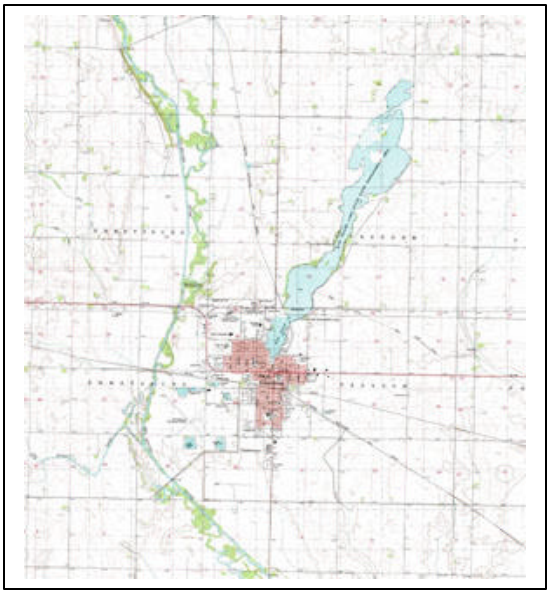
GIS takes into account the actual physical location of these places, information about the place, and can help us understand the relationships among them by showing them on a map on the computer. Once we see the "picture" of where these places are we can begin to see how they are related.

Five Island Lake, Palo Alto County, Iowa

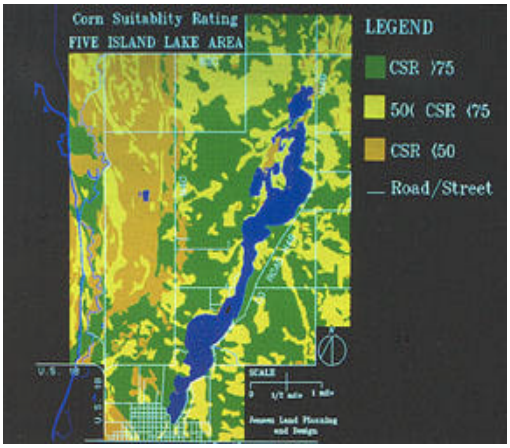
Suppose our area of interest is in the watershed of five Island Lake outside Emmetsburg in Palo Alto County.



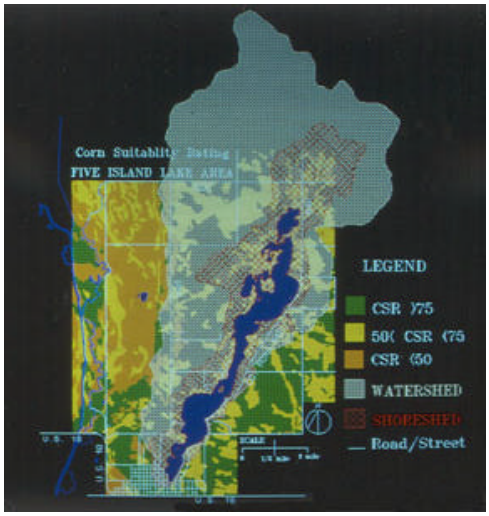
A Unites States Geological Survey (USGS) map of the area would look like the image below.



A GIS could identify specific features in that area, such as in the following image. This image shows the various soil types which are identified according to a productivity rating called the "corn suitability rating" or CSR. The CSR ranks soils on a scale of 1-100 based upon their productive potential.



In the following image the watershed of Five Mile Lake is shown in relationship to the lake and the different soil types. At this point it is possible to ask the GIS, for example, to determine the number of acres of the different soils.



This Emmetsburg example simply shows some of the capabilities and usefulness of GIS in considering a physical place such as a watershed area.

Putting GIS to Work

Some technical skill is usually needed in order to use a GIS. With the guidance of a person familiar with the technology, a group of citizens can identify and investigate the issues and concerns of their watershed in a visual and graphic manner.

Much of the data required is readily available from publicly accessible sources (many are listed below under "Data Source"). Hardware and software suggestions are listed on the following page.

Some of the initial steps to get started with using a GIS are:

? Start with a base map of your general area.

? Identify the boundaries of the watershed.

? Locate your points of interests.

? Identify issues and interests for targeted data collection.

Data Sources

http://www.gis.iastate.edu/DataBaseNew.html
This document describes a centralized geographic information system (GIS) data base maintained by the Iowa State University (ISU) GIS Support and Research Facility. The data base is a general GIS data base, maintained to support research and education. The philosophy behind the creation of the data base is to gather as much information as possible for the variety of uses of GIS information represented at ISU. These applications include everything from planning to environmental monitoring to sociological studies. The data base contains a variety of types of information developed at a variety of map scales and resolutions. Information is maintained at the national, state, and local level.

http://www.gis.iastate.edu/Links.html
Links to a large number of data sources are listed here by the GIS Support and Research Facility, which is a public computing facility established to support the use of geographic information system (GIS) technology at Iowa State University.

http://igic.gis.iastate.edu
This is the website for the Iowa Geographic Information Council (IGIC). The mission of the IGIC is to:

- act as a clearinghouse for GIS information and expertise in Iowa
- encourage the development of open GIS standards
- facilitate the voluntary exchange of data among GIS users in Iowa
- encourage the use of telecommunicationsnetworks, like the Iowa Communications Network, for exchange of ideas
- improve policy makers' knowledge of GIS and related technologies
- serve as a focal point for intergovernmental efforts to receive additional funds, especially federal funds, for GIS development in Iowa.

http://www.dot.state.ia.us/transdata/viewmaps.htm
The Iowa Department of Transportation provides access to digital transportation data through this website.

http://www.igsb.uiowa.edu/nrgis/gishome.htm
The Natural Resources Geographic Information System (NRGIS) is the geographic information system (GIS) developed and maintained by the Iowa Department of Natural Resources (IDNR). The purpose of the NRGIS is to improve the availability, integration, and analysis of natural resource information and improve decisions regarding the management, development, and protection of Iowa's natural resources.

http://www.geographynetwork.com/
The Geography Network is an online resource for finding and sharing geographic content, including maps and data, from many of the world's leading providers.

Hardware & Software

Software:

- ArcView GIS from ESRI. This is popular software package used widely thoughout the U.S. and the world. www.esri.com

  ESRI ArcExplorer Version 2.0.8

  Classic GDS, Informatix Software International Limited, Cambridge, England, http:www.informatix.co.uk/

- GeoMedia Pro by Intergraph. Another popular software package. www.intergraph.com

Hardware:

Many computer configurations are possible and this would depend upon the requirements of the software package which are regularly updated. A computer with processor speeds of over 400mhz, 128 Mb RAM, and 20 Gb hard drive would be suggested with a 17-inch minimum monitor. A color printer will allow you to print maps to share with the watershed group.