How does a GIS work?

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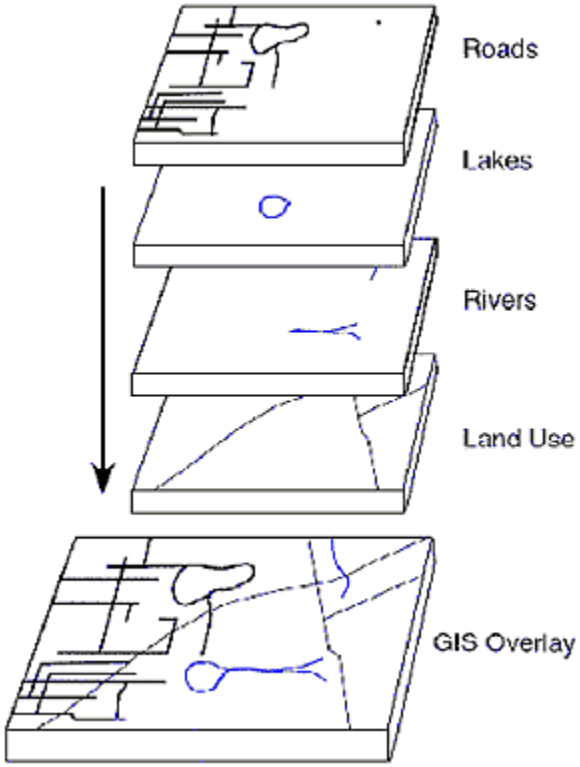
A GIS expands the two-dimensional nature of a map to include information from a database. For example, a map can tell you where a river is located, but a GIS can show you where it is located and with the appropriate data layers can tell you what its average flow is, how clean the water is, how many people use it, or how close the nearest boat launch is.

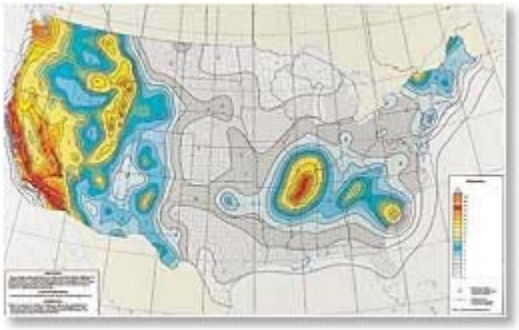


What Can You Do with GIS?

Map Where Things Are

Mapping where things are lets you find places that have the features you're looking for, and to see where to take action.

1. Find a feature—People use maps to see where or what an individual feature is.
2. Finding patterns—Looking at the distribution of features on the map instead of just an individual feature, you can see patterns emerge.



Maps of the locations of earthquake shaking hazards are essential to creating and updating building codes used in the United States. Online, interactive earthquake maps, as well as seismicity and fault data, are available at earthquake.usgs.gov.

Map Quantities

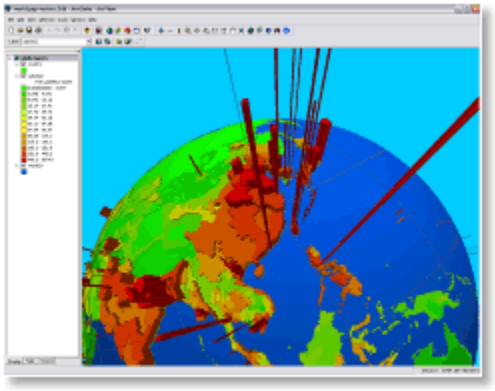
People map quantities, like where the most and least are, to find places that meet their criteria and take action, or to see the relationships between places. This gives an additional level of information beyond simply mapping the locations of features.

This map shows the number of children under 18 per clinically active pediatrician for a particular study area. It was created by the Center for the Evaluative Clinical Sciences at Dartmouth Medical School as part of an effort to develop a national U.S. database of primary care resources and health services.

For example, a catalog company selling children's clothes would want to find ZIP Codes not only around their store, but those ZIP Codes with many young families with relatively high income. Or, public health officials might not only want to map physicians, but also map the numbers of physicians per 1,000 people in each census tract to see which areas are adequately served, and which are not.

Map Densities

While you can see concentrations by simply mapping the locations of features, in areas with many features it may be difficult to see which areas have a higher concentration than others. A density map lets you measure the number of features using a uniform areal unit, such as acres or square miles, so you can clearly see the distribution.



Mapping density is especially useful when mapping areas, such as census tracts or counties, which vary greatly in size. On maps showing the number of people per census tract, the larger tracts might have more people than smaller ones. But some smaller tracts might have more people per square mile—a higher density.

This map shows population density in the east Asian and Indian Ocean regions.

Find What's Inside

Use GIS to monitor what's happening and to take specific action by mapping what's inside a specific area. For example, a district attorney would monitor drug-related arrests to find out if an arrest is within 1,000 feet of a school--if so, stiffer penalties apply.

This image from The Sanborn Map Company, Inc., shows a geoprocessed sample explosion radius around an area in California. Each separate zone represents 1/4-mile, the outermost perimeter being 1 mile away from the source.

Find What's Nearby

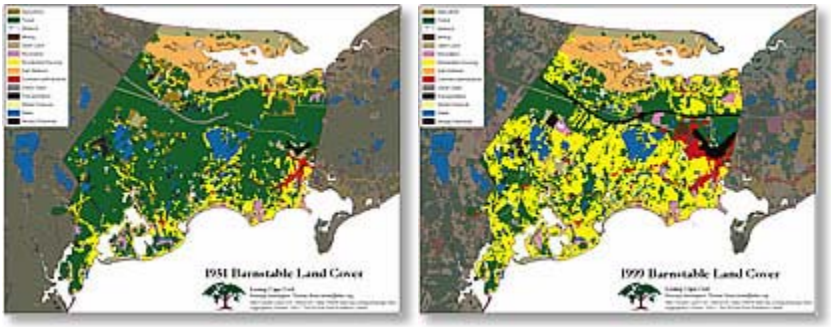
Find out what's occurring within a set distance of a feature by mapping what's nearby.

The Pacific Disaster Center has developed and applied a Vulnerability-Exposure-Sensitivity-Resilience model to map people and facilities (what's nearby) exposed to flood risk in the Lower Mekong River Basin (the feature).

Map Change

Map the change in an area to anticipate future conditions, decide on a course of action, or to evaluate the results of an action or policy.

1. By mapping where and how things move over a period of time, you can gain insight into how they behave. For example, a meteorologist might study the paths of hurricanes to predict where and when they might occur in the future.
2. Map change to anticipate future needs. For example, a police chief might study how crime patterns change from month to month to help decide where officers should be assigned.
3. Map conditions before and after an action or event to see the impact. A retail analyst might map the change in store sales before and after a regional ad campaign to see where the ads were most effective.



These images are from a poster titled "Losing Cape Cod," which is distributed by the Woods Hole Research Center in Woods Hole, Massachusetts. The poster shows the severe change in land use on Cape Cod since 1951. The image on the left shows the town of Barnstable in 1951 and the image on the right shows Barnstable in 1999.

GIS Showcase

GIS improves the speed and accuracy with which you act by uncovering trends and patterns hidden in your data.

GIS has demonstrated real business value, or return on investment (ROI). During the last 30 years companies, agencies, academic institutions, and governments worldwide have implemented GIS programs to take advantage of these benefits.

GIS visually integrates data, increases efficiency, and improves outcomes by facilitating communication and collaboration.

Creating Client Proposals with Internet GIS [PDF]

Lamar Advertising Company uses GIS to cost-effectively share sophisticated mapping resources with their sales force and clients.

GIS supports evidence-based decision making by providing a relevant analytical framework.

GIS and Web Services Help Levi Strauss & Company Find the Best Retailers [PDF]

Levi Strauss & Company uses GIS to manage the growth and approval of new authorized retailer locations and views it as an essential business tool.

GIS adds considerable value to existing information by leveraging existing IT and data investments.

GIS Integrates with SAP to Increase Efficiency in Route Planning [PDF]

Schindler Elevator Corporation uses GIS in conjunction with SAP to manage several million service hours per year and estimates it has gained more than $1 million in improved efficiency.

GIS brings reality to data analysis and information presentation by letting you see things as they really are or will be.

Creating Equitable Insurance Quotes with GIS [PDF]

Norwich Union uses GIS to identify properties at risk from flooding and predict to what extent they would be affected. With GIS, the insurer has reduced business risk and developed a more accurate system of flood insurance premiums.