BACKGROUNDER

MAPS AND GIS

What do photographs, interviews, books, movies, and maps have in common? They can all be used to tell the story of a place.

Maps are powerful tools that can display characteristics of a place at a moment in time or reveal change over time. By comparing maps from different periods, viewers can unveil the history and stories of a place, as well as make predictions about the future.

What is a map?

A **map** is a graphic illustration of a place, usually from directly above, that accurately depicts distance, direction, and scale. Maps can be used to illustrate selected physical, cultural, or social features, and can also represent abstract information such as population density or ethnic diversity. The "big picture" represented in maps greatly enhances decision-making, whether the goal is to find the fastest route to school or to shape the future of the community.

A MATTER OF SCALE

The **map scale** is a crucial part of any map, as it shows the relationship between distance on the map and distance on the ground.

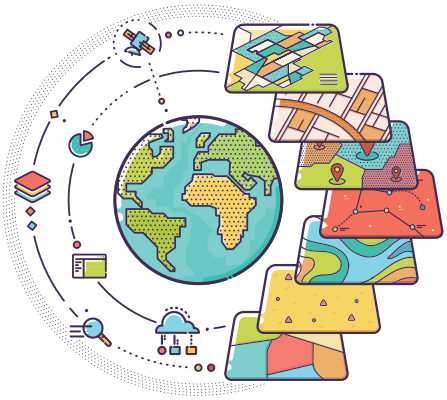
Some map scales are shown as a graphic or bar scale, such as:

Other map scales are provided as a ratio or representative fraction. For example, 1/10,000 or 1:10,000, means that one unit of measurement on the map represents 10,000 of the same units on the ground. If the scale is 1:63,360, then 1 inch on the map represents 63,360 inches or 1 mile on the ground. The first number in the ratio (the map distance) is always 1. The second number (the ground distance) is different for each scale. The larger the second number is, the smaller the scale of the map.

What is GIS?

A Geographic Information System (GIS) is a computer system for capturing, storing, and displaying data related to positions on Earth's surface. GIS connects data to maps, integrating location data (where things are) with all types of descriptive information (what things are like there).

A GIS manages location-based information in data layers—one layer for each characteristic, such as population characteristics or vegetation types—and provides the tools to overlay, display, and analyze the information contained in those data layers. GIS can show many kinds of data on one map, enabling users to understand patterns, relationships, and geographic context.



How does GIS work?

First, geographic information is compiled, often with Global Positioning System (GPS) satellite receivers, which determine the latitude and longitude of points on Earth. Once gathered, the information is downloaded to the GIS software and used to create maps. Sometimes, this information can be downloaded from different organizations, including the U.S. Census Bureau. GIS software takes numbers and words from the columns and rows in a database and plots them on a map by tying each piece of data in a data layer to a specific location.

Transforming data into a map format helps reveal patterns that may not be apparent otherwise. A growing number of professionals and industries use GIS applications. For example:

- Biologists, ecologists, botanists, foresters, and wildlife and natural resource managers use GIS to analyze, interpret, and present biological data, such as the Forests to Faucets 2.0 mapping tool.
- Transportation planners use GIS to monitor mass transit systems, map highway systems, or track shipping vessels.
- Telecommunications specialists use GIS for network planning, customer relations, and marketing strategies.
- Real estate agents and market analysts use GIS to examine housing values and trends.
- Archaeologists use GIS to document, organize, and display their excavations and findings.

FOREST FACT

Urban forests and neighborhood trees help to prevent runoff and erosion, thus maintaining water quality. For example, 1 inch of rainfall on a 10,000-square-foot area with no trees will generate 639 cubic feet of runoff, but if 30% of the area is covered by tree canopy, it will generate just 3.9 cubic feet of runoff.

How to map change?

Examining changes to physical components of a community over time can provide insight into the causes and consequences of community change, and often reveals how those changes are connected. For example, growing numbers of houses and schools usually indicate population growth. New developments might lead to expanding sewer lines and the reduction of green space.

REFLECTION QUESTIONS

1. What is the difference between GIS and a standard map?
2. What kinds of questions can GIS help to answer?
3. How does using GIS help to make patterns more visible?