Definition: topography from *The Hutchinson Unabridged Encyclopedia with Atlas and Weather Guide*

Surface shape and composition of the landscape, comprising both natural and artificial features, and its study. Topographical features include the relief and contours of the land; the distribution of mountains, valleys, and human settlements; and the patterns of rivers, roads, and railways.

Summary Article: Topographic Maps
From *Encyclopedia of Environment and Society*

A TOPOGRAPHIC MAP is a depiction of the earth's landscape, displaying elevation and selected natural and human features. The map portrays elevation as contour lines, lines that connect points of equal elevation, the natural features of hydrology and vegetation, and a variety of cultural characteristics such as roads, buildings, or cemeteries. Topographic maps are generally produced at different scales, with corresponding variations in the configuration of contours, natural and human features and labels to make the map legible.

Landscape portraits depicting relief have been used for over 2,000 years. Beginning in the Middle Ages and continuing into the 1800s, hachuring was used to illustrate slope, using lines drawn downhill to illustrate steep or low relief. In the early to mid-1800s, the French were the first to use contour lines for elevation. To begin, elevations at known locations are collected using surveying techniques. Contours lines are formed by connecting points of equal elevation, interpolating the elevation values between known point heights creates the equal elevation sites.

The topographic map depicts a specific portion of the earth's surface based on the map scale. For instance, the 1:24,000 scale map covers an area of 7.5 minutes of latitude by 7.5 minutes of longitude, an area of approximately 57 square miles (147 square kilometers), while the 1:100,000 scale map covers 30 minutes of latitude by 1 degree of longitude and an area of approximately 1,805 square miles (4,675 square kilometers). The 1:250,000 scale map represents an area of 1 degree of latitude by 2 degrees of longitude, an area of almost 7,845 square miles (20,320 square kilometers). The areal coverage will increase with latitudes closer to the equator or decrease with latitudes closer to the polar regions because of the convergence of longitude lines.

The topographic map presents the terrain as a series of lines depicting levels of constant elevation. Each line represents a set height above mean sea level (MSL). Most maps will have a standard contour interval—such as 10, 20, or 40 feet—by which the elevation will increase (upslope) or decrease (downslope) from one contour to another. Index contour lines are labeled with the elevation in either feet or meters, depending on the scale. In addition to the contour lines, the topographic map will display spot elevations, hydrologic features (streams, lakes, ponds), vegetation (green areas), select cultural features and several different coordinate systems (latitude/longitude, UTM, SPC, and PLSS). The amount of additional information illustrated on the map will depend on the map scale, with the primary purpose not to display everything but to present a visually-readable map of the terrain with additional information for locational reference.

To begin an interpretation and analysis of a topographic map, the map scale, location of the mapped...
area, and the contour interval has to be known. There are five basic rules in topographic map interpretation. First, any location on the same contour line will have the same elevation. Second, contour lines will never cross each other. Third, generally speaking, a move to an adjacent contour line is a change in elevation either an increase or a decrease. Fourth, the closer the contour lines are together the more rapid the change in elevation and the steeper the slope, conversely, the farther apart the contour lines the less slope or the flatter the terrain. Fifth, contour lines crossing a stream or drainage channel will form a V-shape, with the apex pointing uphill or upstream.

Today in the United States, the U.S. Geological Survey produces over 54,000 topographic maps at a scale of 1:24,000 for the conterminous United States and Hawaii, and a scale of 1:63,360 for Alaska. In addition, the entire United States is covered at scales of 1:100,000 and 1:250,000. Currently, it requires the integration of field surveying for horizontal and vertical accuracy and control, the use of aerial photography and analysis for contour mapping, printing techniques to produce the topographic map, and computer analysis and databasing for storage and reproduction. Topographic maps are now produced as a paper copy or a computer-compatible file, to be downloaded into mapping software or into global positioning system units for visualization and location. The use of computers for computation and illustration also allows the cartographer to combine contour lines with different types of color-shading and light enhancement to create a 3-dimensional perspective, emphasizing the landscape relief.

SEE ALSO:
Global Positioning Systems (GPS); Latitude; Longitude; Maps.

BIBLIOGRAPHY

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