

Chapter 2 You and Maps

Understanding the world better

After going through the examples in the previous section, you have probably noticed one thing—we used lots of maps to give a clear picture of the areas discussed. We have seen that maps are powerful means of conveying messages related to places or location. Now let us look at maps in more detail.

A map is a picture of a place. It gives you a better understanding of that place. It is a two dimensional representation of a particular place. Maps are made for many reasons and, therefore, they vary in content and context. Different maps show different information. Different symbols are used to represent the features of the environment on a map. They are explained in the legend for each map.

Some examples

A photograph

A photograph shows a place as our eyes see it. However, the area that is viewed on the ground is limited. It is often difficult to see a substantial landscape in one photograph (Figure 2.1).

Aerial photograph

A photograph taken from an aircraft is known as an aerial photo (Figure 2.2). These photographs are normally taken to prepare maps of an area. Aerial photographs give a 'birds-eye' view of the earth's surface. Features on earth look different from above; consequently, field experience is needed to make correct interpretations of these photographs.



Figure 2.1
A photograph of a landscape



Figure 2.2
Aerial photograph

Shaded relief map

A shaded relief map shows how an area looks when sunlight is shining on it from a particular direction (Figure 2.3). It gives an impression of the nature of the terrain. We can visualise whether an area is plain or rugged by looking at these maps.

Topographic map

A topographic map (Figure 2.4) shows the shape of the earth's surface by contour (elevation) lines. Contours are the imaginary lines that join points of equal elevation on the surface of land above or below a reference surface such as mean sea level. These maps include symbols that represent features such as streets, buildings, rivers and forests. Topographic maps are used by most applications as the base map on which other features or phenomena are referenced.

Road/tourist map

Road maps show people the route for travelling from one place to another. They show some physical features such as rivers and forests, and political features such as cities and towns. Normally, tourist maps emphasise the location of monuments and tourist spots.

3-D map

3-D maps show a phenomenon in three dimensions (Figure 2.6). They help us visualise an area as a continuous surface that rises and falls showing the high and low values of the phenomenon.

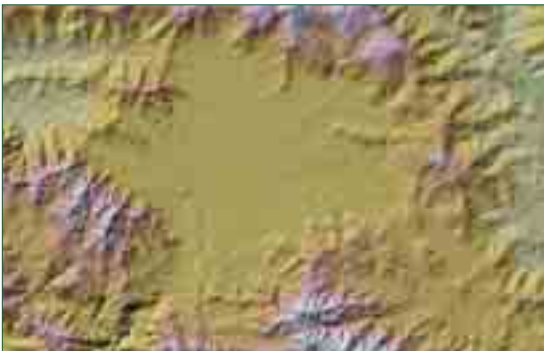


Figure 2.3
Shaded relief map



Figure 2.4
Topographic map



Figure 2.5
Tourist map



Figure 2.6
3-D map

Use of maps

Maps give us a better understanding of a place. The information they contain depends on the type of map. However, maps are used to obtain answers to the following fundamental questions.

Location: where are we?

We sense our surroundings visually and attempt to locate ourselves with relation to visible features in the surroundings. We use rivers, mountains, buildings, trees and other landmarks to make a reference to where we stand. Similarly, we also think of places in terms of other places. For example, you know where you live relative to your friends' houses, your school and the supermarket you visit.

Since these features are depicted on a map with their positions relative to each other, we can locate ourselves by relating these features on the map and these features in our surroundings. To know exactly where we stand in a more scientific way, maps also provide information on latitude and longitude, the co-ordinate system to measure all places on the earth.

Navigation: where are we going?

Travelling is a part of our daily life, whether it is going from our house to school or going from one city to another. Travel depends on skills of navigation; this is the ability to find a route from one place to another and back. Maps have been used as an aid for navigation since ancient times. From a tourist in a new town to a captain of an aeroplane, everybody uses maps and navigation charts as a guide to reach to their destinations.

Information: what else is here?

Apart from road maps and topographic maps that help us locate ourselves and navigate, there are many other types of maps, which are made for conveying information on a specific topic. These are known as thematic maps. They are made for a purpose. Maps of rainfall, temperature, earthquake zones, household incomes or spread of typhoid are thematic maps that give us information on a theme in the area concerned.

Exploring: where do we go from here?

With developments in science and space technology, the making of maps and expansion of their uses have made great progress in the last few decades. Developments in data acquisition techniques—such as remote sensing, digital photogrammetry and global positioning—and the graphic capabilities of computers have greatly changed mapping techniques and practices.

Mapping technologies are being used in many new applications. Biological researchers are exploring the molecular structure of DNA or mapping the genome, geophysicists are mapping the structure of the earth's core, oceanographers are mapping the ocean floor and so on. Mapping techniques are being used to explore the relationships between ideas in what is known as concept mapping.

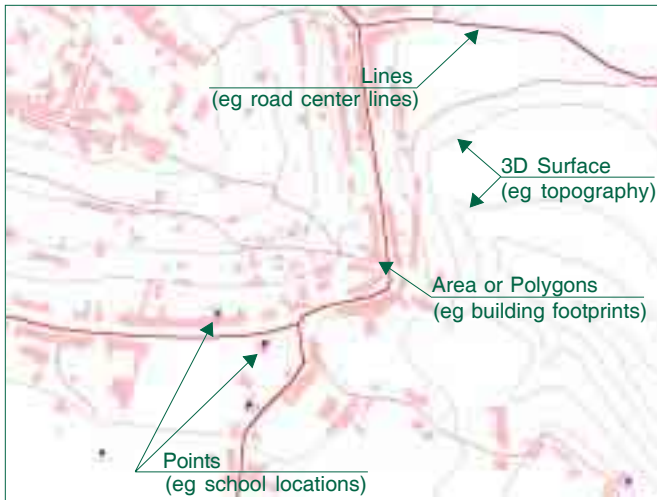


Figure 2.7
Types of map
feature

Map reading

Reading a map means interpreting the colours, lines and other symbols. Features are shown as points, lines or areas depending upon their size and extent (Figure 2.7). Besides recognising the features, knowing their locations and distances accurately is also important. Map symbols and map scale provide this information.

Point features

Point features or geographically defined occurrences are features whose location can be represented by a single x, y or x, y, z location. Points

have no linear or area dimensions but simply define the location of a physical feature (e.g. control point monument, sign, utility pole) or an occurrence (e.g. accident).

Line features

Lines represent features that have a linear extent but no area dimensions. Centrelines of roads, water mains and sewer mains are examples of line features.

Area features

Area features, also called polygons, have a defined two-dimensional extent and are delimited by boundary lines that encompass an area. Typical area features are maintenance districts and soil types.

Three-dimensional surfaces

Some geographic phenomena are best suited to representation in three-dimensional form covering an area. The most frequent example is surface terrain often represented by contour lines that have an elevation value. This concept can be applied to other spatially continuous data as well. For instance, population density or income levels could be mapped as a third dimension to support demographic analysis or water consumption statistics.

Scale

Map scale describes the relationship between mapped size and actual size. It is expressed as a relationship between linear distances on the map and corresponding ground distance. Two methods of notating scale are commonly used.

Inch-foot equivalent. The scale relationship is expressed as '1 inch = x feet' where the map distance of 1 inch equates to its corresponding ground distance.

Representative fraction (RF). This is a pure fraction that represents the ratio of map distance to ground distance without specifying any measurement unit. The

inch-foot equivalent of 1 inch = 100 foot is represented in RF form as 1:1200 or 1/1200.

Large-scale maps cover small areas and usually include a greater level of detail than small-scale maps that depict larger areas in lesser detail. There are no precise definitions for large or small scale but, for most map users, the following general scale categories apply.

Large scale: 1"	= 50' to 1"	= 200' (1:240 to 1:1200)
Medium scale: 1"	= 100' to 1"	= 1000' (1:1200 to 1:12,000)
Small scale: 1"	= 1000' to 1"	= 5000' (1:6000 to 1:60,000)
Very small scale: 1"	= 5000' and smaller	(1:60,000 and smaller)

Symbols

The meaning of each symbol used in a map is described in the map's legend. However, many symbols in topographic maps have become conventional and can be interpreted without looking at the legend. For example, an area feature shown in green is vegetation, blue is water and a built-up area is grey or red. Similarly, many line symbols such as curved, dashed, dotted or a combination are used to show various features. Usually the contours are brown, streams and canals are blue, roads are red and black, and borders are black dash-dots. Various point symbols are used to show schools, hospitals, temples and so on. Figure 2.8 presents some of the standard symbology used in map making.

Map projection

A globe is the best way to show the relative positions of places but it is

neither portable nor practical for large scales (Figure 2.9). The three-dimensional shape of the earth means that it is not possible to depict locations and features directly on to a two-dimensional map space without some distortions. (Try to flatten the skin of an orange on to a piece of paper.) Map projection is a procedure to transform locations and features from the three-dimensional surface of the earth on to two-dimensional paper in a defined and consistent way.

The transformation of map information from a sphere to a flat sheet can be accomplished in many ways. Mapmakers have invented projections that show distances, directions, shapes or areas as they are on a globe to at least some extent. Each projection has advantages



Figure 2.8
Map symbols



Figure 2.9
A Globe

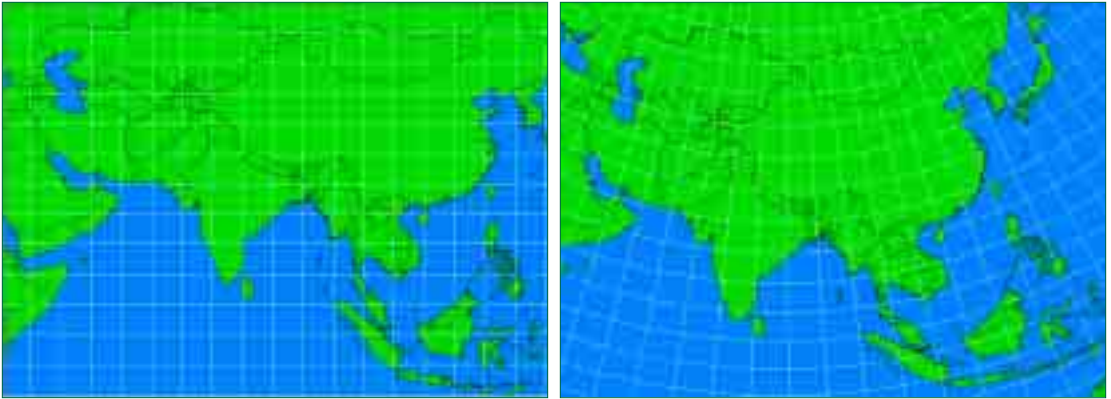
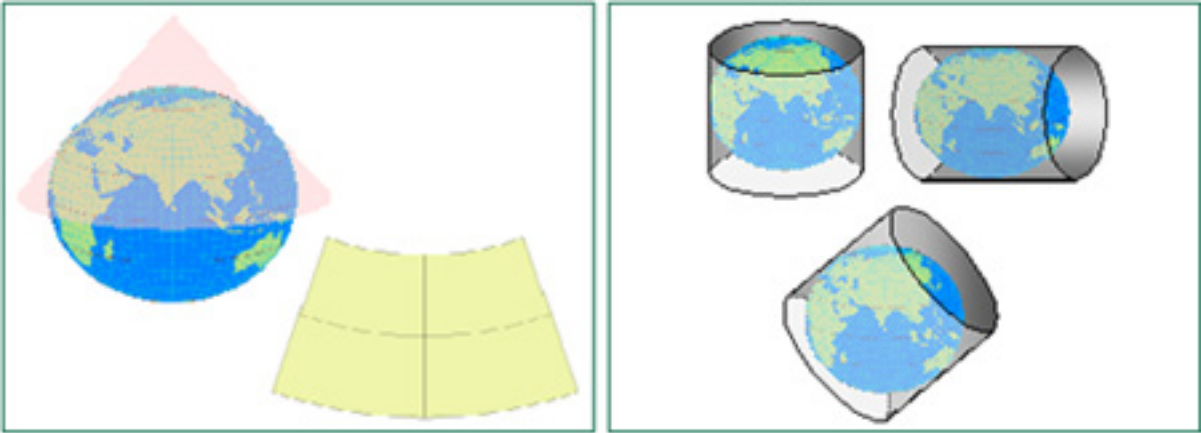


Figure 2.10
 Plate carree projection and albers equal area projection



Conical projections

Cylindrical projections

and disadvantages. Orthographic projections, for example, show shapes as they appear when the globe is viewed from space. Equal-area projections do not distort the size of areas but do distort their shape. Conformal projections are those on which the scale is the same in any direction at any point on the map. Many projections retain one geometric quality and a few retain more than one, but no single projection can accurately portray area, shape, scale and direction (Figures 2.10, 2.11 and 2.12).