



Objectives:	Understanding of Coordinate Reference Systems.
Keywords:	Coordinate Reference System (CRS), Map Projection, On the Fly Projection, Latitude, Longitude, Northing, Easting

Overview:

Map projections try to portray the surface of the earth or a portion of the earth on a flat piece of paper or computer screen. A **coordinate reference system** (CRS) then defines, with the help of coordinates, how the two-dimensional, projected map in your GIS is related to real places on the earth. The decision as to which map projection and coordinate reference system to use, depends on the regional extent of the area you want to work in, on the analysis you want to do and often on the availability of data.

Map Projection in detail

A traditional method of representing the earth's shape is the use of globes. There is, however, a problem with this approach. Although globes preserve the majority of the earth's shape and illustrate the spatial configuration of continent-sized features, they are very difficult to carry in one's pocket. They are also only convenient to use at extremely small scales (e.g. 1 : 100 million).

Most of the thematic map data commonly used in GIS applications are of considerably larger scale. Typical GIS datasets have scales of 1:250 000 or greater, depending on the level of detail. A globe of this size would be difficult and expensive to produce and even more difficult to carry around. As a result, cartographers have developed a set of techniques called **map projections** designed to show, with reasonable accuracy, the spherical earth in two-dimensions.

When viewed at close range the earth appears to be relatively flat. However when viewed from space, we can see that the earth is relatively spherical. Maps, as we will see in the upcoming map production topic, are representations of reality. They are designed to not only represent features, but also their shape and spatial arrangement. Each map projection has **advantages** and **disadvantages**. The best projection for a map depends on the **scale** of the map, and on the purposes for which it will be used. For example, a projection may have unacceptable distortions if used to map the entire African continent, but may be an excellent choice for a **large-scale (detailed) map** of your country. The properties of a map projection may also influence some of the design features of the map. Some projections are good for small areas, some are good for mapping areas with a large East-West extent, and some are better for mapping areas with a large North-South extent.