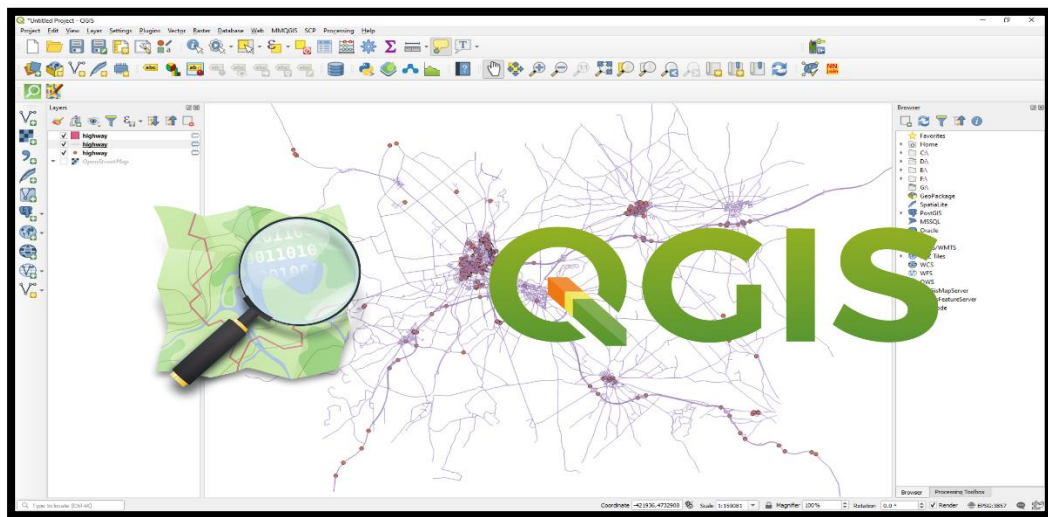


Remote sensing and Geographic Information System

Geography is the study of earth's features and patterns of their variations in spatial allocation and time. Many questions in agricultural production are geographic in nature as the production depends on the environment and prevailing socio-economic conditions, both of which vary spatially in time. For example questions related to natural resources management, precision agriculture, agro ecological classification for land use planning, regional trends and patterns in technology adaptation, agricultural productivity and income, non-point source pollution from agricultural lands etc., Answering these questions requires access to large volumes of multidimensional geographical (spatial) information of weather, soils, topography, water resources, socio economic status etc., Further, answers to even apparently simple questions require that that data from several sources be integrated in a consistent form. Geographical Information Systems or GIS enable representation and integration of such spatial information.



The traditional method of presenting Geographical Information in two dimensions is in the form of maps. Maps are graphic representation of the earth's surface on a plane paper. They shape the way we visualize, access and analyse spatial information. A map consists of points, lines and area elements that are positioned with reference to a common co-ordinate system (usually Latitude & Longitude). They are drawn to specified scales and projection. Map scales can vary and depend on the purpose for which the maps are created. Projection is a mathematical transformation used to represent the real three-dimensional spherical surface of the earth in two dimensions on a plane sheet of paper. The map itself serves to store and present data to the user. Such, analogue maps (on paper) are cumbersome to produce and use, particularly when there are large numbers of them use for analysis. Computer based GIS facilitates both creation of maps and using them for various complex analysis. It allows working with geographic data in a digital format to aid decision making in resources management.

GIS is a generic term implying the use of computers to create and display digital maps. The attribute data, which describe the various features presented in maps, may relate to physical.

Chemical, biological, environmental, social, economic or other earth surface properties. GIS allows mapping, modelling, querying, analysing and displaying large quantities of such diverse data, all held together within a single data base. Its power and appeal stem from its ability to integrate quantities of information about the environment and the wide repertoire of tools, it provides to explore the diverse data. The history of development of GIS parallels the history of developments in digital computers and data base management systems on one hand and those in cartography and automation of map production on the other. The development of GIS has also relied upon innovations made in several other disciplines – geography, photogrammetry, remote sensing, Civil engineering, statistics etc.

A GIS produce maps and reads maps. Its major advantage is that it permits identifying spatial relationships between specific different map features. It can create maps in different scales, projections and colors. But it is not just a map-making tool. It is primarily an analytical tool that provides new ways of looking at, linking and analyzing data by projecting tabular data into maps and integrating data from different diverse sources. This is done by allowing creation of set of maps, each with a different theme (soils, rainfall, temperature, relief, water sources, etc.).

From its early beginnings, GIS has been integrating technology both from the point of view of its development as well as its use. This is because, once geographic information of any kind is translated into the digital form in a GIS, it becomes easy to copy, edit, analyze, manipulate and transmit it. This allows vital linkages made between apparently unrelated activities based on common geographic location. This has led to fundamental changes in the way resource management decisions are made in a variety of situations—forest management, marketing management, utility management, transportation, as well as in agricultural, environmental, and regional planning and management. Some potential agricultural applications where GIS can lead to better management decisions like precision farming, land use planning, watershed management, pest and disease management, irrigation management, resources inventory and mapping, crop area assessment and yield forecasting, biodiversity assessment, genetic resources management, etc.