

## Geographic Information System

Dr. Gayotri Changkakoti

Professor

Geographic Information System (GIS) is a computer-based tool that allows users to capture, store, analyze and visualize geographic data. It combines hardware, software and data to process geographically referenced information, helping users understand patterns, relationships and geographic content. GIS integrates various data layers and uses mapping technologies to facilitate informed decision making.

A working GIS integrates five key components- hardware, software, data, people and methods.

1. Hardware: - The hardware component of a GIS comprises of a computer, servers and other equipments for data storage and processing.
2. Software: - Software includes GIS software for data management, analysis and visualization.
3. Data: - Spatial data and associated attribute data.
4. Methods: - Includes techniques for data inputs, processing analysis and visualization.
5. People: - Many people are involved in GIS such as GIS professional users and stakeholders who utilize GIS technology.

### Uses of GIS

Geographic Information System (GIS) are versatile tools used for managing, analyzing and visualizing geographic data.

It is widely used in fields like urban planning, resource management, environmental monitoring, agriculture, public health, tourism and a host of other fields. They provide a foundation for mapping and analysis that is used in science and almost every industry.

1. Urban Planning: - Most governments use GIS data and GIS based solutions for urban planning, zoning and land use projects. GIS plays a crucial role in

urban planning by providing tools for spatial analysis, data visualization and decision-making. It helps planners identify optimal locations for development, manage urban resources and address various urban challenges. GIS allows for the integration of diverse data sources, enabling planners to better understand urban dynamics and develop targeted solutions.

2. Weather Forecasting: - As extreme weather events increase in intensity and frequency across the globe it becomes all the more urgent for planning and preparing for any eventually for governments and other related departments. Software solutions that combine geospatial data, GIS mapping and advanced environmental analytics enable organizations to make different types of weather-related data actionable. Accurate forecasts use digital maps to help organizations better predict and respond to weather events.
3. Agriculture: - In an agricultural country like India GIS technology makes productive sustainable farming possible by providing accurate comprehensive data about agriculture. Correct knowledge regarding land changes, affecting crop health, which crops will grow better in what type of soil will help improve decision making and make crop management more efficient.
4. Climate Change: - In the global fight against climate change, GIS technology can be an effective tool by providing a comprehensive view of current environmental issues. Detailed visualization through GIS will enable organizations to monitor risks, anticipate potential issues and search for solutions. GIS tools help scientists better understand changing weather patterns which helps governments and organizations make better strategic decisions. In case of a weather crisis, intelligence-based data and satellite imagery ensure that first responders and recovery workers are where they are needed most-and once the crisis is under control, GIS can assist in making sure structures and services are in running condition.
5. Mapping: - GIS software allows users to create various types of maps from basic road maps to highly detailed thematic maps showing specific information like population density or land use. GIS can help visualize complex data in a spatial context making it easier to understand patterns and trends. GIS often allows for interactive exploration of maps, enabling users to zoom, pan and filter data to focus on specific areas or information.
6. GIS in healthcare: - GIS plays a crucial role in healthcare particularly in public health and disease surveillance by providing tools for visualizing and

analyzing spatial data to identify patterns and trends. GIS helps track the outbreak of epidemics like influenza, Zika virus and COVID-19 by mapping the locations of cases and outbreaks, identifying hot spots and predicting future risks of these diseases. GIS can also identify high prevalence areas of diseases which help in targeting interventions. It is also used to optimize the location and capacity of healthcare facilities, including scheduling appointments, managing equipment and optimizing space utilization within hospitals and clinics. Mobile GIS applications can be used by healthcare professionals in the field to collect data, track patients and manage resources. As a whole GIS empowers healthcare professionals and policy makers to make data driven decisions, improve healthcare delivery and address health disparities.

### Conclusion

In conclusion it can be said that GIS has become an indispensable technology bringing about transformation in managing spatial data. Due to its ability to analyze, visualize and integrate geospatial information it has become an important tool in multiple fields from urban planning, healthcare, environmental management. Thus, it can be said that GIS is a powerful technology that helps us understand our world better and make more informed discussions to address complex problems.