

# EYES IN THE SKY AND ANALYSIS OF INFORMATION

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## REMOTE SENSING

- Collecting information about an object, place or phenomenon without actual physical contact is remote sensing.
- Devices used for data collection in remote sensing are called sensors.  
Eg: Cameras and scanners are sensors.

⇒ Data collection using satellites began in 1960.

## PLATFORM

- The carrier on which sensors are fixed is called a platform.

Classification of remote sensing Based on the source of energy

### 1. PASSIVE REMOTE SENSING:

- Remote Sensing is carried out with the help of solar energy is known as passive remote sensing.
- Here the sensors do not emit energy by itself.

### 2. ACTIVE REMOTE SENSING:

- Remote Sensing made with the aid of artificial source of energy is known as active remote sensing.

## CLASSIFICATION OF REMOTE SENSING BASED ON THE PLATFORM

### 1. TERRESTRIAL PHOTOGRAPHY:

- The method of obtaining the earth's topography using cameras from the ground is known as terrestrial photography.

## **2. AERIAL REMOTE SENSING:**

- The method of obtaining photographs of the earth's surface continuously from the sky by using cameras mounted on aircrafts is known as aerial remote sensing.

## **3. SATELLITE REMOTE SENSING:**

- The process of gathering information using the sensors installed in artificial satellites is known as satellite remote sensing.

## **OVERLAP IN AERIAL PHOTOGRAPHS**

- For ensuring continuity and to obtain three dimensional vision with the help of stereoscope, in each aerial photograph covers about 60% area of the adjacent photo is included. This is called overlap of aerial photographs.

## **STEREO PAIR**

- Two adjacent photographs with overlap are known as stereo pair.

## **STEREOSCOPE**

- The instrument which is used to obtain three dimensional views from the stereo pairs is called stereoscope.

## **STEREOSCOPIC VISION**

- Three dimensional view obtained when viewed through a stereoscope is called Stereoscopic vision.

## **Limitations of aerial remote sensing:**

- The shaking of aircraft affects the quality of photos.
- Picturisation of large areas is not practical.
- The aircraft requires open space for takeoff and landing.
- Frequent landings for refueling increase the cost.

## **CLASSIFICATION OF ARTIFICIAL SATELLITES**

The artificial satellites are mainly divided into two types.

1. Geostationary satellites
2. Sun synchronous satellite

## **GEOSTATIONARY SATELLITES:**

The satellites that move in equal velocity with the earth's rotation is known as Geostationary satellites.

### **The features of these satellites:**

- They orbit the earth at an elevation of about 36000 km above the earth.
- One third of the earth comes under its field of view.
- As the movement of these satellites corresponds to the speed of rotation of the earth, it stays constantly above a specific place on the earth.
- This helps in continuous data collection of an area.
- It is used in telecommunication and for weather studies.
- India's INSAT satellites are examples of geo-stationary satellites.

## **SUN SYNCHRONOUS SATELLITES:**

Sun synchronous satellites are the artificial satellites that pass around the earth along the poles.

### **The features of these satellites:**

- The orbit of these satellites is about 900 km in altitude.
- The surveillance area is less than that of the geostationary satellites.
- The repetitive collection of information of a region at regular interval is possible.
- Used for the collection of data on natural resources, land use, ground water etc.
- These satellites are mainly used for remote sensing purposes.
- Satellites in IRS, Landsat series are examples of sun synchronous satellites.

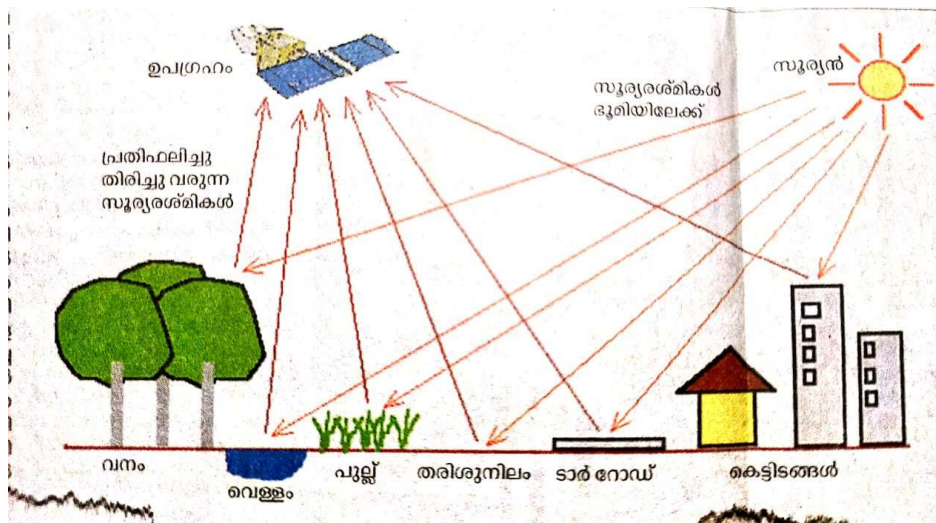
## **Terms are related to satellite remote sensing**

### **1. Spectral signature**

- The sensor records the electromagnetic radiation either reflected or emitted by objects.
- However each object reflects electromagnetic radiation differently.
- The amount of energy reflected by each object is known as spectral signature.

### **2. Satellite imageries**

- The sensors on artificial satellites distinguish objects on the earth's surface based on their spectral signature and transmit the information in digital format to the terrestrial stations.
- This is interpreted with the help of computers and converted in to picture formats. These are called satellite imageries.



### 3. Spatial resolution

- The size of the smallest object on earth surface that can be recognized by the sensors is the spacial resolution of the sensor.
- Sensors having high spacial resolution can represent objects with greater clarity.
- However, as spacial resolution decreases, satellite pictures of more areas are pictured. So it represents objects with less quality.

### USES OF REMOTE SENSING TECHNOLOGY:

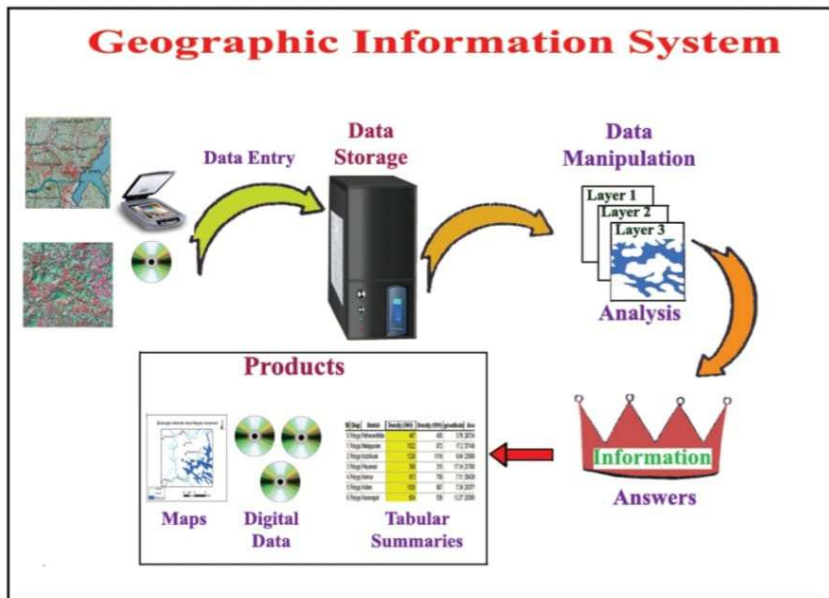
- For the assessment of weather observations.
- For ocean explorations.
- To understand the land use of an area.
- For the monitoring of flood and drought.
- For identifying forest fires in deep forests and to adopt controlling measures.
- To collect data regarding the extent of crops and spread of pest attack.
- For oil explorations.
- To locate ground water potential places.
- For studying about urbanization.
- For observing pollution.

### GEOGRAPHIC INFORMATION SYSTEM (GIS)

- Geographic Information System is a computer based information management system by which the data collected from the sources of information like maps, aerial photographs, satellite imageries, tables, surveys etc. are incorporated in to the computer using softwares, which are retrieved, analyzed and displayed in the form of maps, tables and graphs.

## DIFFERENT STAGES IN GIS:

1. Entering basic data in to computer using data input devices like CDs' and Scanners is the first step.
2. Various layers can be created based on the collected data with the help of Geographic Information System softwares.
3. The analyzed data can be converted in accordance with our needs in to products either in the form of maps, tables or digital data.



## Data analysis in GIS

- Two kinds of data are necessary for data analysis in GIS.
  1. Spatial data
  2. Attributes

## SPATIAL DATA

- Each feature on the surface of the earth has a location of its own. The features of the earth's surface having a specific location is known as spatial data.

## ATTRIBUTES

- The additional information about the characteristics of each spatial data on the earth's surface are called attributes.

## LAYERS

- Spatial data can be separated as different layers with the help of GIS softwares.
- The thematic maps prepared and stored in Geographic Information System for analytical purpose are called layers.

- The spatial relationship among the features on the surface of the earth can easily be understood by analyzing the appropriate layers.

## **ANALYTICAL CAPABILITIES OF GIS**

- The surface features of the earth collected can be analyzed in various ways by the GIS.
- Network analysis, buffer analysis and overlay analysis are the important analytical capabilities of GIS.

## **OVERLAY ANALYSIS**

- Overlay analysis is used for understanding the mutual relationship among the various features on the earth's surface and the periodic changes undergone by them.
- Overlay analysis is helpful in understanding the changes in the area of crops, the changes in land use etc.
- For example. If we want to understand the changes in the area under paddy cultivation in Thrissur district by the year 2015 compared to 2000, all we have to do is to overlay the land use maps of Thrissur in the corresponding years.

## **BUFFER ANALYSIS**

- A circular zone created around a point feature or a parallel zone created beside a linear feature in buffer analysis is called buffer zone.
- For example, suppose a road in your region is widening from 5 m to 8 m as per the government decision. In such a situation, a zone of required width is created along the existing road by using the possibility of buffer analysis in GIS. Thus we can easily determine how much land has to be acquired and how many people will become homeless.

## **NETWORK ANALYSIS**

- The linear features in the map such as road, railway, rivers etc are subjected to network analysis.
- The shortest route, routes without toll, routes with less traffic and petrol pumps, Hotels and hospitals can be identified through network analysis.
- When the road transport hangs up we can identify the shortest and less traffic routes.

## **USES OF GIS:**

- Compile data from different sources.
- Update and incorporate data easily.

- Conduct thematic studies.
- Represent geographic features spatially.
- Generate visual models of feature phenomena and processes based on the data collected.
- Prepare maps, tables and graphs.

## **SATELLITE BASED NAVIGATION SYSTEM**

- Nowadays satellite- based tracking systems are used for monitoring the location and movement of objects on the earth's surface.
- It is used in map making, transportation etc.
- Eg: Global positioning system- GPS of USA.

## **GLOBAL POSITIONING SYSTEM (GPS)**

- GPS is an instrument used for the determination of the positions of the object on the earth's surface.
- In this system a series of 24 satellites placed at 6 different orbits between the heights 20,000 and 20200 km above the earth's surface locate objects.
- GPS is an instrument that is used for carrying out surveys in a simple manner.
- It works using signals received from the artificial satellite.
- The GPS requires signals from at least 4 satellites to display information like the latitude, longitude, elevation and time. etc.
- Though started initially for the USA defence, this facility is now open to the public since 1980.
- Indian Regional Navigation System (IRNSS) were developed by India for satellite based navigation system.

## **POSSIBILITIES OF GPS:**

- Map making.
- Ocean transportation.
- To easy road transportation.
- Security transportation of valuable things and observing their location.

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Prepared by,  
 HAMZA KANNANTHODI  
 MUHSS OORAKAM  
 9847767121