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BSC. (Hons) Zoology 6th semester

Wildlife Conservation and Management

Remote Sensing and GIS

24/4/2024

* Remote Sensing

Remote sensing is the scurving of data about an object or phenomenon without connecting with the object. Hence, it is in contrast to an on-location perception. The term is applied particularly for obtaining information about the Earth. Far off remote sensing is in use in various fields. Fields including topography, land reviewing and most Earth science disciplines. For instance, hydrology, nature, meteorology, oceonography, glaciology, geography. It likewise has military, knowledge, business monetary, arranging, and philanthropic applications, among others.

⇀ What is Remote Sensing?

Remote Sensing is an innovation to assemble data and dissecting an object or phenomenon without connecting. This innovation is utilized in various fields like topography, hydrology environment, oceanography and many more.

A geographic data framework is an instrument that is in use for planning and breaking

down component occasions on Earth. The far off detecting and GIS innovation consolidate significant information base activities like measurable investigation and inquiry with maps. The GIS oversees data on areas and gives devices to examination and show of various insights that incorporate populace, financial term of events, attributes and vegetation. It like wise permits connecting information basis to make dynamic presentations. These capacities make GIS unique in relation to different frameworks and make it a wide scope of private and public far off detecting applications for arranging and forseeing results from far off detecting Satellites.

In current use, the word remote sensing generally is for the most part alludes in the utilization of satellite. Even used in aeroplane - based sensor advances to distinguish and group protests on Earth. It incorporates the surface and the air and seas, in view of spread signs. For example, electromagnetic radiation. It may be very well part into "active" distance detecting when a sign is transmitted by a satellite or aeroplane

to the item and its appearance is distinguised by the sensor and "passive" far off sensing when the impression of daylight is identified by the sensor.

Brief History of Remote Sensing

The innovation of current remote sensing or distant detecting started with the creation of the camera. Prior photos were "still photos". Yet taking Earth's pictures with the end goal of geological planning arose during the 1840s. Cameras were fixed in inflatables for taking pictures. During WWI, cameras were mounted on planes to get an aeronautical perspective on grounds which demonstrated to acquire transformation the military. It was distinctly during the Space age, Satellite remote sensing as far off detecting developed They were in use to picture Earth surfaces just as sensor another Shuttle. The expression "remote Sensing" was first in use within the united States during the 1950s by Ms Evelyn Pruitt of the Us office of Naval research.

Components of Remote Sensing

Platform → It can be defined as the carrier for remote sensing sensors. There are three main remote sensing platforms, which are mentioned below:

1) Ground-level platforms - like cranes and towers.
2) Aerial platforms - like helicopters, high altitude aircraft, and low altitude aircraft.
3) Spaceborne platforms - like space shuttles, geostationary satellites and polar-orbiting satellites.

2. **Sensors** → It is a device that is used to receive electromagnetic radiation from different objects and surfaces and convert them into a signal that can be recorded and exhibited, either in the form of numerical data or in the form of an image.

☆ There are also many elements involved in the functioning of remote sensing, which are mentioned below:

1. Source of energy (A)
2. Radiation of a source of energy in the atmosphere (B)
3. Interaction of radiation with the object (C)
4. Recording of the energy by a sensor (D)
5. Transmission, Reception, and Processing of Radiation (E)

6. Interpretation and analysis of the radiation by the sensor (F)
7. Applications of the radiation (Gr)

* Types of Remote Sensing

There are mainly two types of sensors used, which are as mentioned below:

⇒ Active Remote Sensing

Active remote sensing utilizes an artificial source of radiation as an investigation, and the resulting signal, which scatters back to the sensor, depicts the Earth or the atmosphere.
The Synthetic-Aperture Radar system is a type of active sensor, which can emit radiation in the form of a beam coming from a moving sensor and can also measure the backscattered components returning to the sensor from the ground in the region of the microwave.

⇒ Passive Remote Sensing

Passive remote sensing depends only on

Solar radiation as its source of energy, which can be seen in multispectral and hyperspectral sensors. It is mainly concentrated in the visible, near-infrared and shortwave infrared spectral regions.
These sensors at the satellite measuring the emerging radiation from the surface of the Earth's atmosphere system in the direction of sensor observation. In a remote sensing image, a grid of pixels is located to achieve image sensing by a combination of scanning in the cross-track direction and sensor platform movement along the in-track direction.

* Principles of Remote Sensing →

The principles of remote sensing involves detection and measurement of the radiations of different wavelengths which are reflected or emitted from the surface of distant object or materials, which helps in their identification and categorization

⇒ It has four basic components to measure, which include :

1. Energy Source
2. Transmission path
3. Target
4. Satellite Sensor

Among these components, as energy source which is also known as electromagnetic energy plays a very important role. As it fulfils a significant medium for transmitting the information from the target to the sensor. It can also be described as an electromagnetic spectrum on which many forms of energy exist which can be described as different types of energy in a specific region of the spectrum.

This spectrum includes visible light, radio waves, microwaves, heat waves, infrared rays, UV rays, X-rays, and gamma rays. It is also a synopsis of the continuem of ectromagnetic waves and energy from extremely short wavelengths like cosmic gamma rays to extremely long wavelengths like in television and radio waves. It should always be kept in mind that these divisions are not absolute and definite as overlapping can occur.

Relying on the wavelength and the insignificant spectral location, principle applications can be approximated with suitable satellite bands for the classification

* Application of Remote Sensing

- Conventional radar is generally connected with the ethereal traffic light, early admonition, and certain enormous scope of meteorological information. Doppler radar is in use by neighbourhood law authorizations checking of speed limits and is an improved meteorological assortment. For example, wind speed and course inside climate frameworks not with standing precipitation area and power. Different kinds of dynamic assortment remember plasmas for the ionosphere. Interferometric manufactured atomic radar is utilized to create exact advanced rise models of huge scope landscape [RADARSAT, TerraSAR-X, Magellan).

- Laser and radar altimeters on satellites have given a wide scope of information. By estimating the lumps of water.

brought about by gravity, they map highlights on the ocean bottom to a goal of a mile or somewhere in the vicinity. By estimating the tallness and frequency of sea waves, the altimeters measure wind paces and heading, and surface sea flows and bearings.

- Ultrasound [acoustic] and radar tide checks measure ocean level, tides and wave heading and seaward tide measures.

- Light recognition and going (LIDAR) are notable in instances of weapon running, laser enlightened homing of shots. LIDAR is utilized to distinguish and gauge the centralization of different Synthetic compounds in the climate, while airborne LIDAR can be in use to quantify stature of articles and highlights on the ground more precisely than with radar innovation. Vegetation distant detecting is key utilization of LIDAR.

Radiometers and photometers are the most well-known instrument being used, gathering. The most widely recognized

are noticeable and infrared sensors, trailed by microwave, gamma beam and seldom, bright. They may likewise be utilized to recognise the emanation spectra of different synthetic compounds. Giving information on surface fixations in the environments.

- Radiometers are additionally utilized around evening time, on the grounds that counterfeits light outflows are a critical mark of human activity. Applications incorporate fare off detecting of the populace, UDP, and harm to the framework from war or fiascos.
- Spectropolarimetric Imaging accounds to be valuable for a target following purposes by specialists at the U.S. Armed force Research Laboratory. They consist that artificial things have polarimetric marks that are not found in normal objects.
- Stereographic sets of aeronautical photos have regularly in use to make geographical guides by symbolism and

and landscape investigators in suitability and parkway offices for likely sources. However, demonstrating earthbound living space highlights.

Some of the areas where remote sensing can be useful for wildlife studies are :=>

- Revision and updating of stock maps.
- Fire risk Zonation
- Planning response routes
- Protected area management
- Site Suitability analysis for Afforestration
- Soil and water conservation.
- Mapping wildlife corridors
- Habitat suitability mapping.
- Prediction Analysis
- Change Detection Analysis
- Mapping Required Resources for Wildlife
- Real time tracking
- Population Mapping
- Developing and updating Web Portal of particular Wildlife.

GIS (Geographical Information System)

Making decisions based on geography is basic to human thinking where shall we go, what will it be like, and what shall we do when we get there are applied to the simple event of going to the store or to the major event of launching a bathysphere into the ocean's depths. By understanding geography and people's relationship to location, we can make informed decisions about the way we live on our planet. A geographic information system (GIS) is a technological tool for comprehending geography and making intelligent decisions.

GIS organizes geographic data so that a person reading a map can select data necessary for a specific project or task. A thematic map has a table of contents that allows the reader to add layers of information to a basemap of real-world locations. For example, a social analyst might use the basemap of Eugene, Oregon, and select datasets

from the U.S census Bureau to add data layers to a map that shows residents' education levels, ages, and employment status with an ability to combine a variety of datasets in an infinite number of ways, GIS is useful tool for nearly every field of knowledge from archaeology to zoology.

A good GIS program is able to process geography data from a variety of sources and integrate it into a map project. Many countries have an abundance of geographic data for analysis, and governments often make GIS datasets publicly available. Map file databases often come included with GIS packages; Others can be obtained from both commercial vendors and government agencies. Some data is gathered in the field by global positioning units that attach a location coordinate (latitude and longitude) to a feature such as pump station.

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GIS maps are interactive. On the computer screen, map users can scan a GIS map in any direction, zoom in or out, and change the nature of the information contained in the map. They can choose whether to see the roads, how many roads to see, and how roads should be depicted. Then they can select what other items they wish to view alongside these roads such as storm drains, gas lines, rare plants, or hospitals. Some GIS programs are designed to perform sophisticated calculations for tracking storms or predicting erosions patterns. GIS application can be embedded into common activities such as verifying an address.

From routinely performing work-related tasks to scientifically exploring the complexities of our world, GIS gives people the geographic advantage to become more productive more aware, and more responsive citizens of planet Earth.

GIS For Wildlife Management

Human-caused disruptions, such as habitat loss, population, invasive species introduction, and climate change, are all threats to wildlife health and biodiversity. GIS technology is an effective tool for managing, analyzing, and visualizing wildlife data to target areas where interventional management practices are needed to monitor their effectiveness. GIS helps wildlife management professionals examine and envision:

- Habitat requirements and ranges
- Population patches and linkages
- Disease levels within populations
- Progress of management activities
- Historical and present wildlife densities

> Understanding the specific needs of wildlife populations is key to preventing local or global extinctions, rehabilitating populations, and restoring habitat.