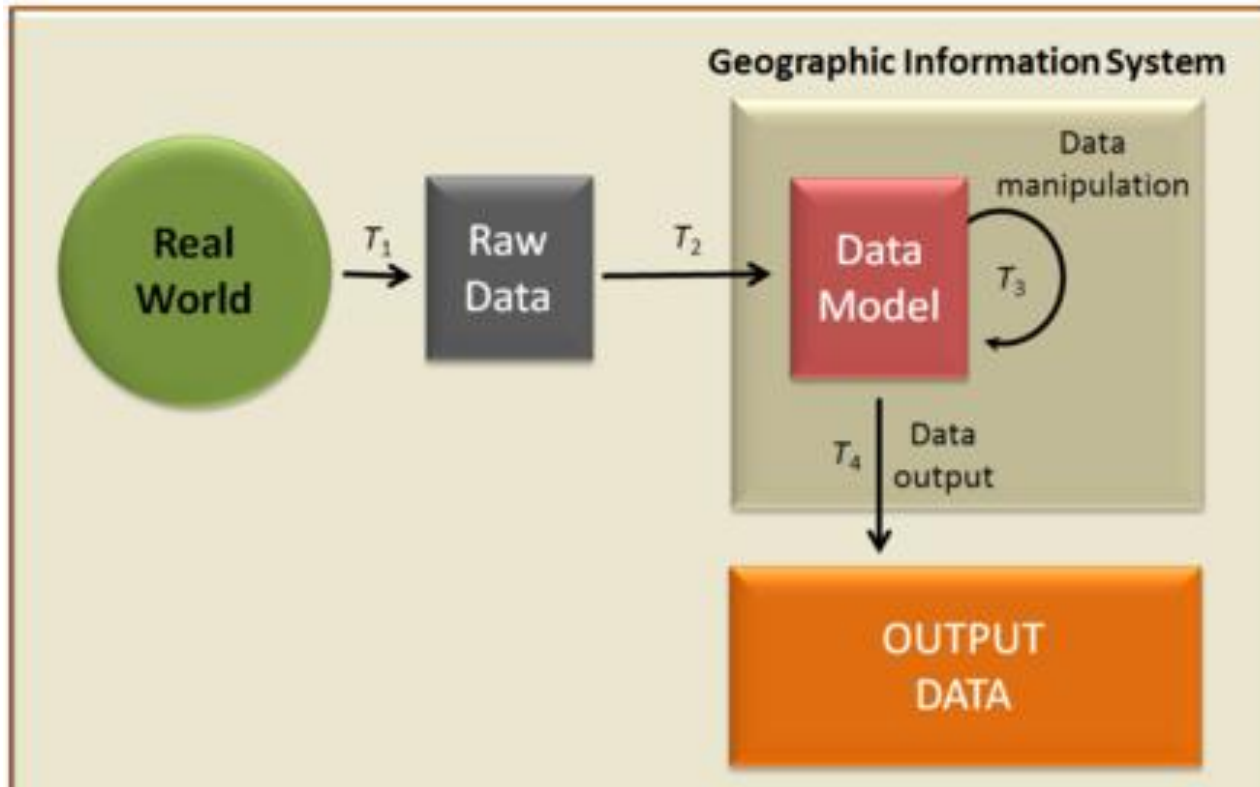


# Application of GIS and remote sensing in wildlife biology



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# Introduction

- Wildlife and Biodiversity management require a reliable and relevant data on the distribution of species, abundance, their habitats, as well as threats. Therefore, **Remote Sensing and GIS (Geographic information system)** assists in data collection and to analyse the abundance of wildlife as well as provide suitable data for conservation management and planning.
- **GIS** is a computerized system designed for the storage, retrieval and analysis of geographically referenced data. GIS uses advanced analytical tools to explore at a scientific level the spatial relationships, patterns and processes of cultural, biological, demographic, economic, geographic and physical phenomena.
- **Remote sensing** is the acquisition of information about an object or phenomenon without making physical contact with the object, in contrast to in situ or on-site observation. The term is applied especially to acquiring information about the Earth and other planets. Remote sensing is used in numerous fields, including geography, land surveying and most Earth science disciplines. Other uses include different areas of the earth sciences such as natural resource management, agricultural fields such as land usage and conservation.

- ❑ According to the IUCN (1996), “The main purpose of wildlife conservation is to maintain maximum plant and animal diversity through genetic traits, ecological functions and bio-geo-chemical cycles, as well as uphold aesthetic values.”
- ❑ Remote sensing and GIS are the most efficient means for management of our natural resources. Respective coverage from various satellites provides an excellent geographic database for future planning of our resources. Resource information system is the primary need for planning management and its valuable implementation.
- ❑ Geographic Information System (GIS) can provide spatial information with relevant conventional statistics when data is made computer readable. It can help in changing the very approach of wildlife management based more on current information and location oriented.
- ❑ **Remote Sensing techniques (both satellite image and aerial photo interpretation)** play a vital role in wildlife and biodiversity management because of its unique Characteristics of synoptic view, repetitive coverage, and uniformity. The forest management objective where the Remote Sensing has a significant roles to play a revision and updating of working plan, wildlife management, logging planning, fire control, land utilization studies, grazing land management, soil and water conservation, mapping of sites suitable for social forestry (fuel & fodder plantations) and for other important species of general Afforestation programmes.

# APPLICATION OF REMOTE SENSING & GIS

- ☐ Revision and updating of stock maps
- ☐ Preparation of working plan
- ☐ Fire risk Zonation
- ☐ Planning response routes
- ☐ Wildlife habitat analyses
- ☐ Protected area management
- ☐ Wasteland development planning
- ☐ Site suitability analysis for Afforestation
- ☐ Identification of JFM (Joint Forest Management)
- ☐ Areas and participatory forest
- ☐ Fire line and Management
- ☐ Soil and water conservation

Wildlife, and its conservation, is in crisis. Unprecedented and increasing loss of native species and their habitats has been caused by different human activities. Management strategies have focused mainly on single species and protected areas. Immediate conservation is required particularly for areas outside the protected area system, which have rich wildlife resources. However, this action is hampered by lack of information and knowledge about species abundance, species distributions and factors influencing their distributions in these areas. Also there is general lack of understanding about the ecological, social and cultural processes that maintain diversity in different areas or ecosystems, i.e. of wildlife conservation at a landscape scale. Successful wildlife management requires appropriate data on wildlife especially data on spatial and temporal abundance and distribution. Remote sensing and GIS techniques are increasingly being used in the collection and analysis of the data as well as the monitoring and overall management of wildlife.

- ❑ Geographic information on the distribution of wildlife populations forms a basic source of information in wildlife management. Most commonly, distribution is derived from observations in the field of the animal species or their artefacts. **Radio-telemetry and satellite tracking** have been used to record the distribution of a variety of animal species.
- ❑ **GIS is increasingly used for mapping wildlife density and distribution** derived from ground or aerial survey observations.

### **Some other application of GIS in Wildlife Ecology**

1. Population viability analysis
2. Home range analysis
3. Human-wildlife conflicts
4. Wildlife conservation
  - a. Population distribution
  - b. Habitat use
  - c. Current regional biodiversity

# Population Viability Analysis (PVA)

➤ It is a quantitative analysis of population dynamics with the goal of assessing extinction risk. Population sizes change over time. The population sizes are affected by many things:

1. Demographic uncertainty
2. Environmental uncertainty
3. Genetic uncertainty

## **Uses of PVA:**

- Estimate the extinction probability for a population
- Determine the minimum viable population
- Determine the minimum reserve size
- Predict future population size
- Shows the importance of recovery efforts

# Home Range Analysis

- Home range is area transversed by the individuals in its normal activities for food gathering, mating and caring for young ones.
- There are several methods to estimate home ranges of wildlife. They are
  - **Polygon method:** This estimators are derived from the peripheral points and it provides the extent of the animal range.
  - **Center of activity method:** This estimators are derived by assuming a parametric form the utilization distribution function and putting them in the form of activity data.
  - **Nonparametric method:** This estimators are derived by approximating the utilization distribution function using robust density estimator on geographic coordinates.



# Human-Wildlife Conflict

- Considering the facts that the human-wildlife conflict create problem and damage around different reserve in the country. The use of remote sensing technology and GIS has made some efforts to identify such events and reduces the cause.
- ❑ The perspective for the use of Remote sensing and GIS information system in biodiversity mapping, natural resource planning, and management are vast. These technologies are presently fully developed, and they are gradually more being applied in natural resource mapping, planning, and management.
- ❑ Future research in Wildlife and Biodiversity management should focus on developing more Realistic and dynamic management of Wildlife in space and time.
- ❑ GIS is also considerable as an important tool for making the decision to solve the problems of environment by dealing with the Geo-information. The basic elements of the GIS includes software, hardware, live ware and data.

“If an egg is broken from outside  
force....life ends  
but  
it is broken from inside force life begins.  
So  
Great things always begin from our inside.

**THANK YOU**