

# **M.Sc. Remote Sensing and GIS**

## **RT-401**

# **Remote Sensing in Human Settlement Analysis**

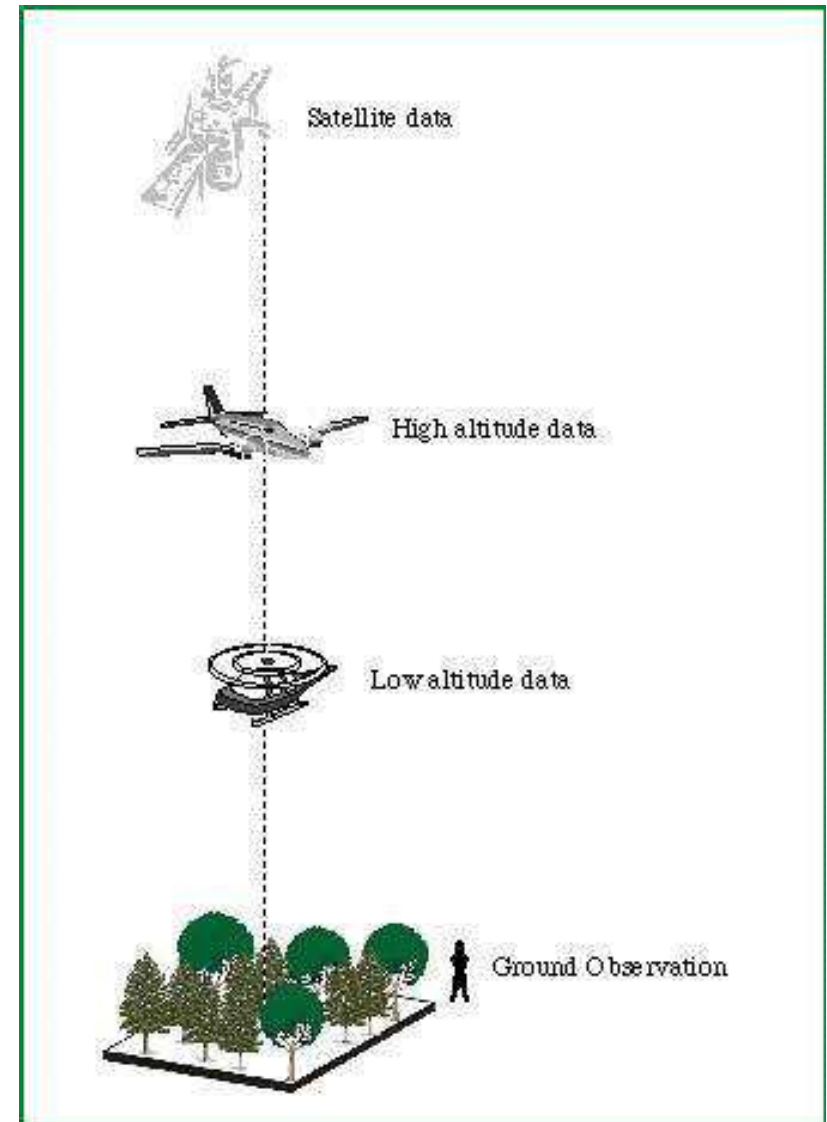
## **Unit-III**

### **3.2 Urban Planning, Mapping and Analysis**

**MS: Monika Sharma**

# REMOTE SENSING

- ❑ Acquiring information about an object without touching the object itself.
- ❑ Acquired data is digitized and processed into image.
- ❑ Captures **spatial** (area), **spectral** (colour) and **temporal** (time) data with accuracy, speed and cost effective on a repetitive basis.



# URBAN PLANNING - APPLICATIONS OF RS

**SATELLITE IMAGERY FOR DIFFERENT LEVELS OF URBAN PLANNING**

	Low Resolution 80-360 m	Medium Resolution 20-40 m	High Resolution 1-5 m
<b>Level of Planning</b>	<b>Macro Level (Regional &amp; Perspective)</b>	<b>Meso Level ( District/ Development)</b>	<b>Micro Level ( Project, Micro-watershed, Village)</b>
<b>Scale Mapping</b>	<b>1: 50000 to 1:1M</b>	<b>1:25000 to 1: 50000</b>	<b>1:1000 to 1:5000</b>
<b>Urban Planning</b>	<ul style="list-style-type: none"> <li>©Urban Sprawl analysis</li> <li>©Urban land use at level-1</li> <li>©Transportation network</li> <li>©(Highways, Railways etc.)</li> </ul>	<ul style="list-style-type: none"> <li>©Urban landuse mapping (level-1)</li> <li>©Urban suitability analysis</li> <li>©Mapping of major transport network</li> <li>©Updation of city guide maps</li> </ul>	<ul style="list-style-type: none"> <li>©Urban landuse mapping (level 1, 2 &amp;3)</li> <li>©Slum typology</li> <li>©Mapping of street level Urban road network</li> <li>©Mapping of property parcels</li> <li>©Inputs for infrastructure development</li> <li>©Utilities and service maps</li> <li>©Population estimation</li> </ul>

# **URBAN PLANNING - APPLICATIONS OF RS**

- ❑ Important source of data for urban landuse/land cover mapping**
- ❑ Environmental monitoring**
- ❑ helps in encroaching urban problems even of very small magnitude.**

# URBAN PLANNING - APPLICATIONS OF RS

- ❑ **Digitization of planning basemaps** facilitated updating of basemaps wherever changes have taken place in terms of land development etc.
- ❑ **Superimposition of any two digital maps which are on two different scales** is feasible.
- ❑ **Superimposition of revenue maps on basemaps** with reasonable accuracy is great advantage compared to manually done jobs.

# **URBAN PLANNING - APPLICATIONS OF RS**

- **Study urban growth/sprawl and trend of growth**
- **Updating and monitoring using repetitive coverage**
- **Study of urban morphology, population estimation**
- **Space use surveys in city centers**
- **Slum detection, monitoring and updating**
- **Study of transportation system and important aspects both in static and dynamic mode**
- **Site suitability and catchments area analysis**
- **Study of open/vacant space.**

# GIS

(GEOGRAPHIC INFORMATION SYSTEM)



# GIS-WHAT IS IT?

## Geographic/Geospatial Information

- ✓ information about places on the earth's surface
- ✓ knowledge about “what is where when”  
(Don't forget time!)
- ✓ Geographic/geospatial: synonymous

## GIS--what's in the S?

- Systems: the technology
- Science: the concepts and theory
- Studies: the societal context



# GIS

## DATA TYPES – SPATIAL & ATTRIBUTE

- ❑ Spatial - the absolute and relative location of Geographic features.
- ❑ Attribute data – which describes the characteristics of the spatial features. characteristics can be quantitative and/or qualitative in nature. Attribute data is often referred to as tabular data.

# GIS

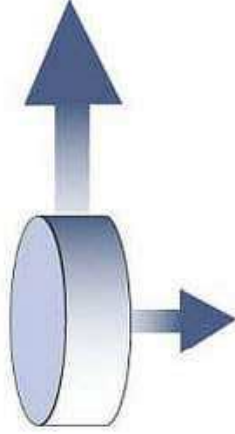
- ❑ A map with a database behind it.
- ❑ A virtual representation of the real world and its infrastructure.
- ❑ A consistent “as-built” of the real world, natural and manmade which is *queried* to support *on-going operations*
- ❑ *summarized* to support *strategic decision making and policy formulation*
- ❑ *analyzed* to support *scientific inquiry*

# GIS

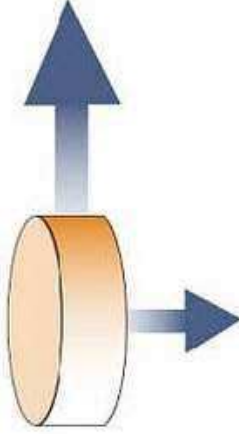
GIS TECHNIQUE	PLANNING APPLICATION
OVERLAYING	LAND SUITABILITY, LANDUSE CHANGE DETECTION
BUFFERING	LOCATION ANALYSIS (police station, education etc) ACCESIBILITY TO TRANSPORTATION ( to find inaccessible areas)
OPTIMAL ROUTE ANALYSIS	In terms of time, distance, relevance, safety

## Data source

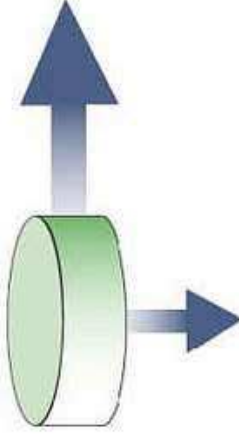
Street data



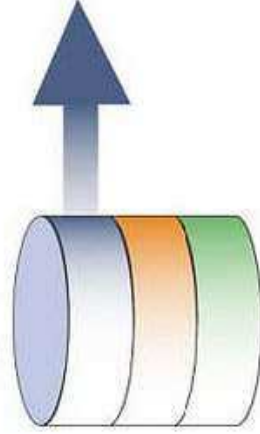
Buildings data



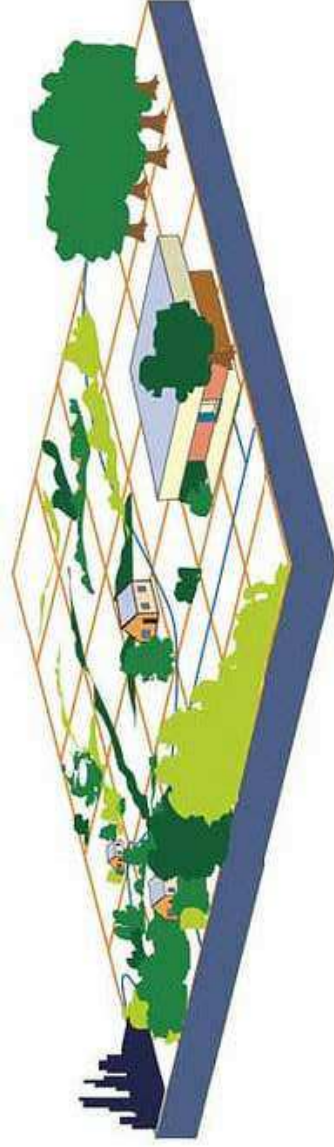
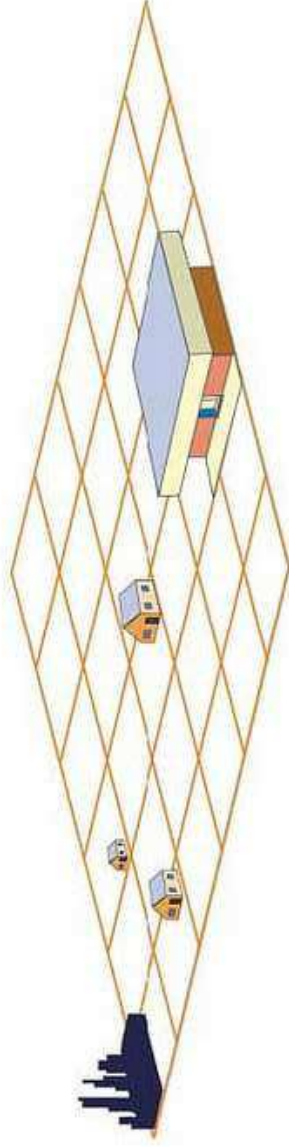
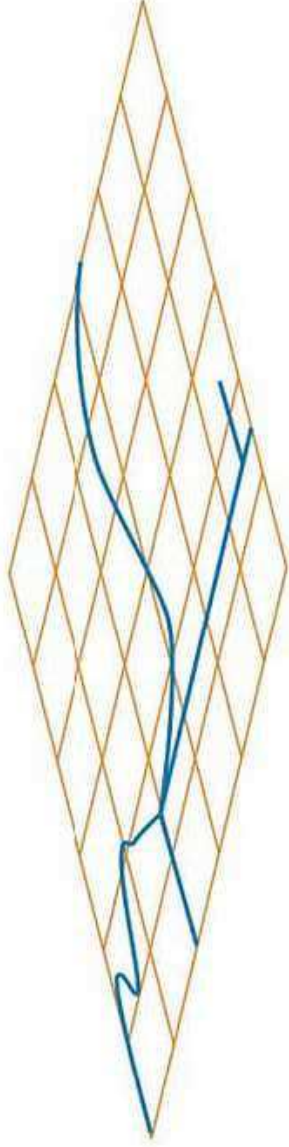
Vegetation data



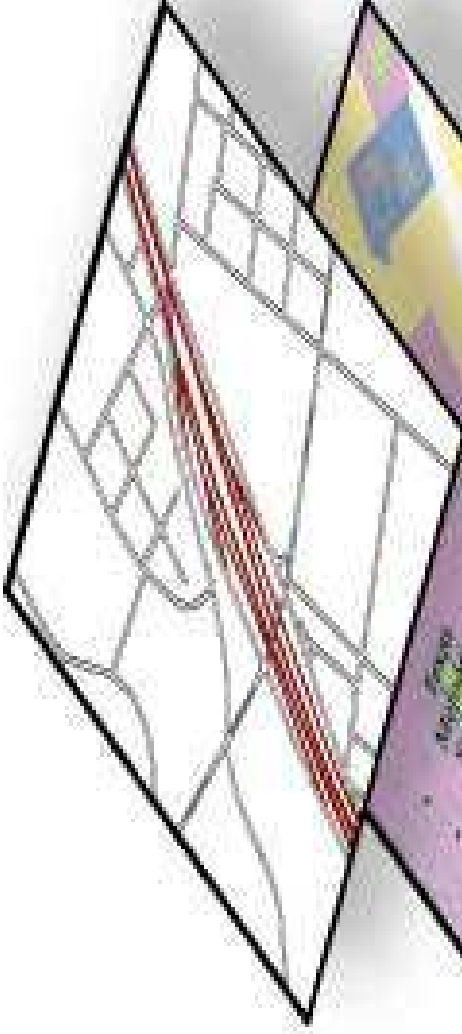
Integrated data



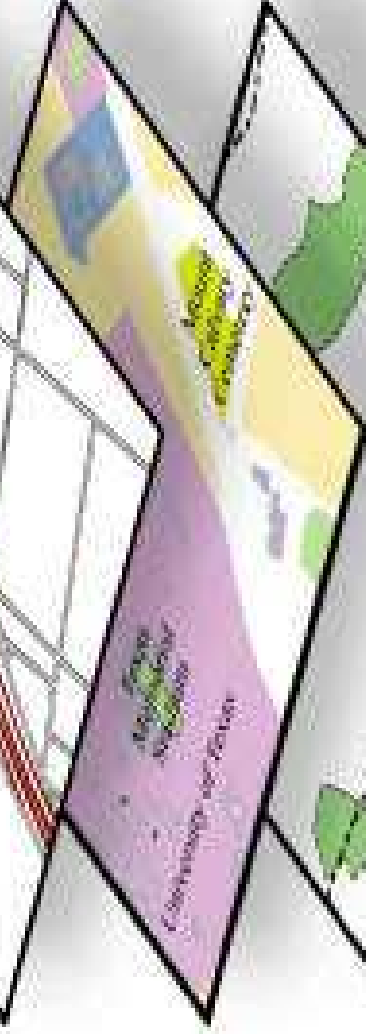
## Data layers



**Streets**



**Land Use**



**Administrative Areas**



**Hydrography**



**Elevation**



**Imagery**



# **GIS IN URBAN PLANNING, MANAGEMENT & POLICY**

- **Zoning, subdivision planning**
- **Land acquisition**
- **Economic development**
- **Code enforcement**
- **Housing renovation programs**
- **Emergency response**
- **Crime analysis**
- **Tax assessment**

# **URBAN PLANNING - APPLICATIONS OF GIS**

- Area monitoring (both on a sectoral and integral basis)**
- Regional potential and feasibility analyses.**
- Site selection studies**
- Alternate plans are generated (flexible design, optimization and evaluation tools)**

# **URBAN PLANNING - APPLICATIONS OF GIS**

- Documentation of spatial plans and in the approval process for the development, building and installation permit.**
- Land management and land use planning issues including the interpretation and formulation of land use policy.**
- Land-use policy can be interpreted within GIS using a modelling approach.**



# GEOGRAPHIC INFORMATION TECHNOLOGIES

## **Global Positioning Systems (GPS)**

- a system of earth-orbiting satellites which can provide precise (100 meter to sub-cm.) location on the earth's surface (in lat/long coordinates or equiv.)

## **Remote Sensing (RS)**

- use of satellites or aircraft to capture information about the earth's surface
- Digital ortho images a key product (map accurate digital photos)

## **Geographic Information Systems (GIS)**

- Software systems with capability for input, storage, manipulation/analysis and output/display of geographic (spatial) information.

***GPS and RS are sources of input data for a GIS.***

***A GIS provides for storing and manipulating GPS and RS data***

# CONCLUSION

- The present study indicates the uses of Remote Sensing and Geographic Information System for spatial planning.
- very easy to use analysis and visualization tools.
- Rapid development in city poses several challenges including problems associated with urbanization for urban managers and policy makers. Meeting these challenges requires access to timely and reliable information.

# REFERENCES

- ❑ *Remote Sensing and Urban Analysis*, Taylor and Francis Publications, London.
- ❑ Patkar, V.N. (2003), “Directions for GIS in Urban Planning”
- ❑ Tiwari, D.P. (2006), *Remote Sensing and GIS for efficient Urban Planning*, GIS Development.
- ❑ *GIS for Urban and Regional Planning*, ESRI