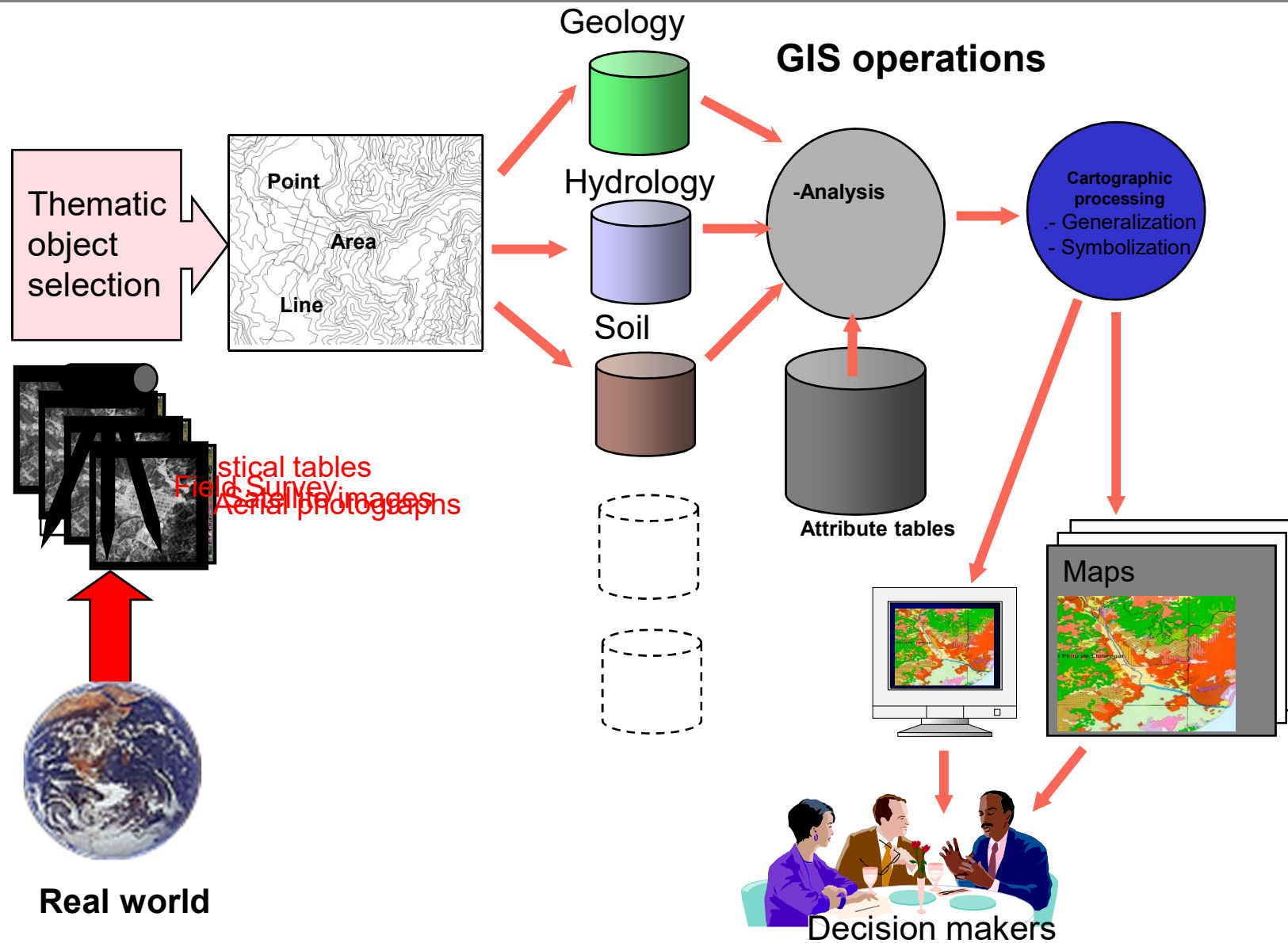


# Introduction to GIS

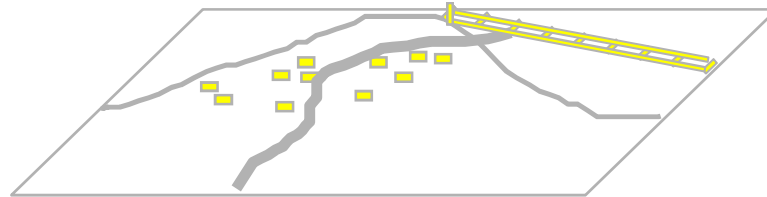
Teacher: Dr. Atta-ur-Rahman  
Course: Geographic Information System  
Lecture 2

# HOW GIS WORKS

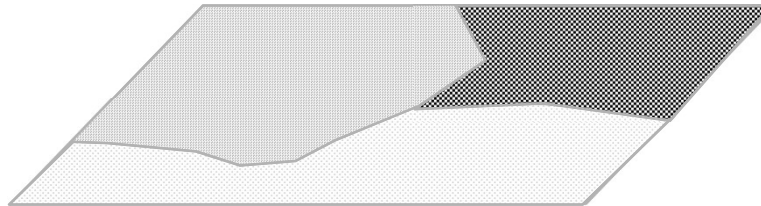


# MAPS AND SPATIAL DATA

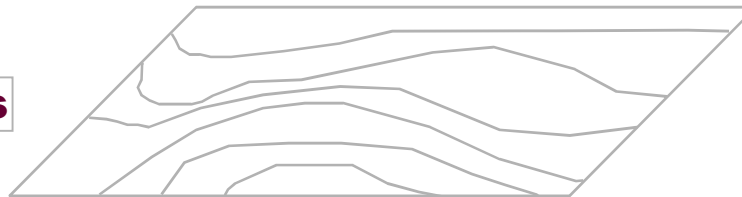
**Topographic**



**Parcels**



**Contour lines**



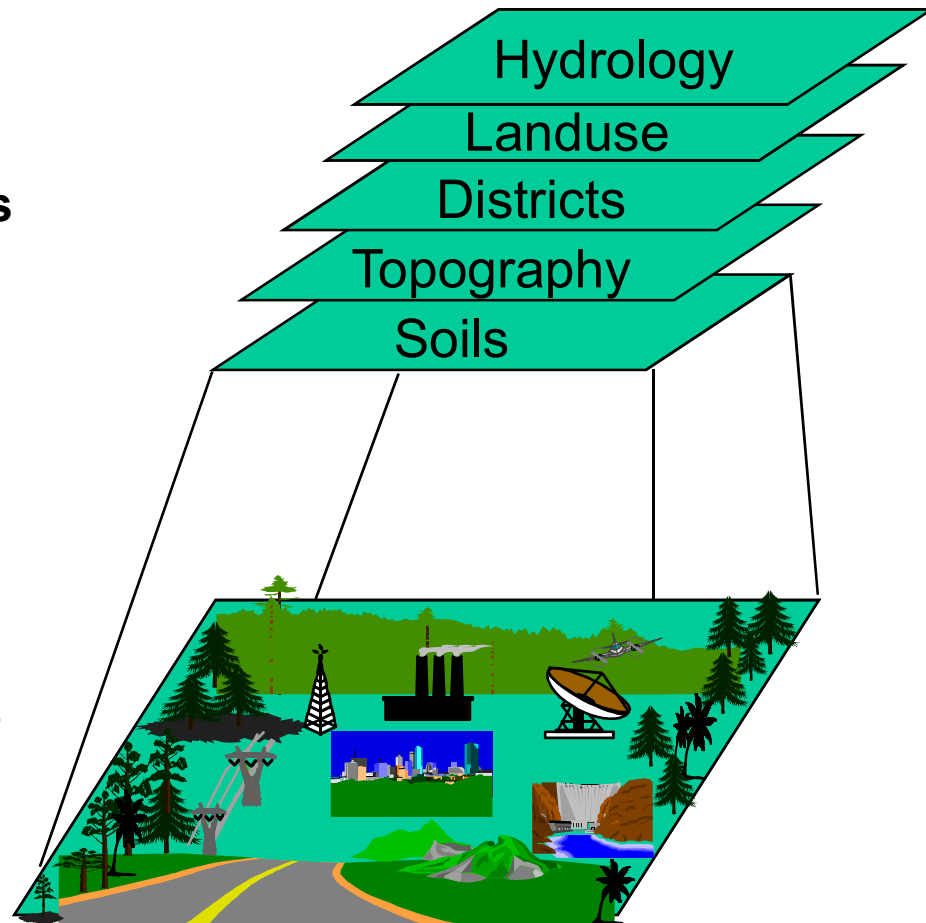
**REAL-WORLD**



# GIS

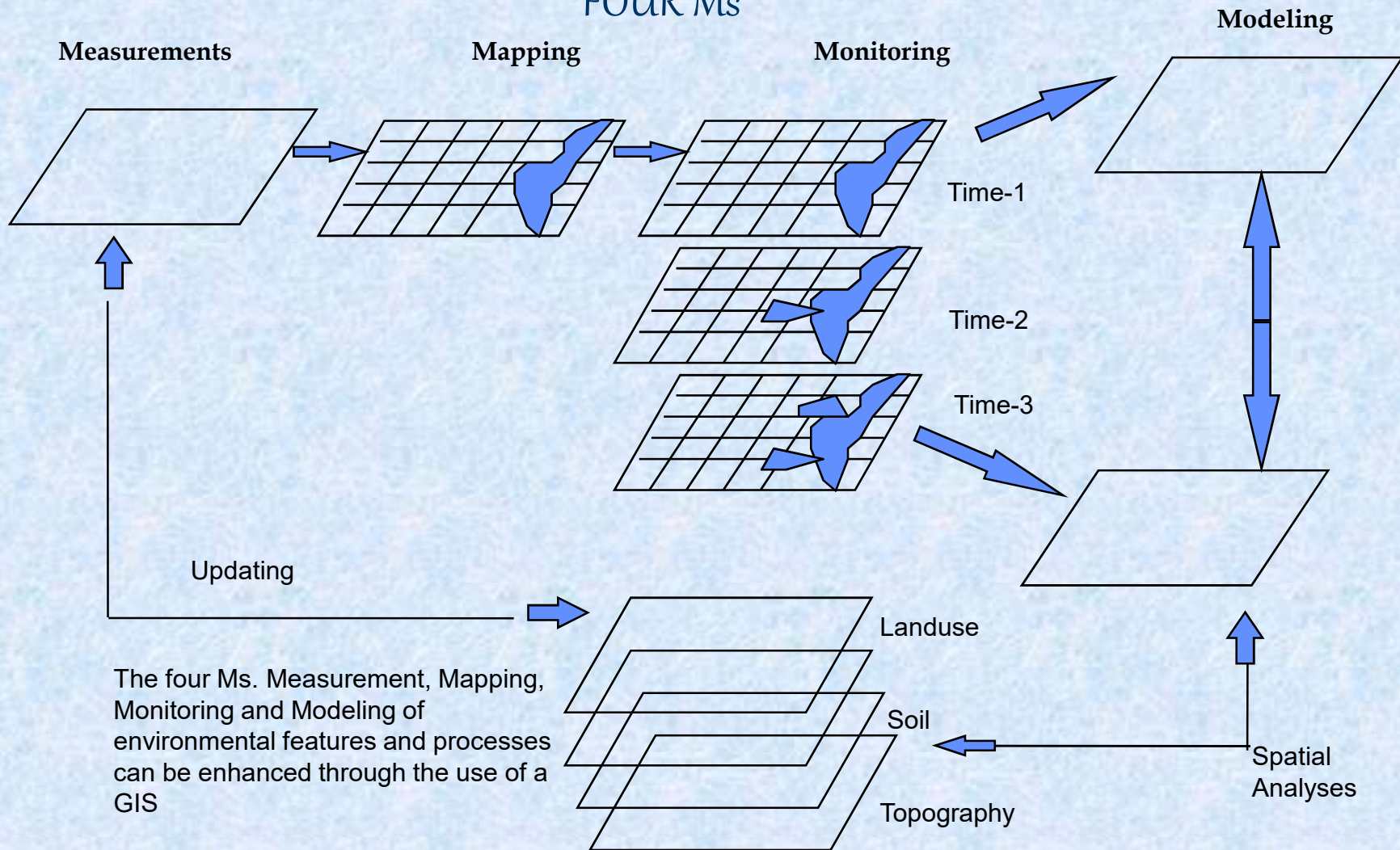
A computer based system capable of holding and using data describing places on the earth's surface

The real world consists of many geographies which can be represented as a number of related data layers.



***GIS IS SUPPORTING TOOL FOR DECISION MAKERS***

## FOUR Ms



## GEOGRAPHIC INFORMATION SYSTEM

Adapted from J.Stars and J.Estates

## Why GIS?

- 70% of the information includes some geographical facts in the decision-making process
- Ability to assimilate divergent sources of data both spatial and non-spatial (attribute data)
- Visualisation impact
- Sharing of information
- Analytical capability in a spatial context

# GIS Historical Development

**Computer Science**

**Earth Science**

**CAD/CAM**

Geography

**Remote Sensing**

**Military Studies**

**Spatial  
Mathematics**

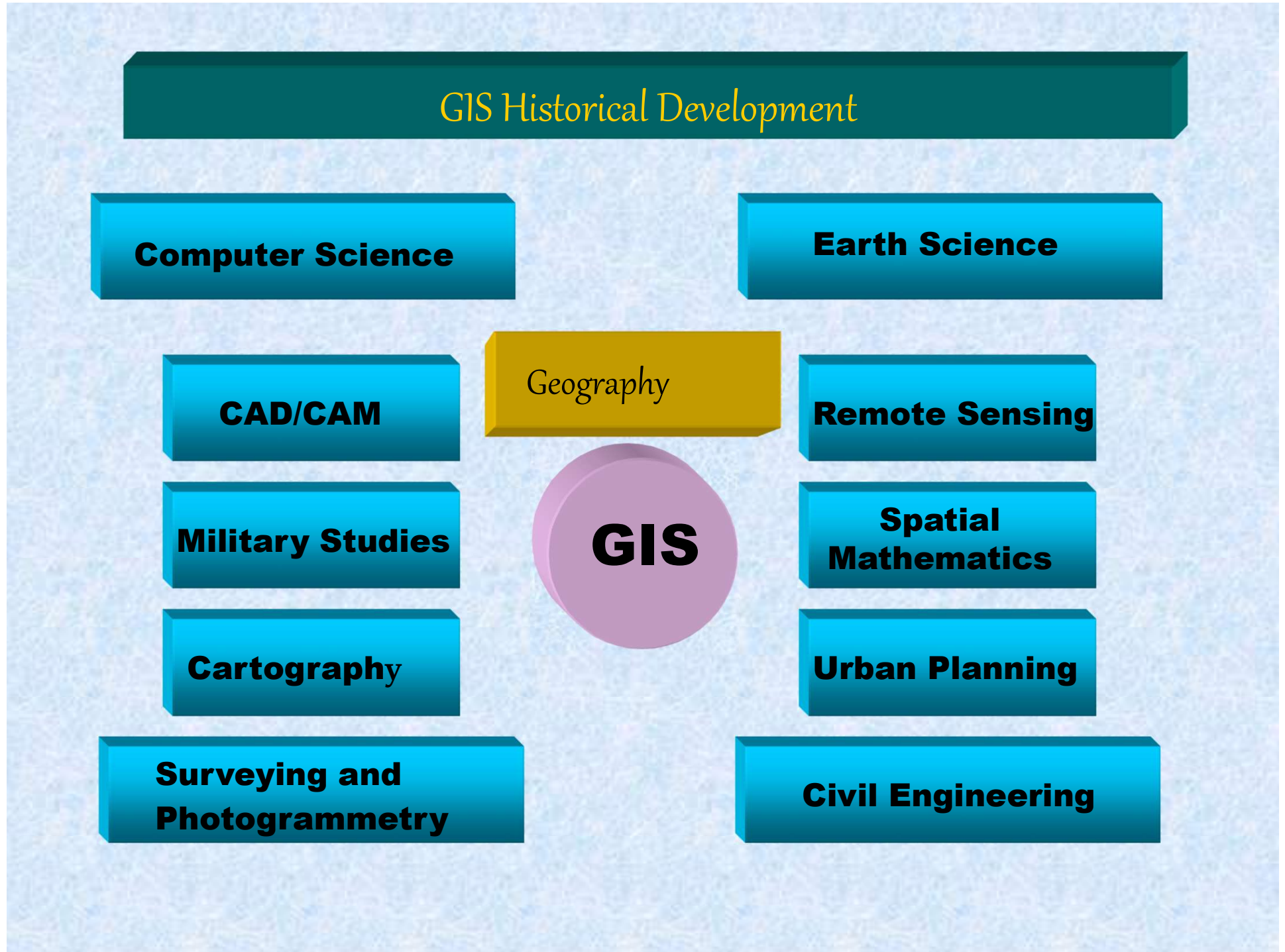
**Cartography**

**Urban Planning**

**Surveying and  
Photogrammetry**

**Civil Engineering**

**GIS**

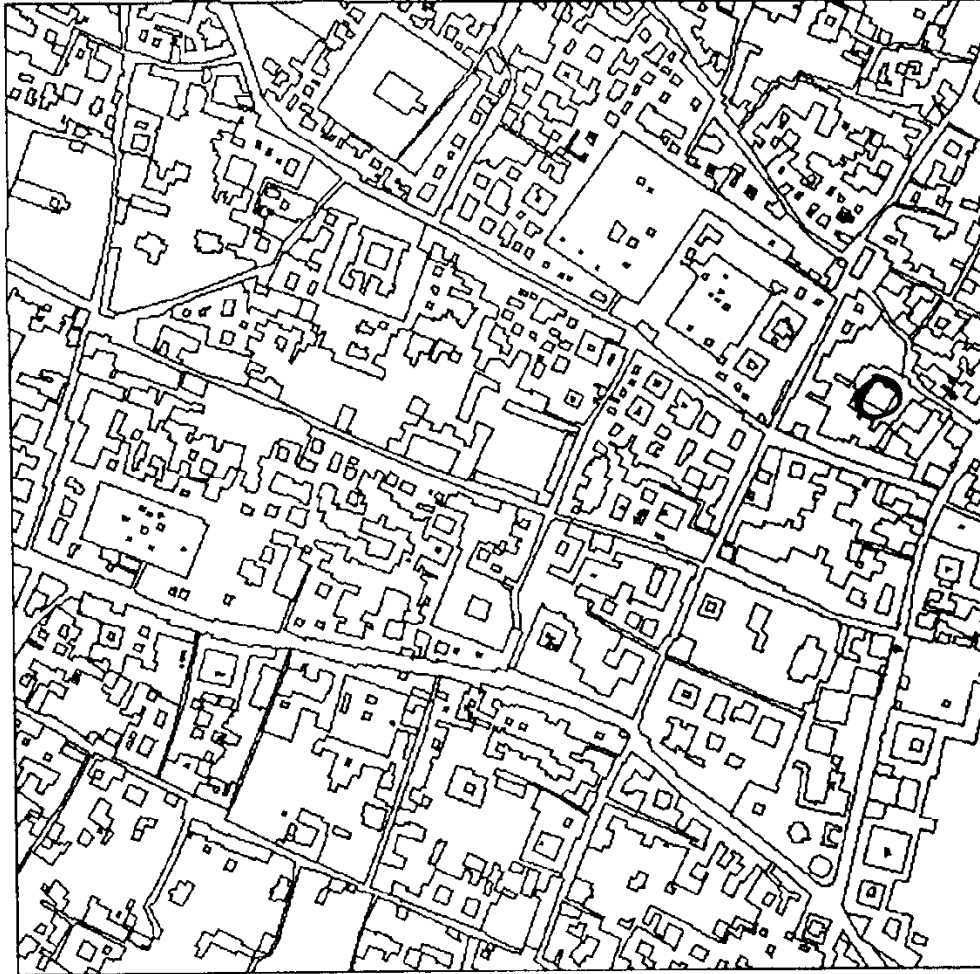


# *Questions a GIS can answer*

- Location
- Condition
- Trends
- Patterns
- Modelling

# GIS Questions - Locations - What is at ... ?

## Mangal Bazar, Lalitpur District



Identifier	Shrestha Niwas
Area	215.712
Owner	Asha Ram Shrestha
Address	14/210 Mahapal
Zoned land use	Residential
Assessment	NRs. 5000000

Who owns the land at Mangal Bazar, and its assessment ?

# GIS Questions - Conditions - Where is it... ?

**Mangal Bazar, Lalitpur District**

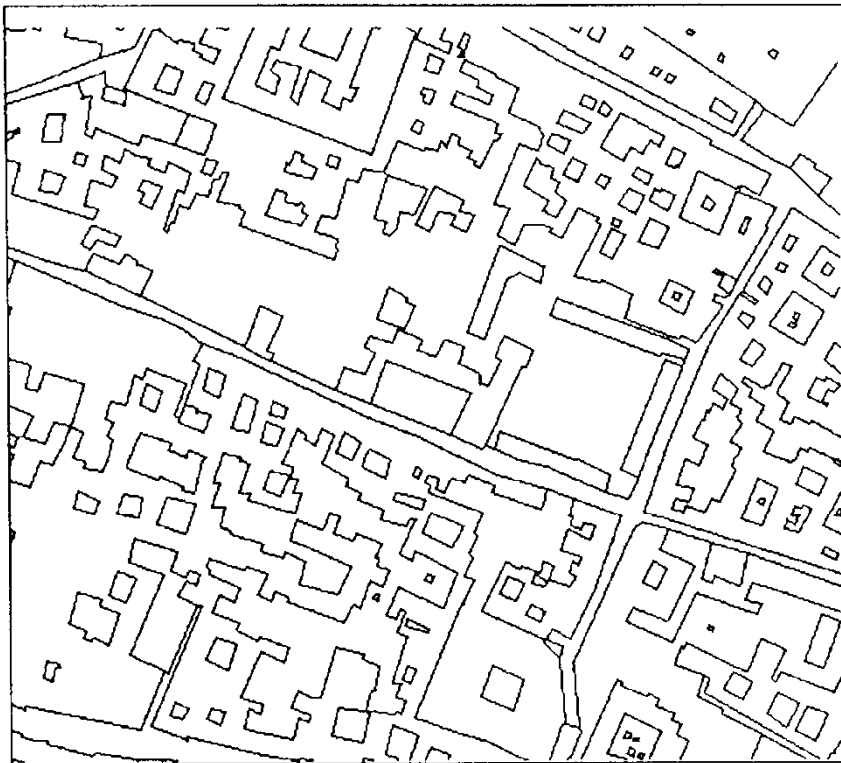


**Residential Land use**  
**Assessed at less than Rs. 500000**  
**4 bedrooms**  
**Made of local bricks**

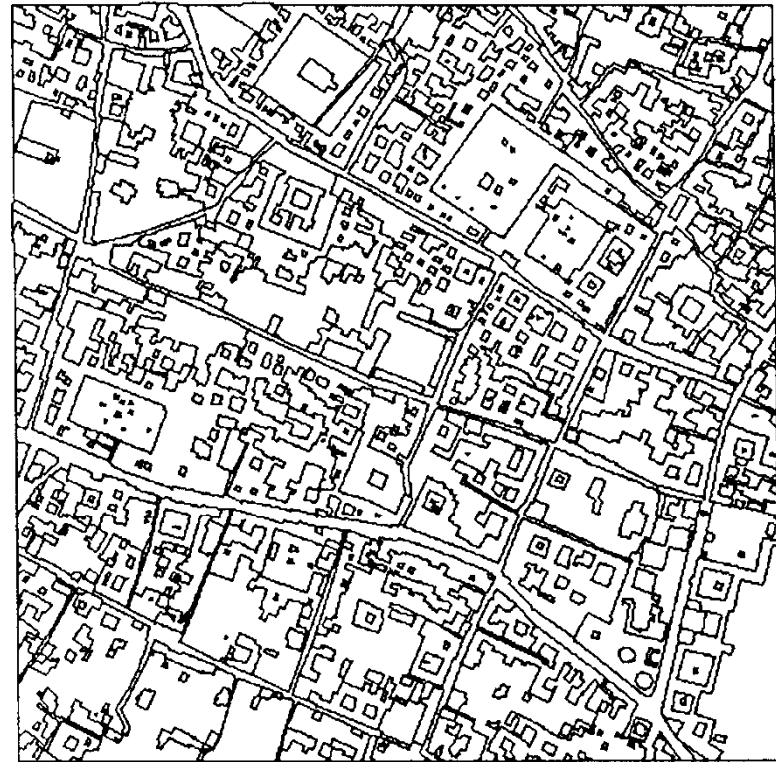
**Where are houses located that you might consider buying ?**

# GIS Questions - Trends - What has changed since... ?

Mangal Bazar, Lalitpur District



1970

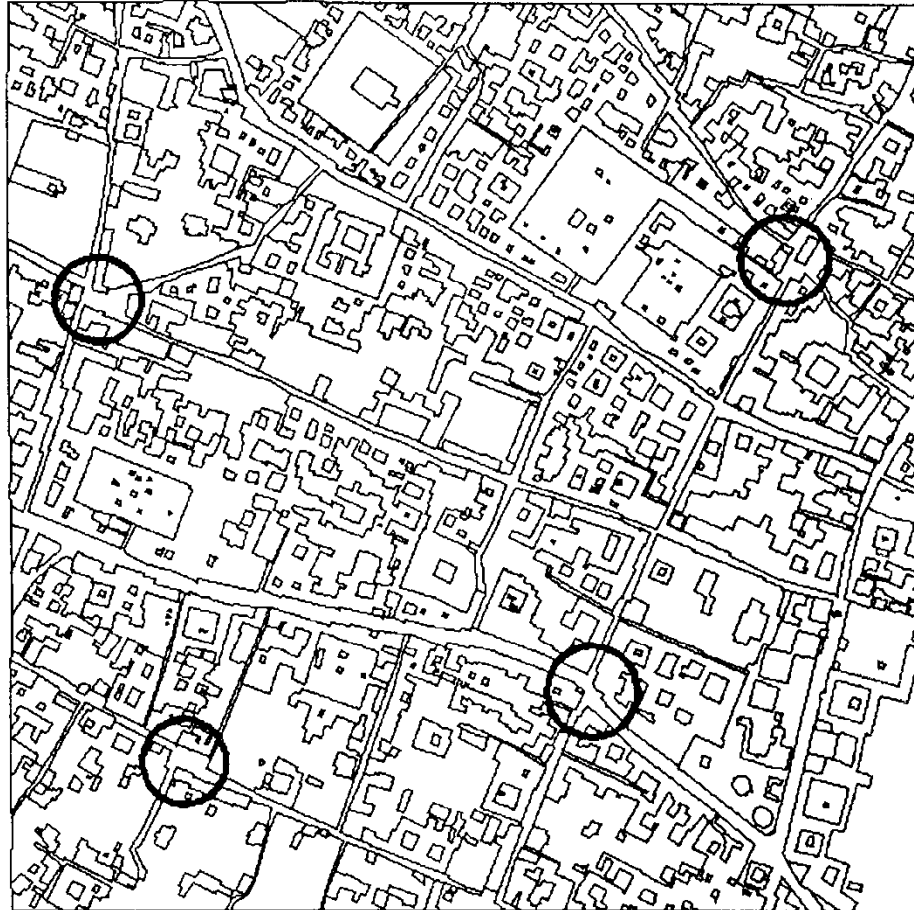


1990

How much land has used for residential area since 1970 ?

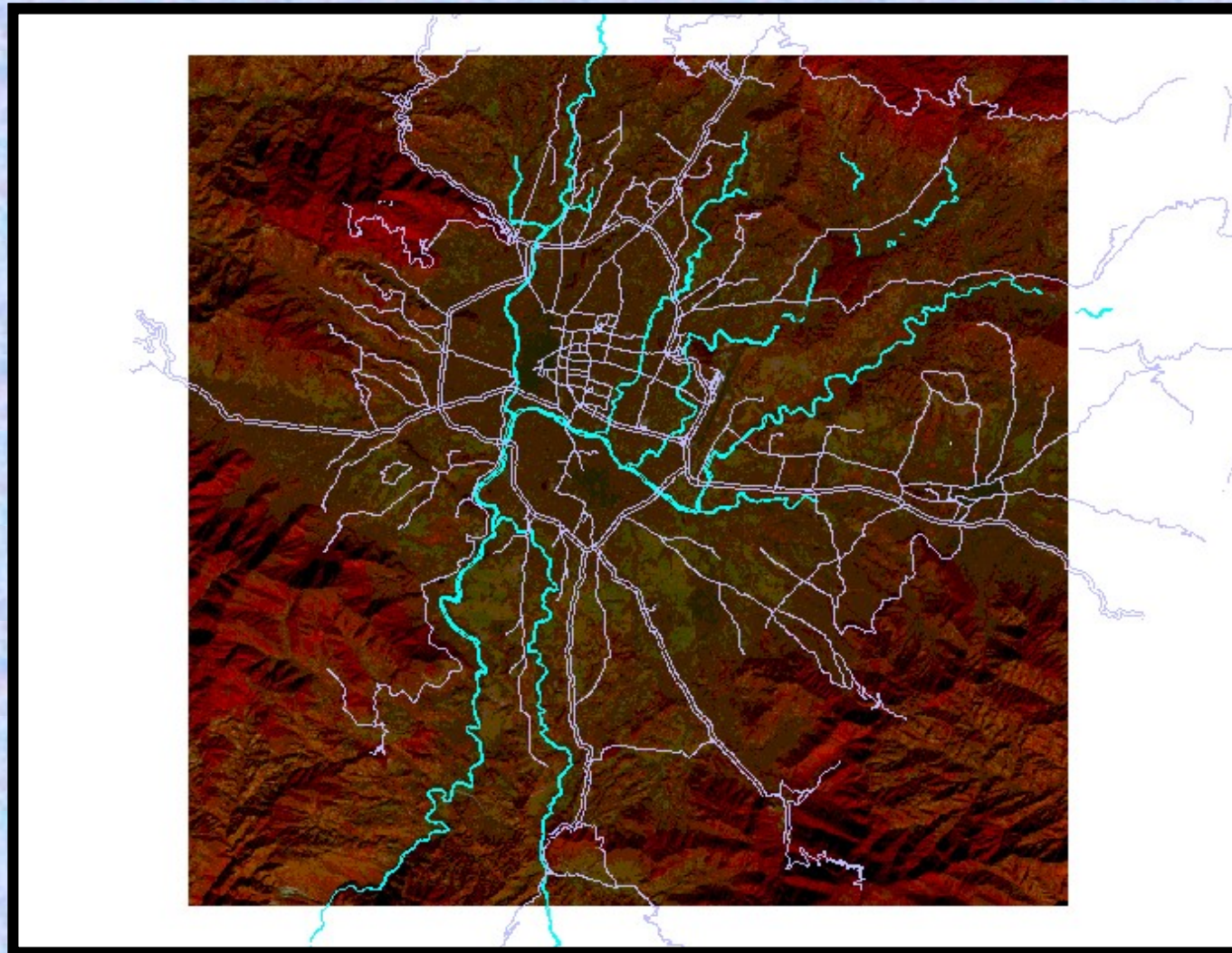
# GIS Questions - Patterns - What data are related... ?

Mangal Bazar, Lalitpur District



What kind of patterns exist for vehicle accidents ?

## Geographic Data



# Types of GIS

- Vector GIS
- Raster GIS
- Hybrid GIS

**Technology is moving towards hybrid GIS**  
**Raster Vector Integration**

## Vector Representation

### The Vector Data Model

#### Features of Spatial Object

**Points** (Example : Location of house)

**Lines**(Example : Railway)

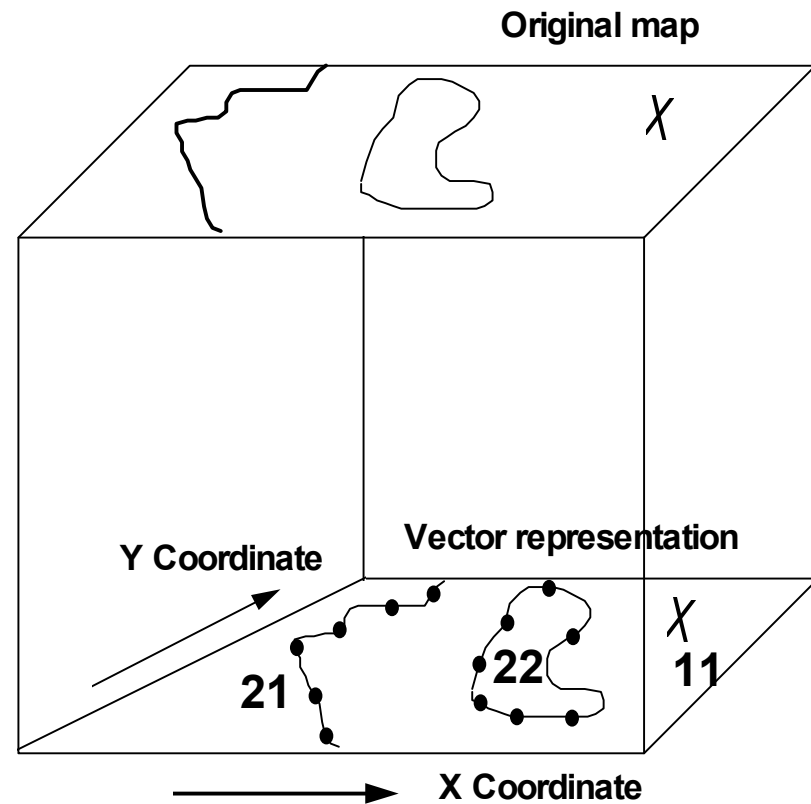
**Polygons** (Examples : Forest area)

The location of features on the earth's surface are referred to map positions using an XY coordinate system (termed a Cartesian Coordinate System).

**Point**A Singly XY pair

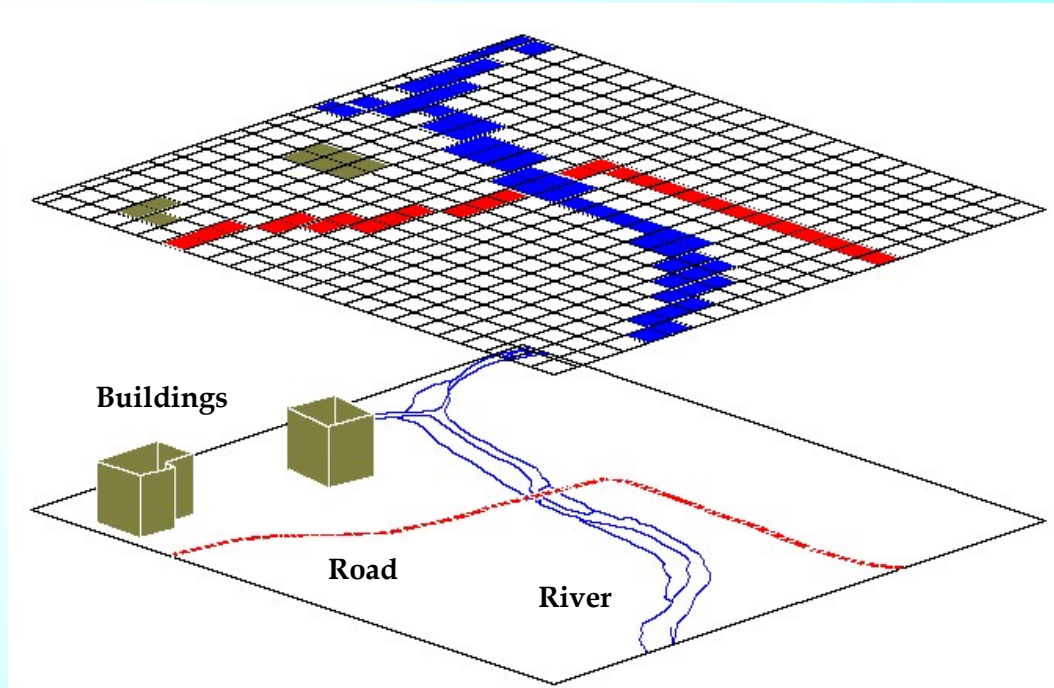
**Line**Series of XY pair

**Polygon**A closed loop of XY coordinate pairs that define the boundary



## Raster Representation

- Row
- Column
- Cell Size
- Resolution



## Attribute Data

District Name	Area	Population
Peshawar	395 sq. km.	6,75,341
Swabi	385 sq. km.	2,57,086
Dir lower	119 sq. km.	1,72,952

➡ Industry Information

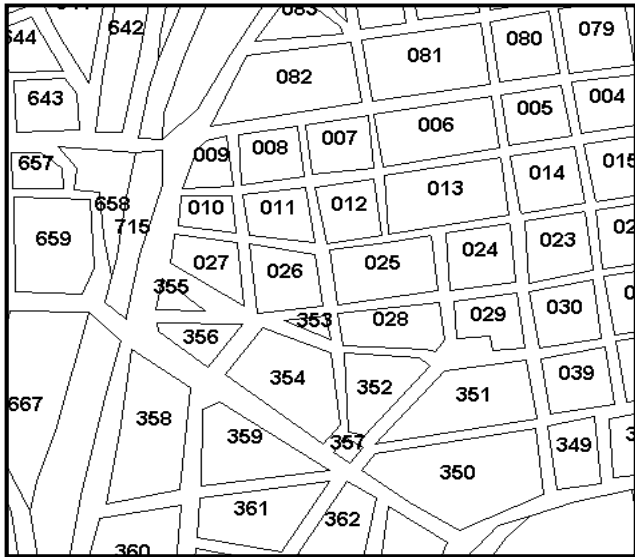
➡ Agriculture Census

➡ Industry Information

➡ Education and Health

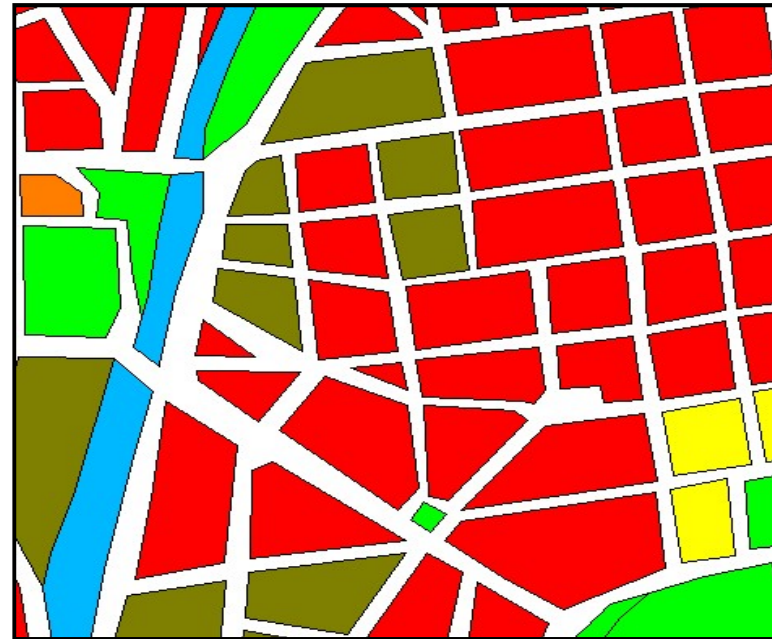
# SPATIAL AND NON-SPATIAL DATA

Map: City blocks



City blocks	Land use
001	Institutional
002	Commercial
003	Commercial
004	Residential
005	Residential
006	Residential
007	Industrial
008	Residential
009	Industrial
010	Industrial
011	Residential
012	Industrial
013	Residential
014	Residential
015	Residential

SPATIAL DATA



NON-SPATIAL DATA