GIS Curriculum for PMGSY

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Intended Audience:

NRIDA YCEs

GIS Nodal Officers (State)

GIS Analysts (State)

Module 1	Module 2	Module 3	Module 4	Module 5
Introduction to GIS and Load your CSV Data in Qgis	Georeferencing and Create Layers	Creating GIS Maps and Reports	Functions in QGIS	Working with Google Earth

Module 1 – Introduction to GIS and Load your CSV Data in Qgis

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Learning Objectives

Introduction to GIS and Visualizing PMGSY Rural Facilities Excel Data on Satellite Imagery using GIS.

Module 1	Module 2	Module 3	Module 4	Module 5
Introduction to GIS and Load your CSV Data in Qgis	Georeferencing and Create Layers	Creating GIS Maps and Reports	Functions in QGIS	Working with Google Earth

M1- Introduction to GIS and Load your CSV Data in Qgis

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GIS Curriculum for PMGSY - Goal

Goal is that every government civil engineer (PWD, RD etc) will be able to take this course and upskill themselves in the use of GIS and data-driven planning and policy.

Exploring Possibilities and not Technicalities

Objectives of the overall course:

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- Convert text-based data to a GIS format
- Georeference the maps and create vector GIS data
- Add Plugins
- Create thematic maps
- Apply GIS Operations like Intersect, Dissolve, and Buffer
- Handling the attribute data
- Automate the task using the graphical modeler
- Operations on Google Earth e.g. Geotagging, historical image

Modules

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1. M1: Introduction to GIS and Load your CSV Data in Qgis – 1 hrs.
2. M2 Georeferencing and Create Layers – 2 hrs.
3. M3: Creating GIS Map and Reports – 1 hrs.
4. M4: Functions in QGIS – 3 hrs.
5. M5: Working with Google Earth – 1 hrs.

Total - 8 hrs.

Definition of GIS

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"A system for capturing, storing, checking, integrating, manipulating, analysing and displaying data which are spatially referenced to the Earth."

GIS = Geographic Information System

- **Links databases and maps**
- **Manages information about places**
- **Helps answer questions such as:**

- **Where is it?**
- **What else is nearby?**
- **Where can I find things with characteristic 'Y'?**
- **Where is the closest 'Z' to my location?**

GIS is the Science of **Where**

Why GIS ?

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Isn't this table enough?

A table having Block name and associate Average cost of road project but it is difficult to say why some blocks having higher average cost than other blocks.

Things like cost depends on geography

Block Name	Length	Project_Cost	Average cost
Acharapakkam	2.8	170.4	61.42
Alangayam	7.3	351.6	48.16
Alankulam	6.7	403.8	60.27
Ammapet	3.2	198.3	62.97
Ammapet	2.0	130.0	64.99
Anaicut	3.0	101.8	33.95
Andimadam	12.3	492.2	40.07
Annagramam	4.6	299.5	65.37
Annavasal	8.3	414.3	49.83
Anthiyur	5.9	474.4	80.00
Arakonam	3.3	236.5	72.78
Arantangi	8.9	577.9	64.67
Aravakurichi	15.4	938.9	60.93
Arcot	2.3	107.7	47.12
Arimalam	24.4	1338.9	54.94
Arni	4.9	268.3	54.75
Attur	2.5	162.2	64.88
Avinashi	7.3	582.9	79.52

Why GIS ?

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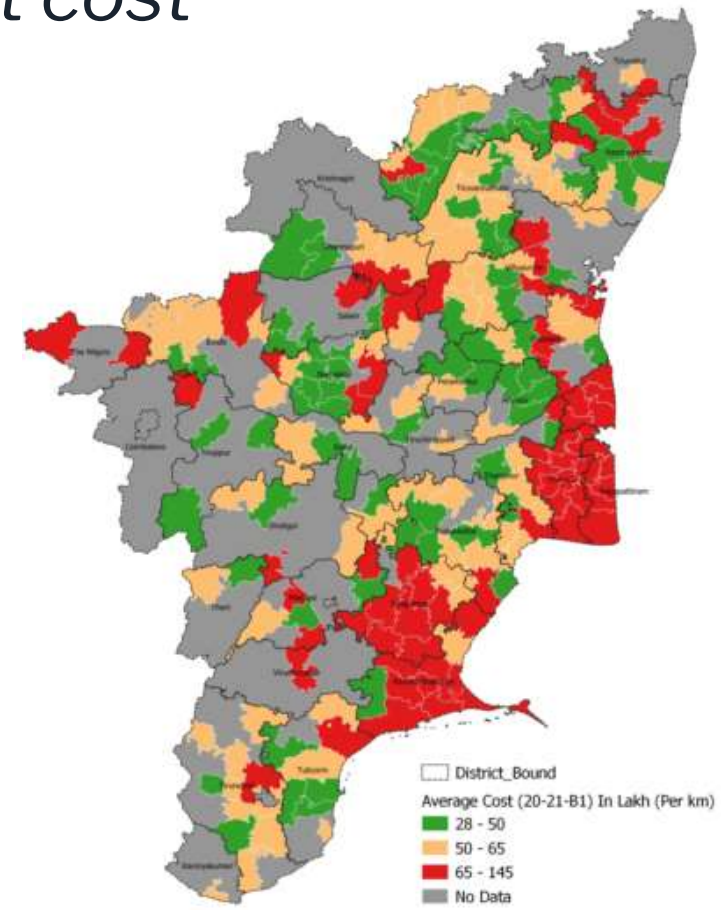
See it to understand it: Highest project cost blocks.

A GIS allows you to visualize your data as a map and understand things based on where they are.



Why GIS ?

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Here is another example of how GIS can be useful. We have data collected by health workers here we have date and place of residence of every patient and Disease.

Longitude	Latitude	Disease	Date
26.870436	31.909519	Mumps	13/12/2008
26.868682	31.909259	Mumps	24-12-2008
26.867707	31.910494	Mumps	22-01-2009
26.854908	31.920759	Measles	11-01-2009
26.855817	31.921929	Measles	26-01-2009
26.852764	31.921929	Measles	10-02-2009
26.852764	31.921929	Measles	22/02/2009
26.869072	31.911988	Mumps	02/02/2009
26.863354	31.916406	Chicken Pox	26-02-2009

Why GIS ?

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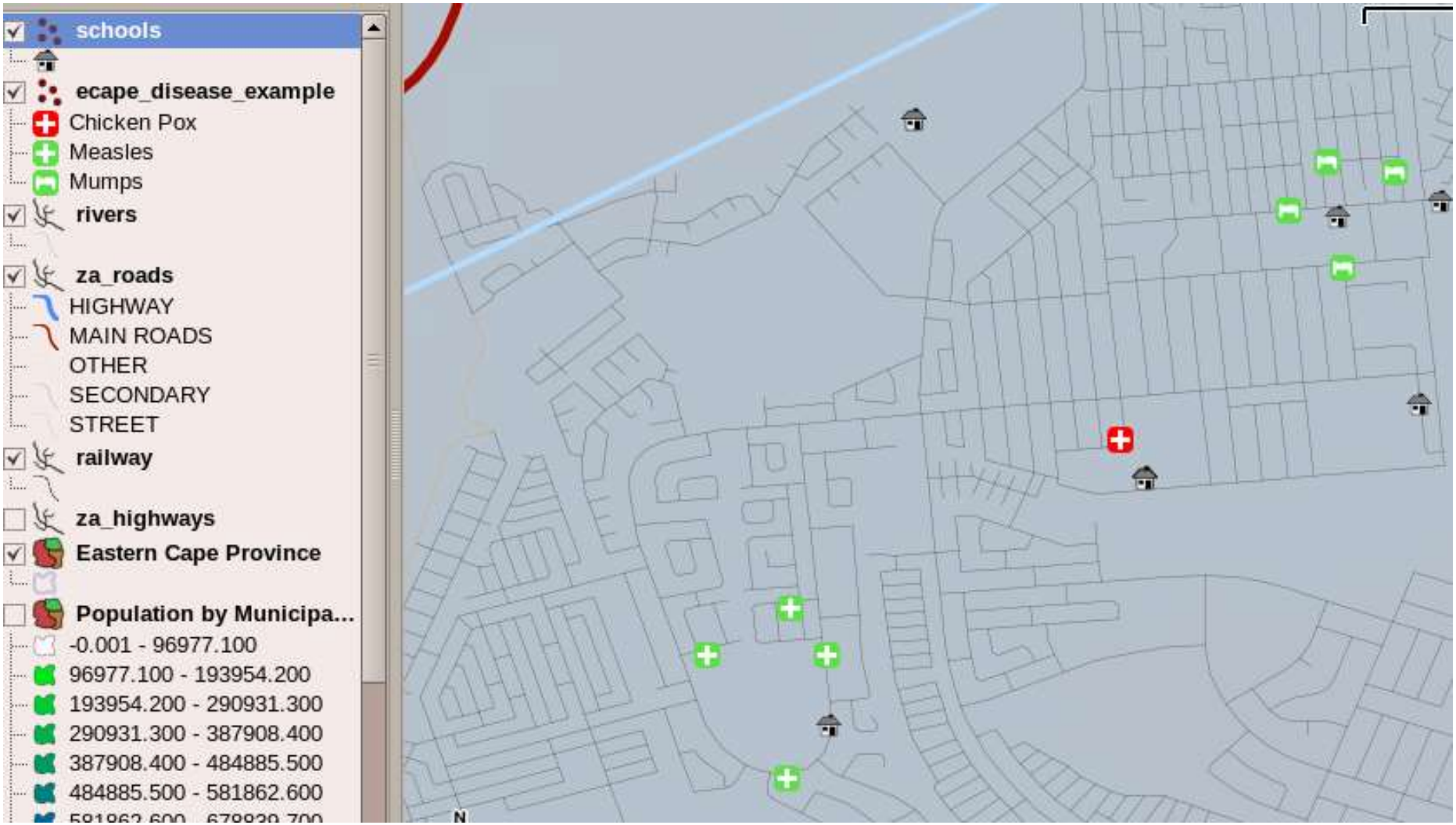

What GIS Application Do

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Visualization and Mapping

Calculate areas, distances, route lengths

Integrate data (i.e. property maps and satellite photos)

Spatial database management

Spatial Analysis

Block Name	Length	Project_Cost	Average cost
Acharapakkam	2.8	170.4	61.42
Alangayam	7.3	351.6	48.16
Alankulam	6.7	403.8	60.27
Ammapet	3.2	198.3	62.97
Ammapet	2.0	130.0	64.99
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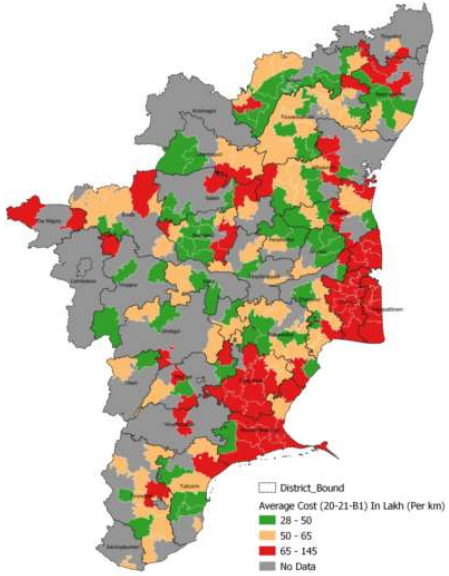

What GIS Application Do

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- **Answer** spatial queries
  - *(how many Facilities are within the 5 km proximity?)*
- **Perform** complex spatial modeling
  - *(‘what if” scenarios for resource management – where to put new sites, transportation – how to get resources to people in need, etc.)*

GIS Data:

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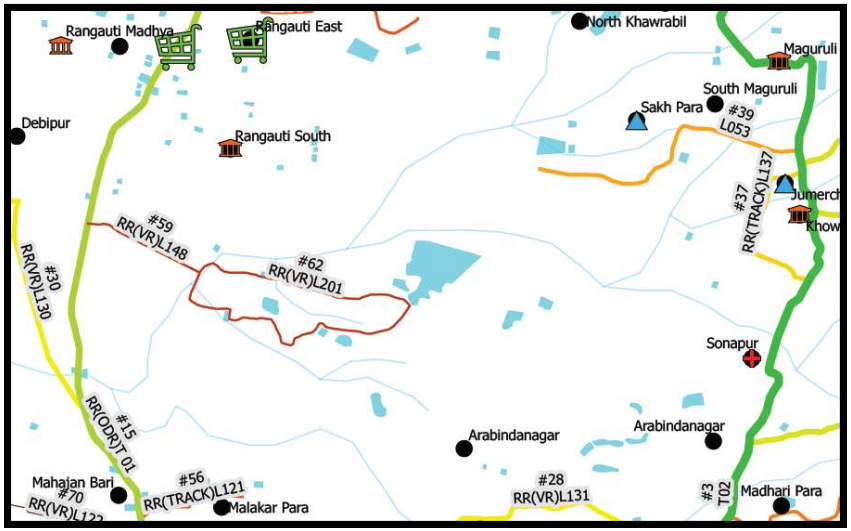
- GIS
  - Spatial
    - Vector
    - Raster
  - Non Spatial (Attribute)

Consist of text or numerical information that describe the features



Vector Data

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A vector feature has its shape represented using **geometry.**

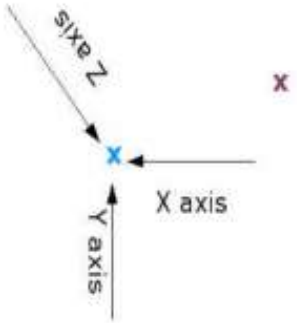
– Point

– Lines (direction and length)

– Polygons (area, centroids, and perimeter)

Vector Point Feature

Point Geometry (indicates the x,y and z position of the feature)

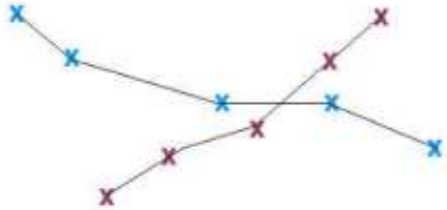


Point attributes (describe the feature)

Id, Name, Description
1, Tree, Outside our classroom 2, Light post, At the school entrance

Vector Polyline Feature

Polyline Geometry (a series of connected vertices that do not form an enclosed shape)

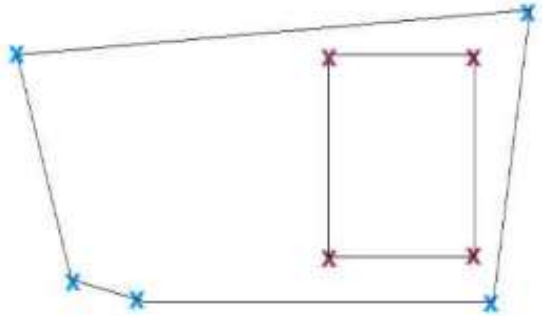


Polyline attributes (describe the feature)

Id, Name, Description
1, Footpath 1, From class to the playground 2, Footpath 2, From the school gate to the hall

Vector Polygon Feature

Polygon Geometry (a series of connected vertices that do form an enclosed shape)



Polygon attributes (describe the feature)

Id, Name, Description
1, School Boundary, Fenceline for the school 2, Sports Field, We play soccer here

Point Feature

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Spatially distributed entities, activities or events
Points have a single geographic coordinate such as :

- Tree
- Survey Locations
- House
- Accident locations

Line Feature

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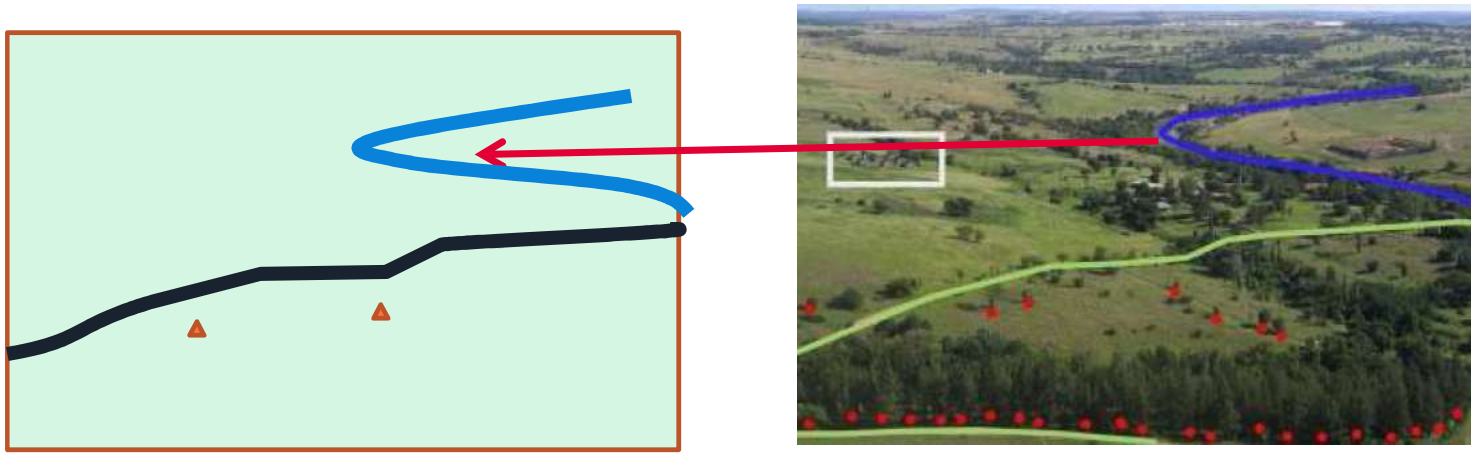
Spatially distributed entities, activities or events.
Lines (Arcs) are a series of geographic coordinates joined to form a line such as:
Road
Stream
Railway



Area Feature

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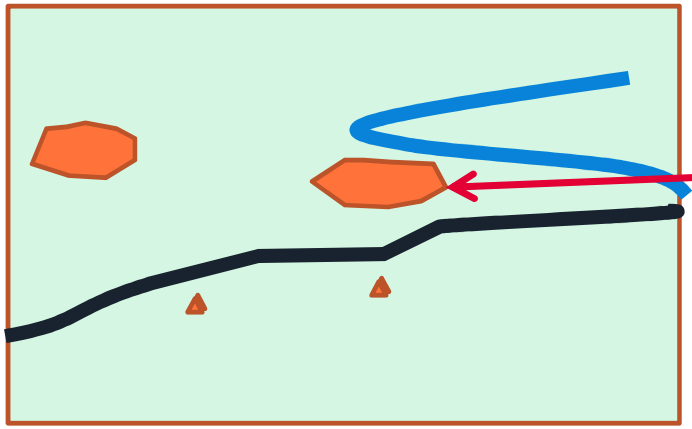
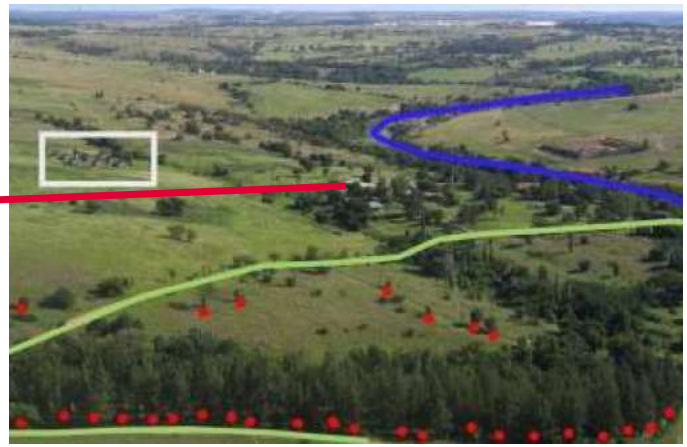
Spatially distributed entities, activities or events
Area (Polygons) are series of geographic coordinates joined together to form a boundary such as:
Lake
Soil Types
Block Boundaries





Raster Data

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Raster create surface layers

– Records information about each element on a fixed grid as pixels (E.g.: Satellite images, aerial photos)

Raster data are often images taken by satellites. Here we can see mountains in the imagery

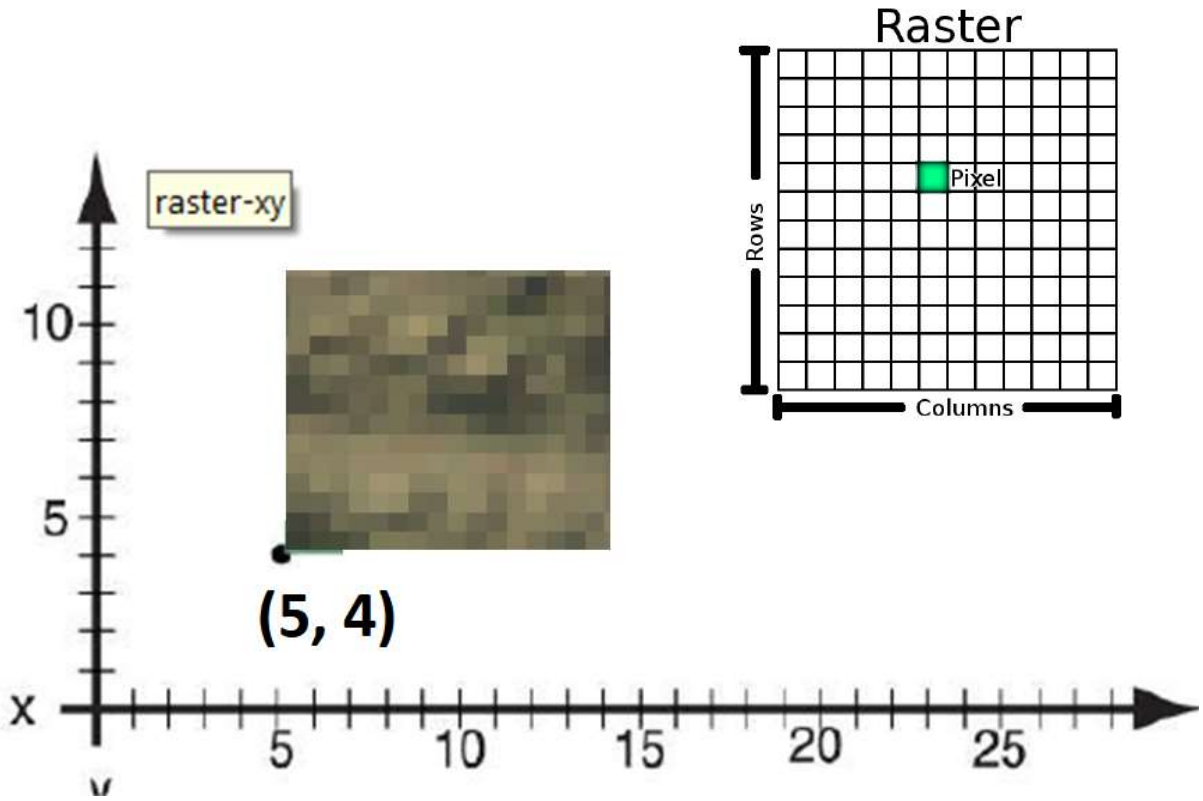

Table or attribute data (Non Spatial Data)

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Tables - contain data for places that can be converted to GIS files and mapped

- If the data contains coordinates like latitude and longitude, the data can be plotted and converted to a vector file.
- If each data record contains unique ID codes for each place, those records can be joined to their corresponding features in a GIS file and mapped.

Data Organization in GIS

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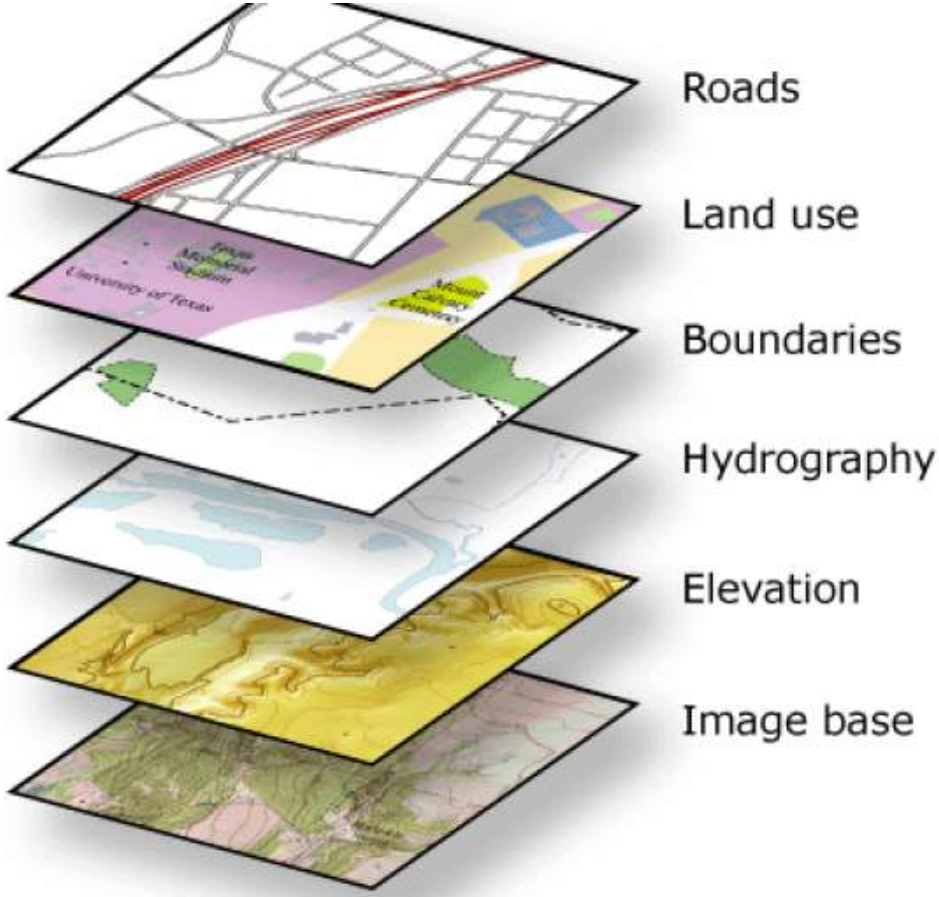
- Each layer contains one specific type of information.
- Layers are integrated using their geographic location on the earth's surface as the organizing principle



Data is organised by layers