Geospatial Technologies

Day 1- GIS, RS and GPS

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(Funded by IDRC)

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Allied Market Research

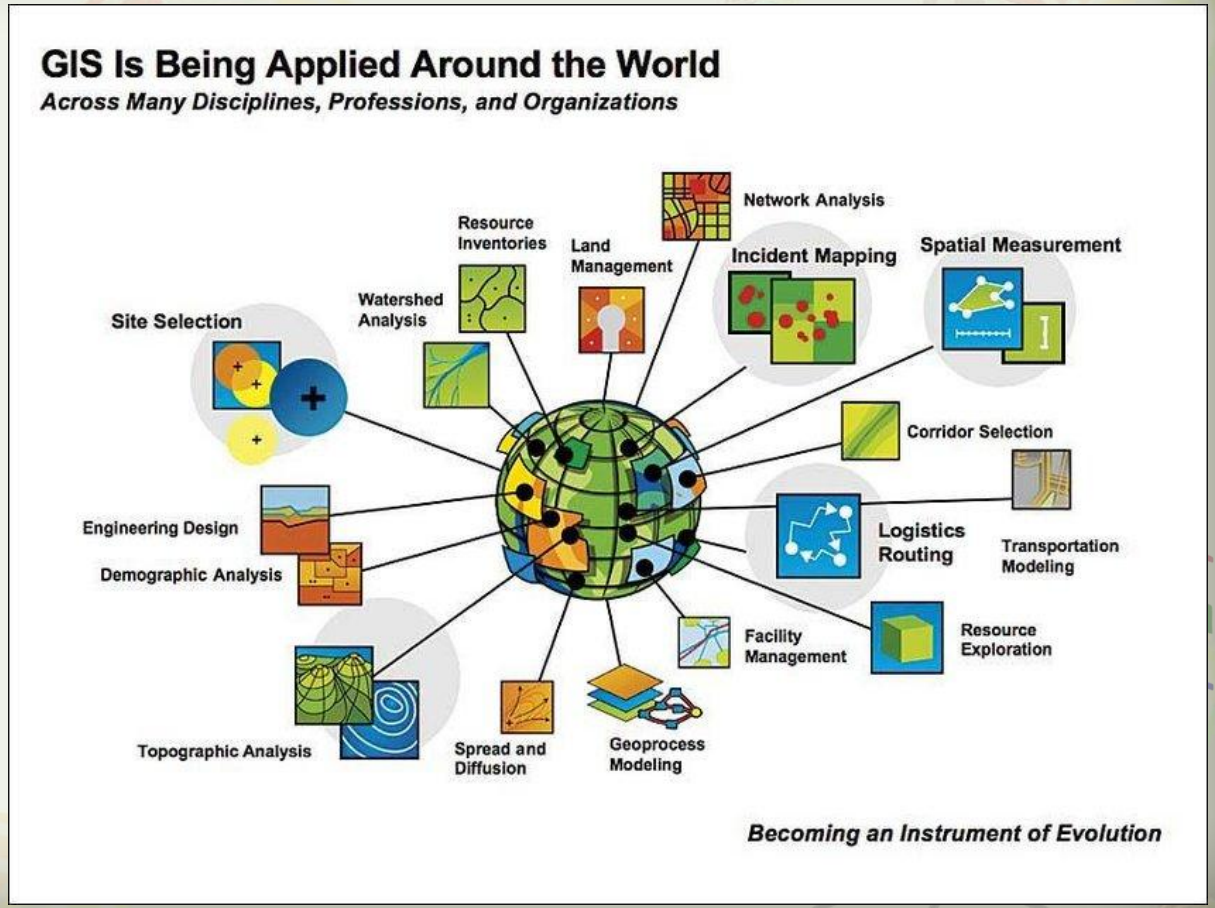
GEOGRAPHIC INFORMATION SYSTEM (GIS) SOFTWARE MARKET

OPPORTUNITIES AND FORECAST, 2020 - 2030

Geographic information system (gis) software market is expected to reach **$25.5 Billion** in 2030

Growing at a **CAGR of 15.2%** (2021-2030)

Why GIS



Why GIS

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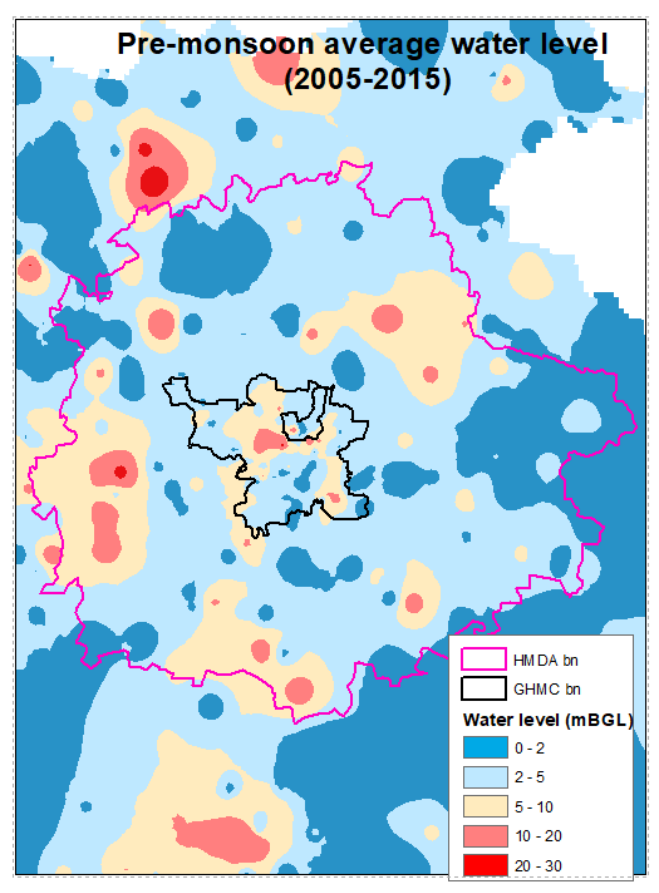
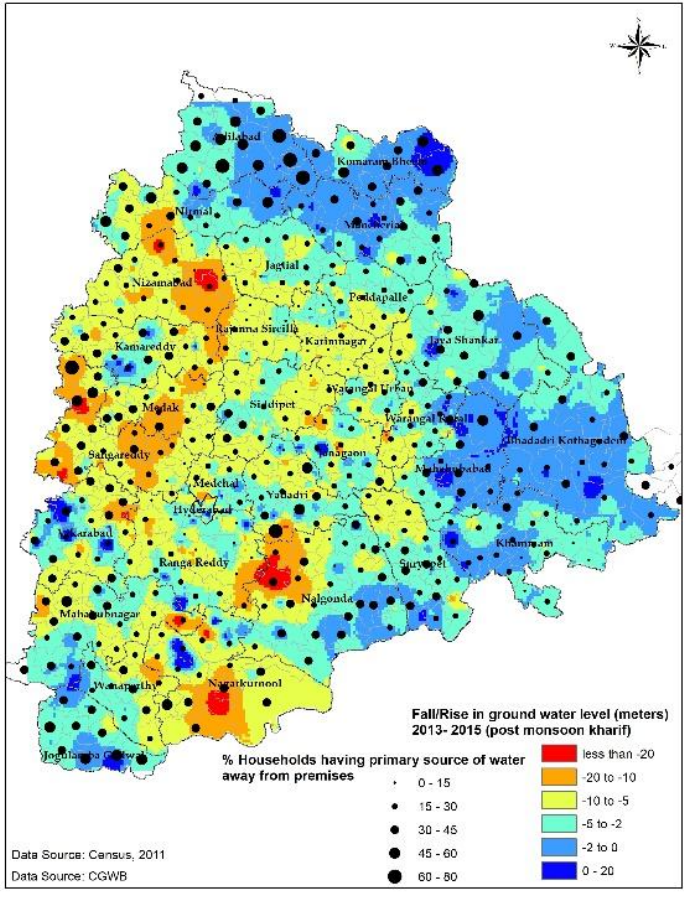
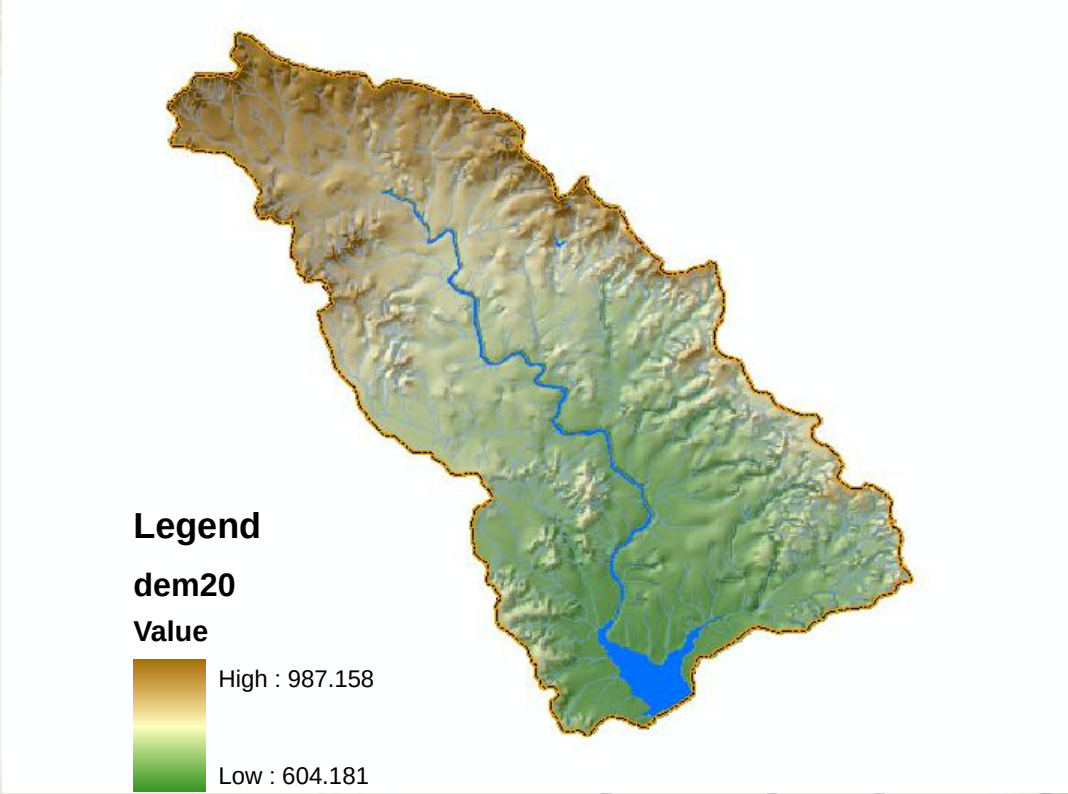




Why GIS

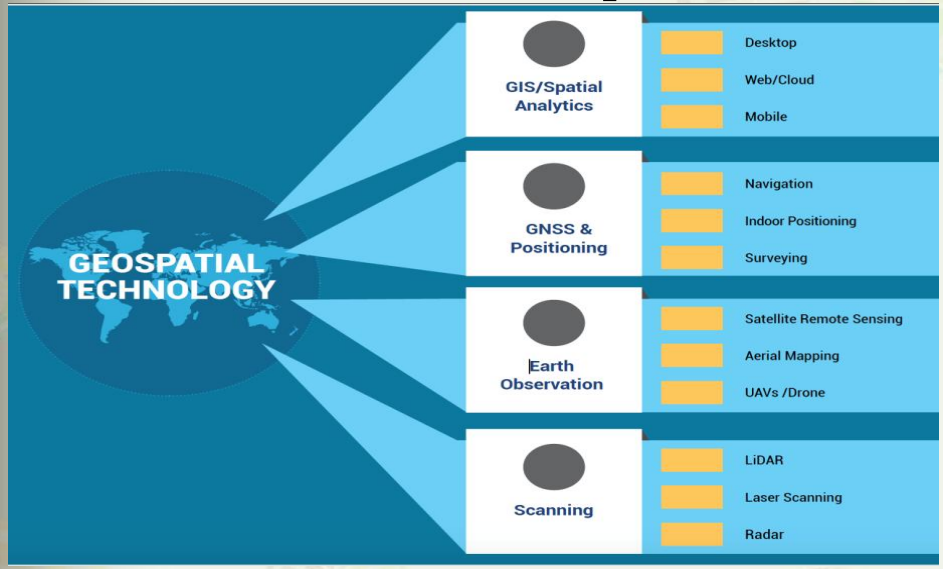
- Watershed Area
- Spot Height
- Contour
- Waterbodies
- Drainage
- Final Output

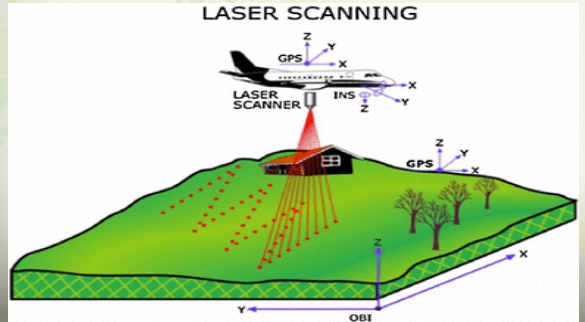


Why GIS

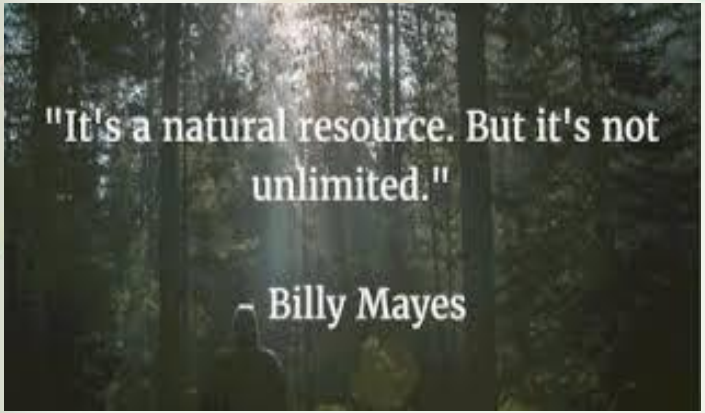
- Understand and Visualize Geospatial Data
- Enhance Emergency Response and Disaster Management
- Optimize Planning, Decision Making and management (water resources, land resources etc)

Geospatial Technologies





Geospatial Tools for Water Resources Management

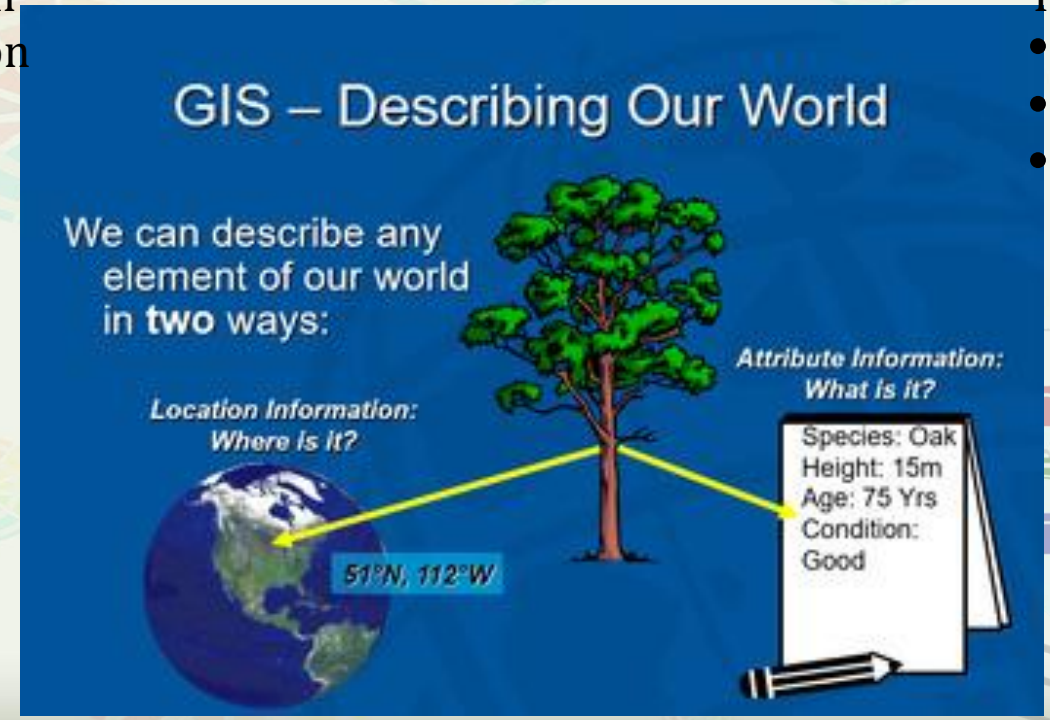


We are producing enough food enough for 17 Billion people, but we are only 7 Billion people, but close to half the population is starved, not because resource is lacking, simply because consciousness is lacking, we are still thinking 'YOU vs ME', we are not thinking 'WE'

Sadhguru

GIS, GPS, RS

GPS helps to fill this information

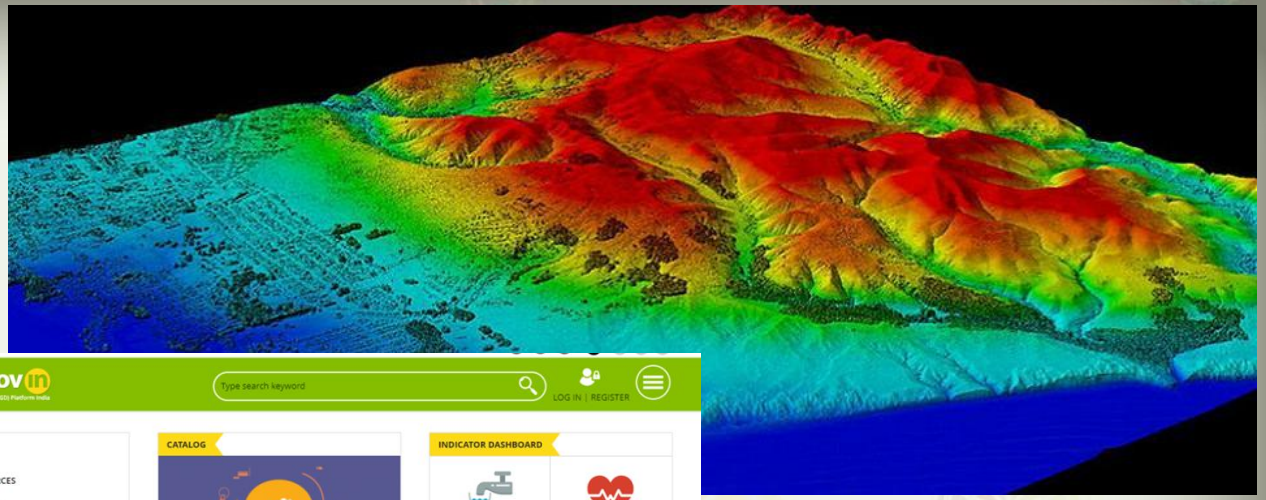


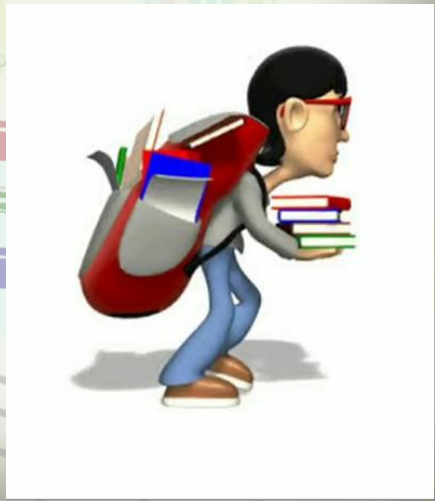
This can come from

- Remote Sensing
- Secondary data
- Primary data

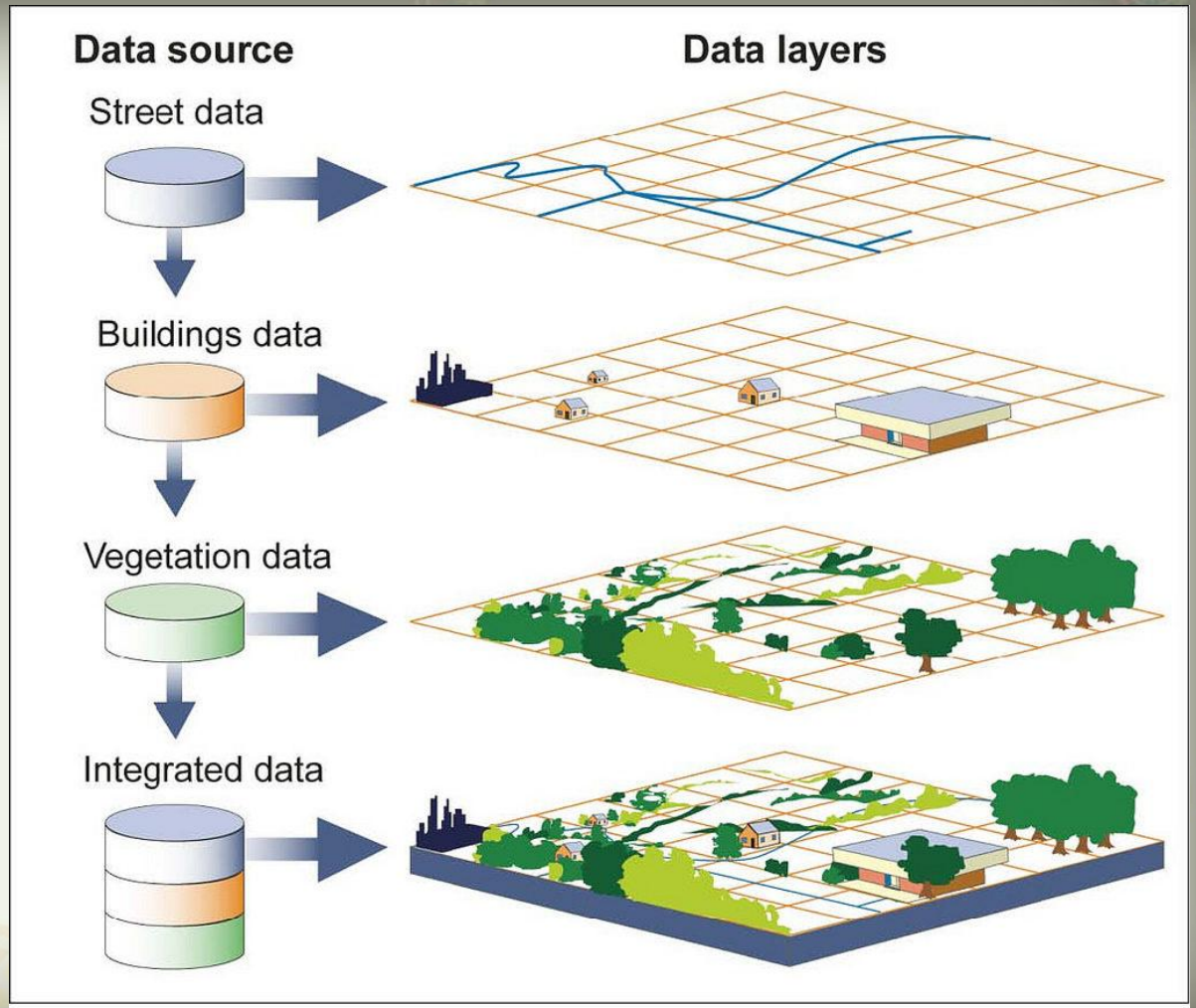
Part 2- Data from either

- Remote Sensing
- Secondary data
- Primary data

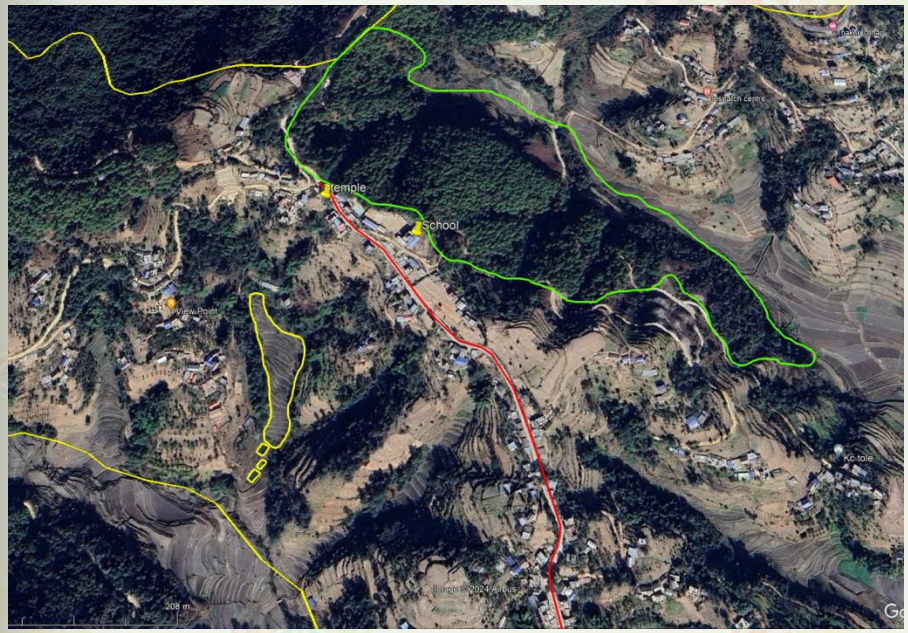


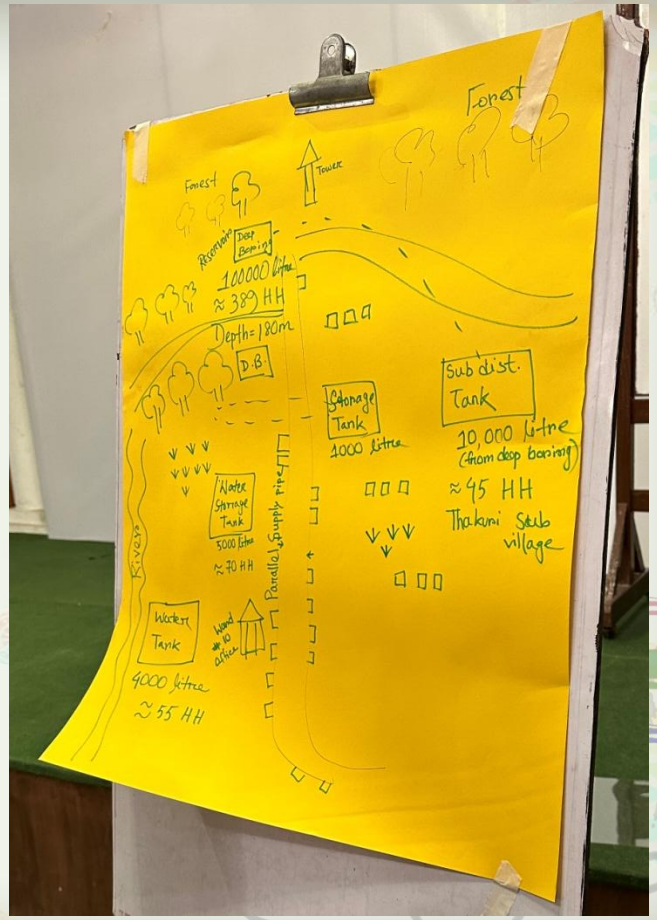


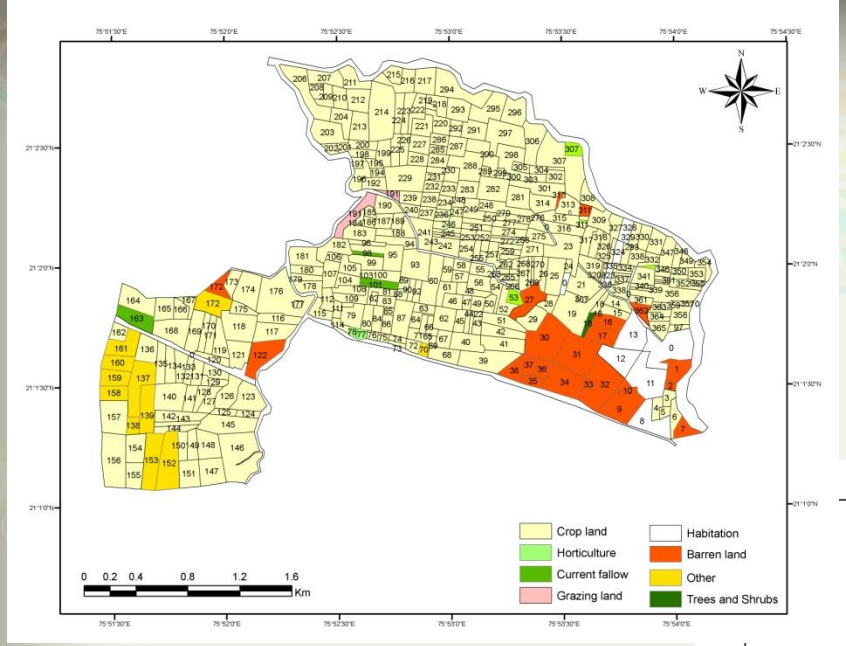
GIS links maps to databases and creates a visualization of data, and allows interactivity between the map and the data in a database.

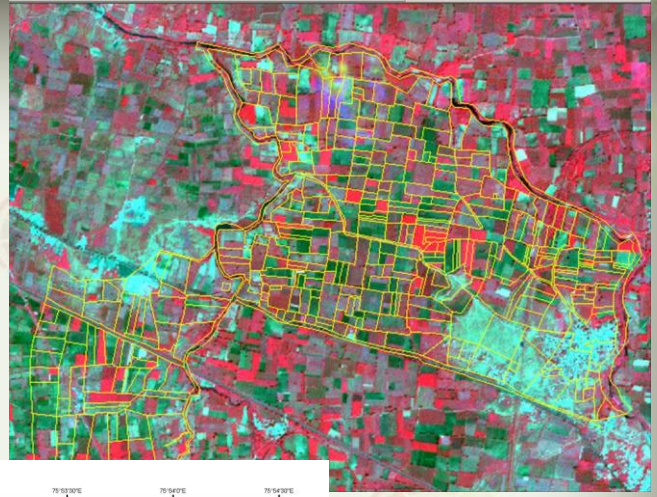


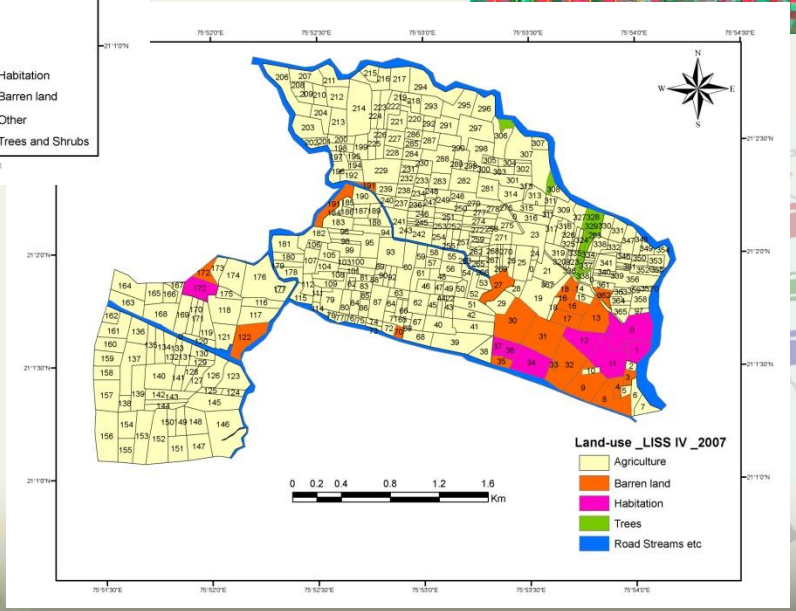
Source: GAO.


Temple
School
View Point
Ko tole
208 m


Forest
Forest
Tower
Reservoir
Deep Boring
100000 litre
≈ 389 HH
Depth = 180m
D.B.
Storage Tank
1000 litre
Sub dist. Tank
10,000 litre
(from deep boring)
≈ 45 HH
Thakuri Sub village
Water Storage Tank
5000 litre
≈ 70 HH
Rivers
Parallel Supply Line
Wicket Tank
4000 litre
≈ 55 HH
Hand pump


Crop land
Horticulture
Current fallow
Grazing land
Habitation
Barren land
Other
Trees and Shrubs
0 0.2 0.4 0.8 1.2 1.6
Km

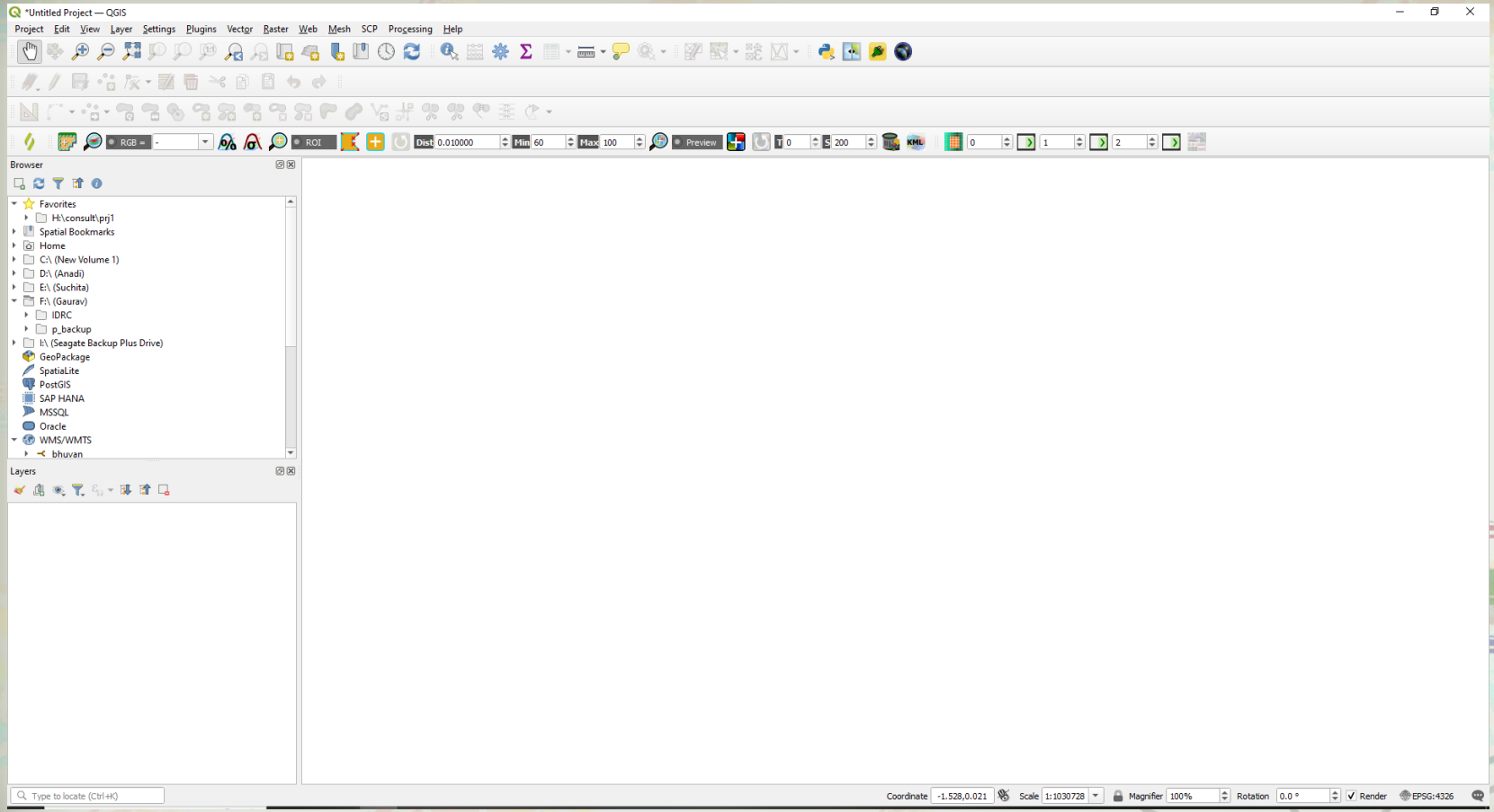



Land-use _LISS IV _2007
Agriculture
Barren land
Habitation
Trees
Road Streams etc
0 0.2 0.4 0.8 1.2 1.6
Km

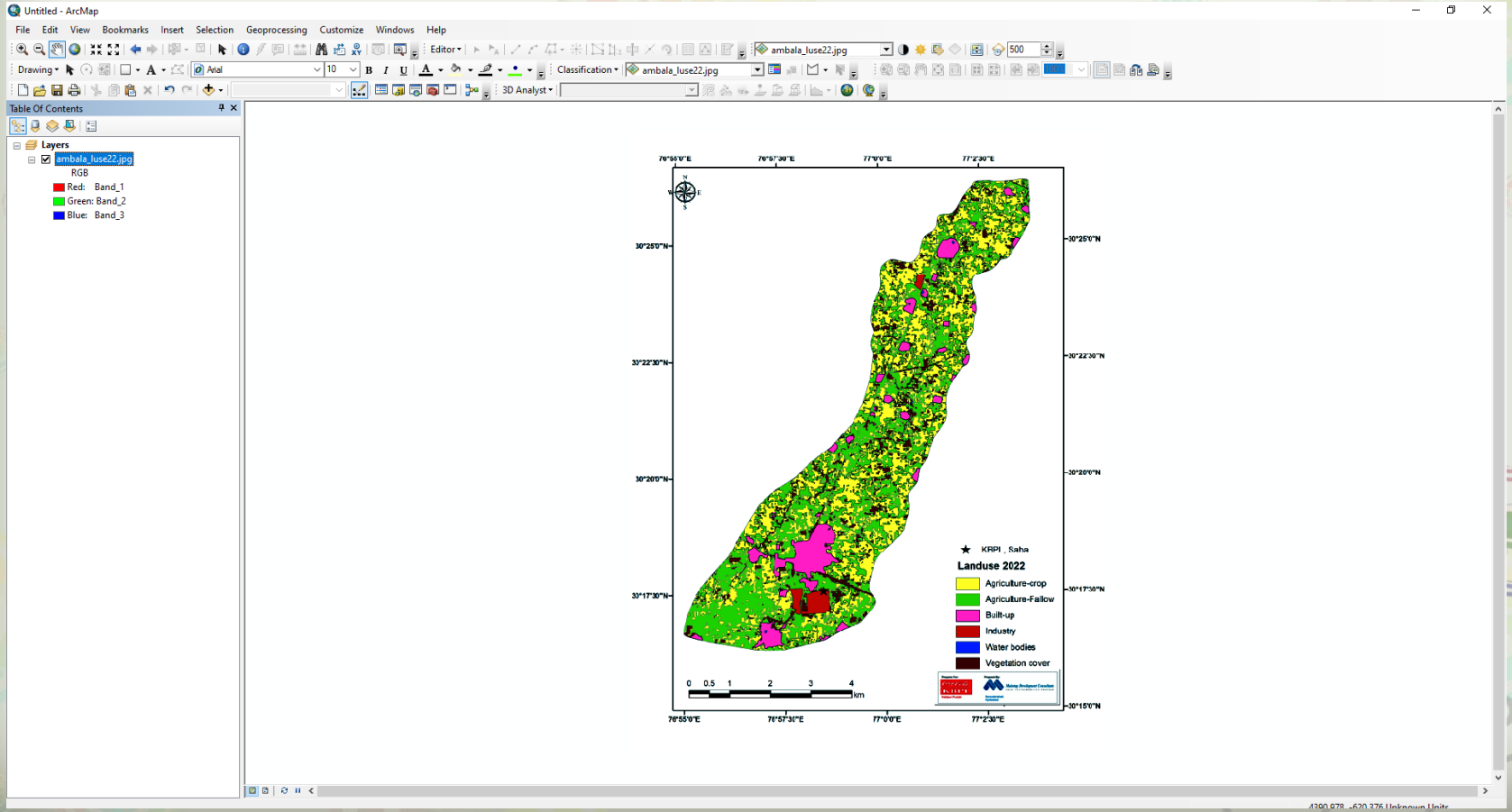
Top ranking GIS softwares

Esri – Products include Arc GIS pro, Arc GIS desktop, ArcSDE, ArcIMS, ArcWeb services and ArcGIS Server
QGIS – Powerful cartographic and geospatial data processing tools with extensive plug-in support
Intergraph – Products include G/Technology, GeoMedia, GeoMedia Professional, GeoMedia
ERDAS IMAGINE – Products include Leica Photogrammetry Suite, ERDAS ER Mapper – good for image processing
Autodesk – Products that interface with its AutoCAD software package include Map 3D, Topobase, and MapGuide.
ENVI – Utilized for image analysis, exploitation, and hyperspectral analysis. WebMap, and add-on products for industry sectors, as well as photogrammetry.
MapInfo – Desktop GIS MapInfo Professional.
GRASS GIS – Geospatial data management, vector and raster manipulation
ILWIS (Integrated Land and Water Information System) – Integrates image, vector and thematic data
MapWindow GIS – Free desktop application with plugins and a programmer library
SAGA GIS (System for Automated Geoscientific Analysis) – Tools for environmental modeling, terrain analysis, and 3D mapping

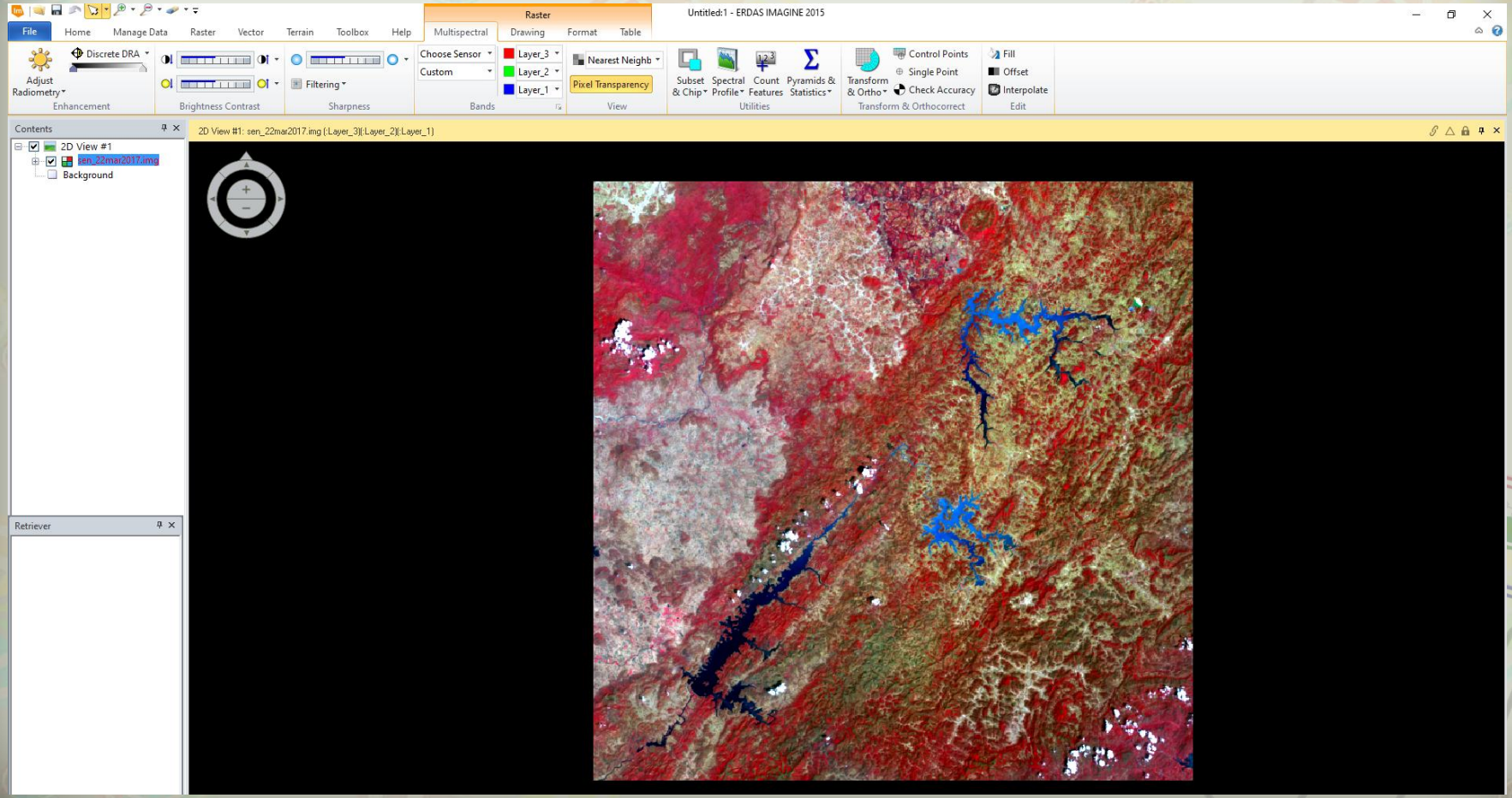
QGIS 3.22



ARC GIS Desktop v 10.3



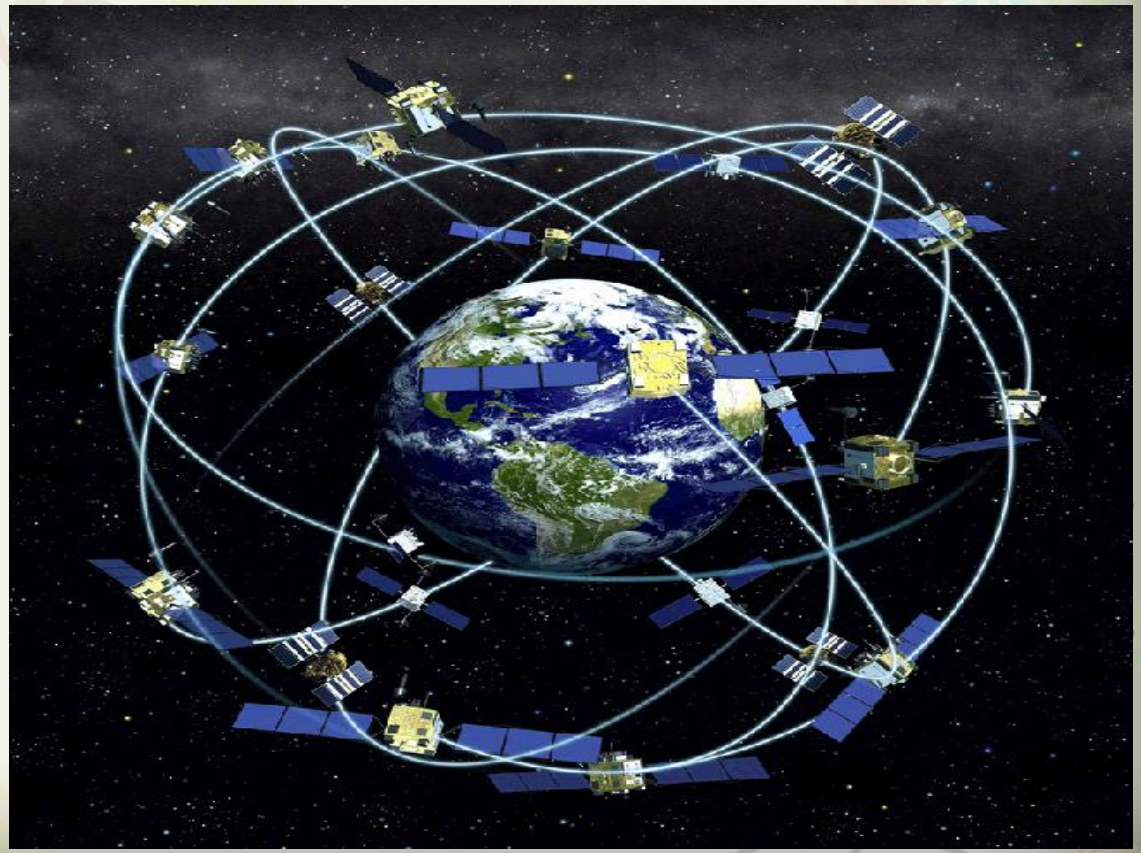
ERDAS v 15



How does GPS work

Space Segment

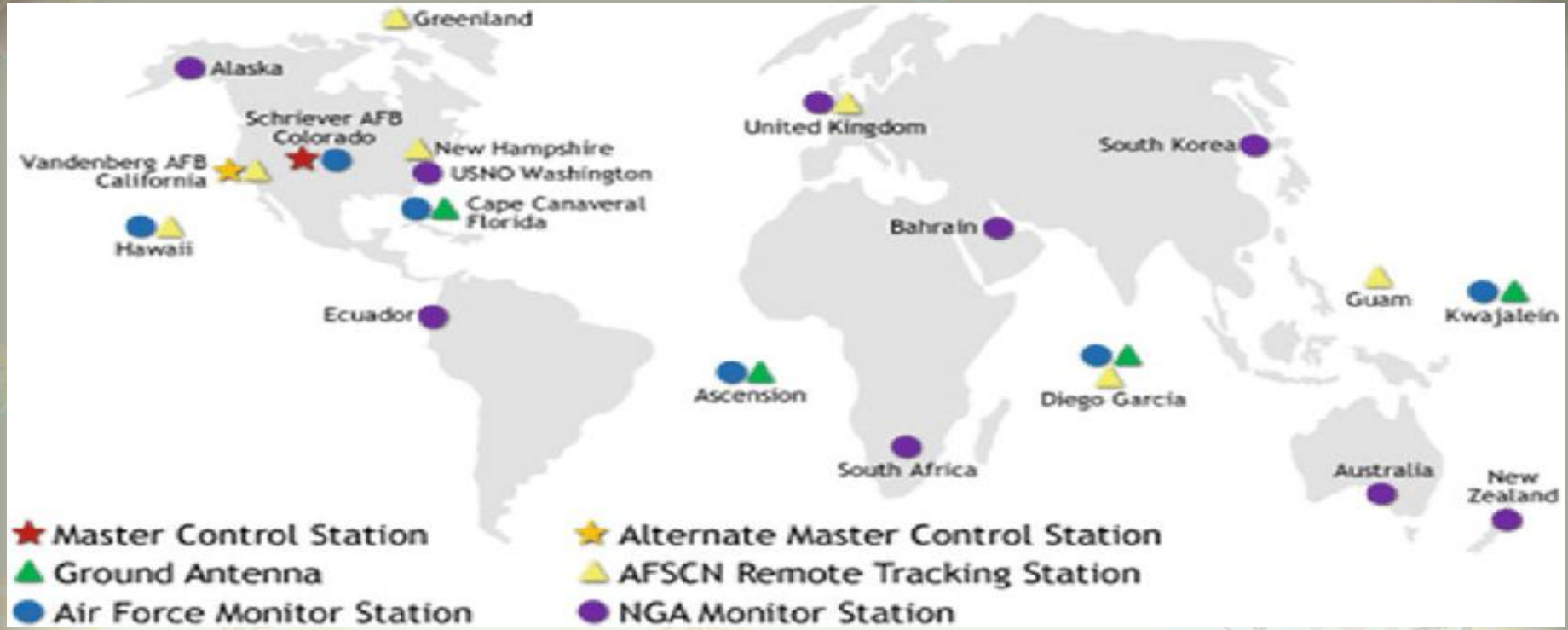
- 24 satellite vehicles
- 6 obital planes
- Obital period of 11 hr 55 min
- 20,200 km elevation above Earth
- Five to eight satellites visible from any point on Earth



How does GPS work

Ground Segment

- Monitor and control GPS satellites
- One master control station (MCS)
- Five monitor stations
- Three ground antennas


Greenland
Alaska
Schriever AFB
Colorado
Vandenberg AFB
California
New Hampshire
USNO Washington
Cape Canaveral
Florida
Hawaii
Ecuador
United Kingdom
South Korea
Bahrain
Guam
Kwajalein
Ascension
Diego Garcia
South Africa
Australia
New
Zealand
Master Control Station
Alternate Master Control Station
Ground Antenna
AFSCN Remote Tracking Station
Air Force Monitor Station
NGA Monitor Station

How does GPS work

User Segment

- Receive signal from satellites
- calculate current position and speed/direction

Open access data for Nepal

- Global data

https://www.diva-gis.org/Data

- Administrative boundaries

https://download.hermes.com.np/nepal-administrative-boundary-wgs/

- Household level data

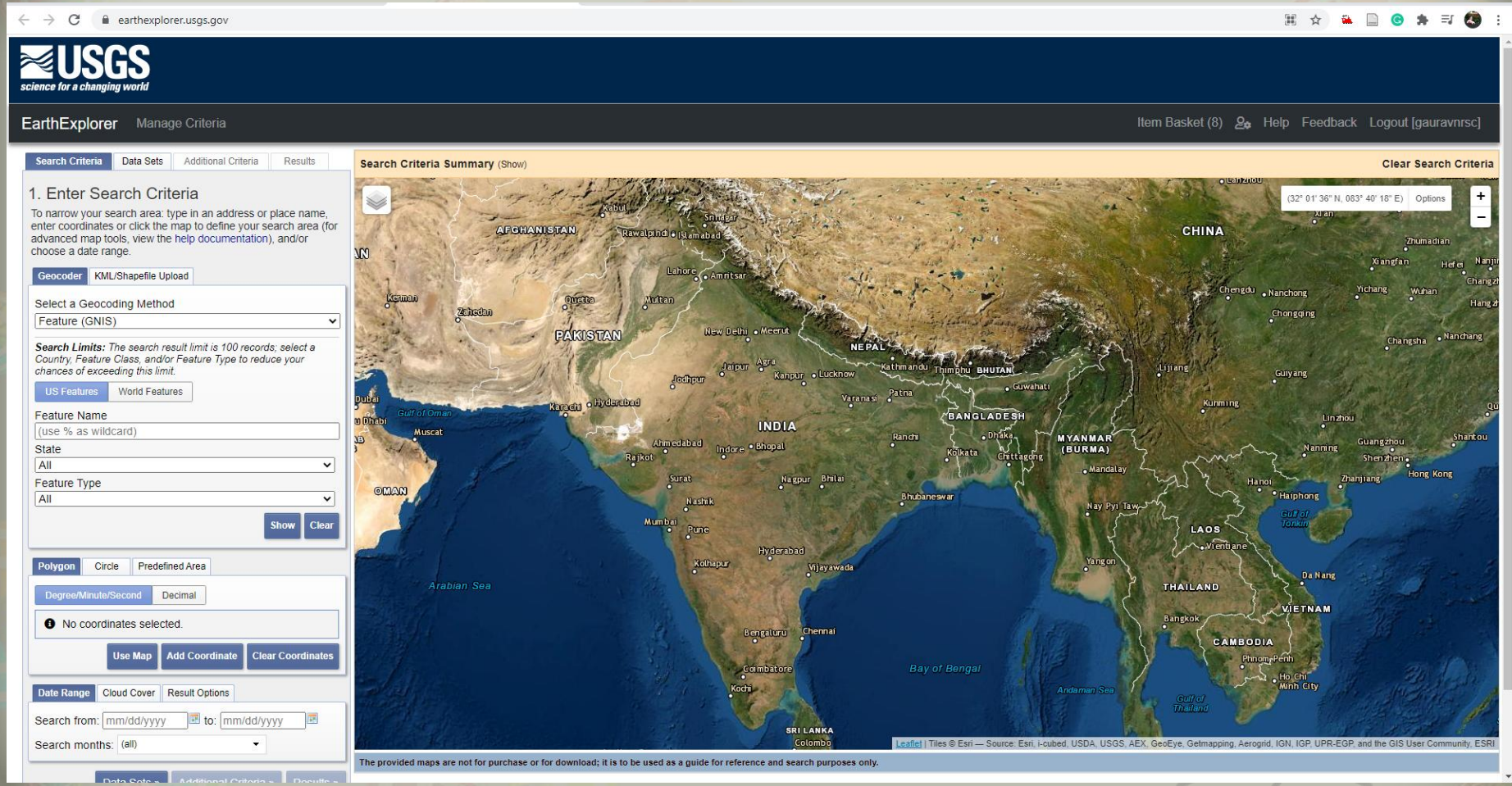
https://datacatalog.worldbank.org/search/dataset/0062658/Nepal-Spatial-Database

- Other spatial data (Road/railways/waterways/buildings/educational facilities/other socioeconomic data)

https://data.humdata.org/dataset/?q=nepal&sort=last_modified%20desc&ext_page_size=25

- Toposheets at 1:250000 scale https://maps.lib.utexas.edu/maps/ams/
  at 1:50000 scale
- Satellite data
  - https://earthexplorer.usgs.gov
  - https://sentinel.esa.int/web/sentinel/sentinel-data-access

https://earthexplorer.usgs.gov/



https://sentinel.esa.int/web/sentinel/sentinel-data-access