MAP Digitisation and Data Ingest

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Overview

- Paper to Digital Map
- Digitising
- Field Data Collection
- Data ingest

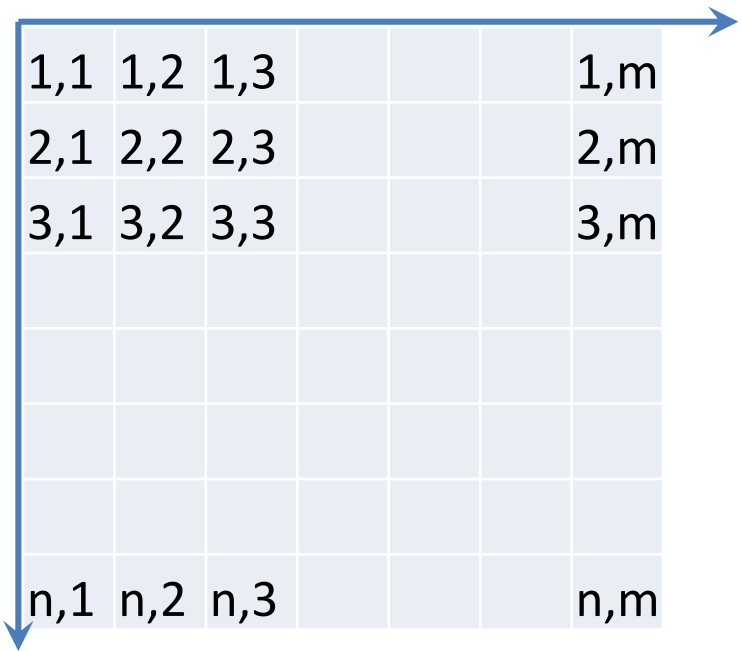
Paper Map and Digital Map

- Paper Map
- Maps in the form of hard copies

- Digital Maps
- Maps as soft copies
  - Those can be viewed directly on computers.
  - Modification with respect to scale.
  - Zoom/Move to a particular portion.

Scanning

- Scanners are the devices that convert analog data to digital grid based images.
- Used to capture the geographical data in a very high resolution raster format that are further processes to develop vector data.
- Light source is used to scan and record the maps in digital format.



Scanning

- Digital images are made of grids with a reflectance values
- Scanned images would contain smudges and defects of the original map
- Needs enhancement (contrast, brightness etc.) if the image quality is low.

Scanners

FLAT BED SCANNERS

ROLLER SCANNERS

Paper Map to Digital Map

Paper Map

Printing

Conversion

Scanning

Digital Map

Need for conversion

Most of the ancillary data's are available in analog versions, conversion is necessary to:

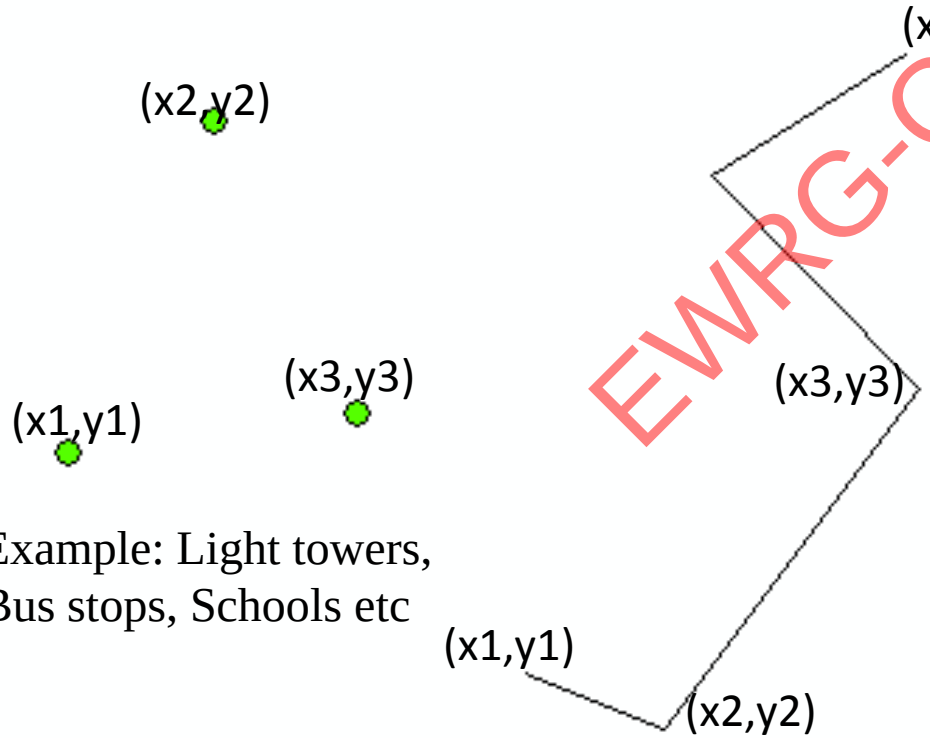
1. To prepare GIS database .

2. Vectorisation as Point, Line and Polygon for further analysis. *Example : Change detection*

3. Paper maps are susceptible to physical damage .

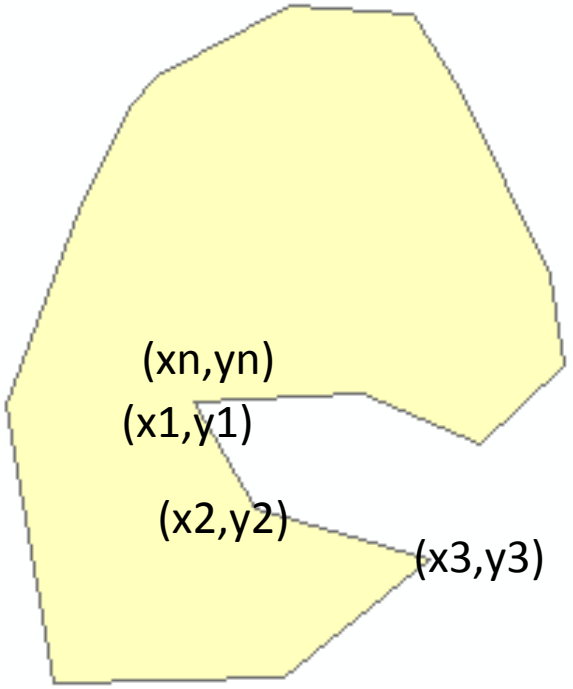
Digitising

- Process of representing features as points, lines and polygons.

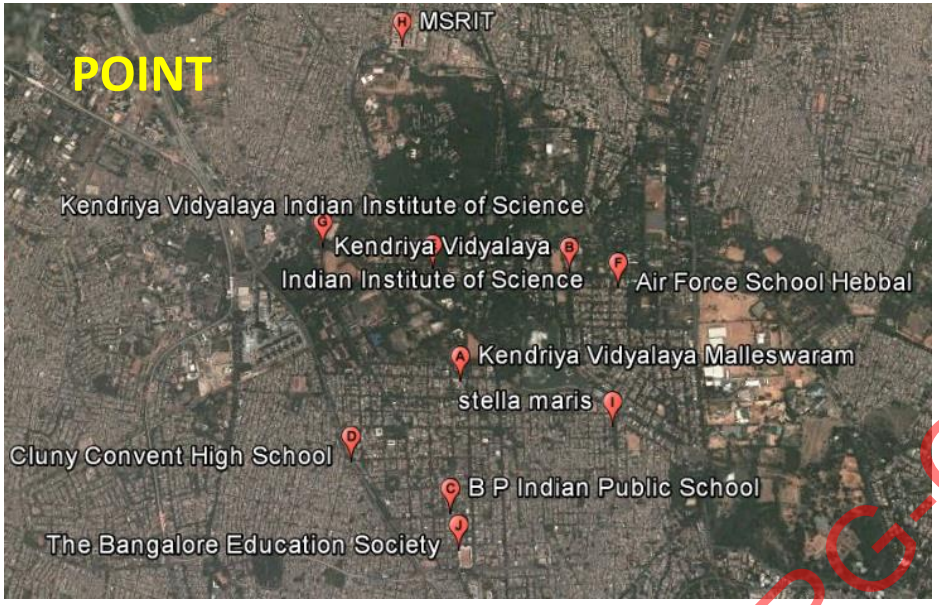


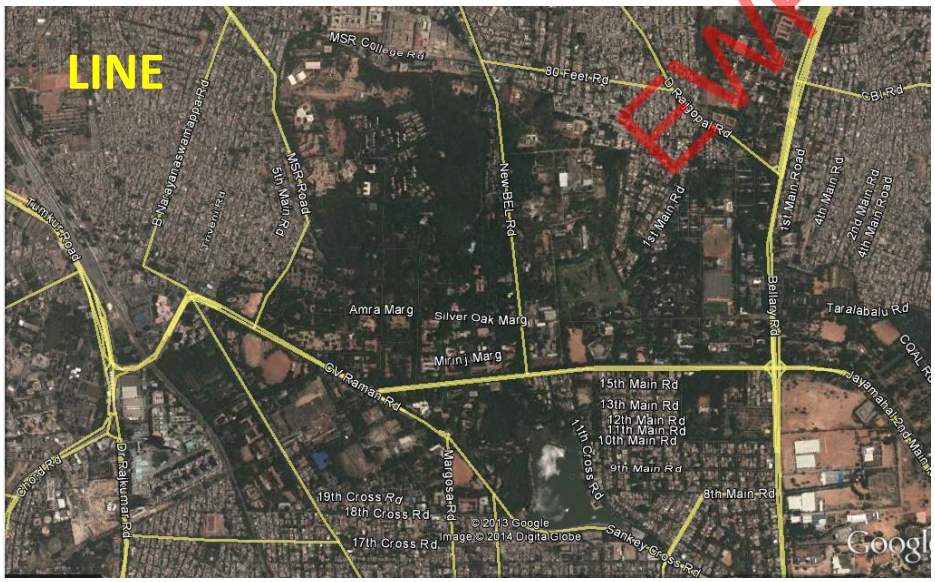
Example: Light towers, Bus stops, Schools etc

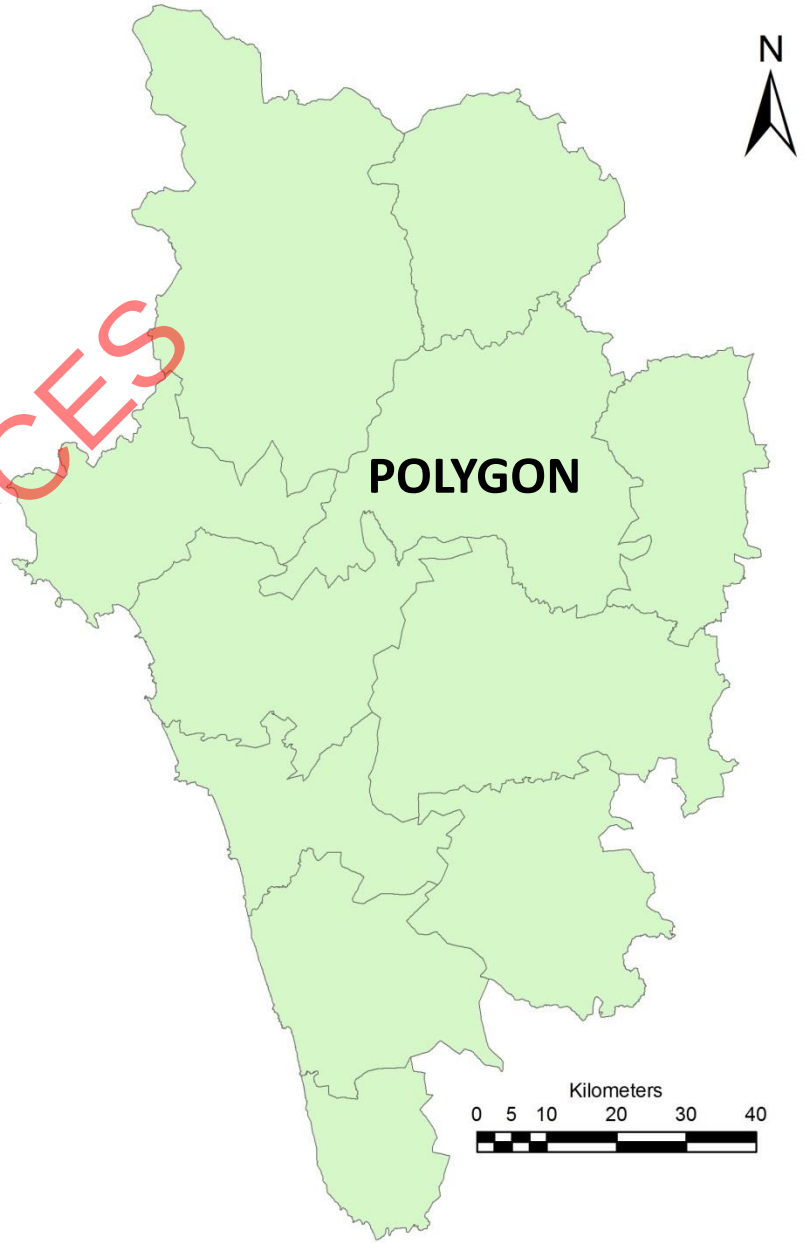
Example: Road network, Stream Network etc.

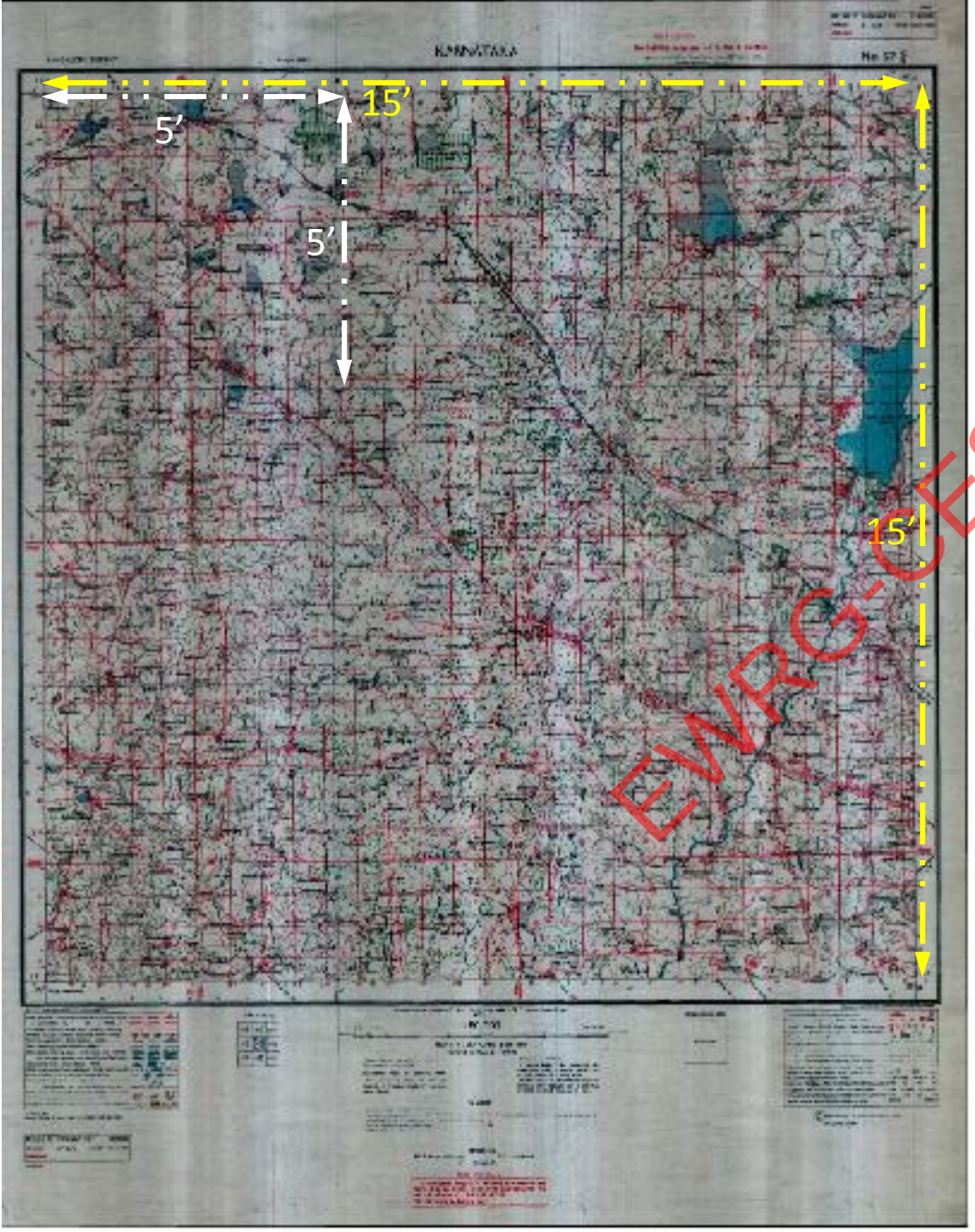


Example: Forests, political boundaries .. etc


POINT
MSRIT
Kendriya Vidyalaya Indian Institute of Science
Kendriya Vidyalaya
Indian Institute of Science
Air Force School Hebbal
Kendriya Vidyalaya Malleswaram
stella maris
Cluny Convent High School
B P Indian Public School
The Bangalore Education Society


LINE
MSR College Rd
80 Feet Rd
D Rajgopal Rd
CBI Rd
B Narayanaswamappa Rd
MSR Road
5th Main Rd
New BEL Rd
1st Main Rd
1st Main Road
4th Main Rd
2nd Main Rd
4th Main Road
Tumkur Road
Amra Marg
Silver Oak Marg
Mirinj Marg
Bellary Rd
Taralabalu Rd
C V Raman Rd
15th Main Rd
13th Main Rd
12th Main Rd
11th Main Rd
10th Main Rd
9th Main Rd
11th Cross Rd
Margosa Rd
19th Cross Rd
18th Cross Rd
17th Cross Rd
8th Main Rd
Sankey Cross Rd
© 2013 Google
Image © 2014 DigitalGlobe


POLYGON
N
Kilometers
0 5 10 20 30 40

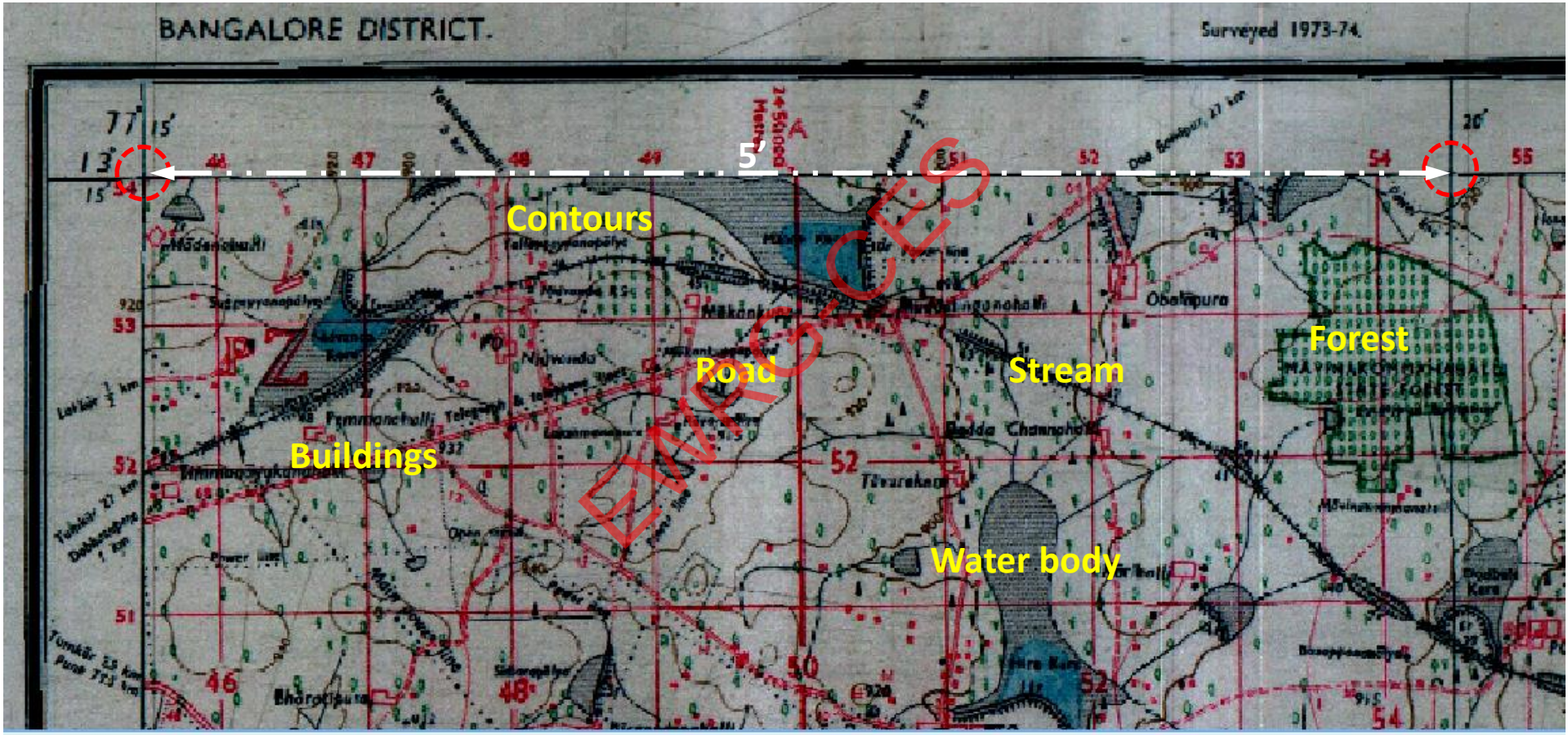


Reading Coordinates in toposheet

- 1: 50000

- Scanned toposheets have no geographical reference i.e., they are in the rectangular coordinate system

Features in a toposheet



Line Features: Contours, Roads, Railway lines, Streams, Drainages,etc

Polygon Features: Tanks, Forests, Reservoirs, towns and villages

Digitising Features

- Digitisation features is based on the scale of the work
- Example : A building on a small scale map is represented as a point, where as on a large scale map a building is represented as polygon.
- For linear features, end points are sufficient to represent , rather than having multiple points in between.
- Features must obey the topology rules

Topology Rules

- Points shall not over lap one over the other
- Linear features shall have end nodes only other than intersections
- Features shall be connected to each other.
- Line features shall not have dangles or overshoots
- Polygons must not overlap each
- Polygons must not have gaps
- Sliver polygons should not exist

……..etc

Field Data Collection

- Information to be collected - about the feature of interest.
- Example : **Trees**: location of the tree, DBH of the tree, cannopy area of the tree, tree species-family…etc.

- The coordinate information about the location (point), length of the road (line), areal extent (polygon) are collected using GPS

GPS

- GPS – Global Positioning System
- Gives the x, y and z coordinates about a point
- Uses the satellites to locate the position (triangulation).
- Application
  - Navigation
  - Location of a Feature
  - Velocity measurements
  - Altitude Measurements


Church St
W Broadway
TRIBECA NY
Hudson St
Chambers St
0.20
miles
4.8 M
31 mph
4:33 pm
4:52 pm
TOMTOM


9:42 AM
Overview


GARMIN

Using GPS in Field data collection

- In the field GPS is used to identify the location of the feature.
- Waypoints are used to mark the locations and store in GPS.
- For each (known) waypoint, attribute data including the description of the feature/location are identified
- GPS needs to be pre calibrated, uncertainty exists in closed areas where signals are low

Example :

Latitude (Degree)	Longitude (Degree)	Elevation (meters)	Id	Description	Capacity
12.9694	77.5935	910	A1	Kanteerava Stadium	40000

GPS

Information

Data Ingest

- Data ingestion is the process of obtaining, importing, and processing data.

- Process : involves altering individual files by editing their content and fit into a larger document.

- Concept of database is used in the process of joining the datasets using the primary key and foreign key.

Database

- Database is a collection of structured data, independent of any particular application.
  - Data : consists of unorganised facts and entities
  - Information: Organsied data
  - Knowledge : information used to process, and draw conclusions
- Database management systems (DBMS) are computer programs used to organise and manage the database.

Data Ingest Examples

- Recorded field data to the GPS (Spatial) data.
- Attaching Population database to Village layer (based on the village id)
- Attaching the attributes about the road
  - Attaching photo of pot holes on the road with the location and description on web
- Rain Gauge stations with rainfall data at each station

Database ingest

OBJECTID	Rain gauge id
1	270201
2	270401
3	270402
4	270403
5	270603
6	270601
7	270903
8	270907
9	270902
10	270904
11	270908
12	270909
13	270910

Spatial Database

Non Spatial Database

RGS_id	January	February	March	April	May	June	July	August	September	October	November	December	Annual
270201	24.9	8.3	23.8	33.4	174.6	1117.7	1271.3	827.8	397.9	206.0	72.7	34.2	4192.7
270401	6.6	0.3	15.6	15.9	124.5	986.6	1125.7	701.8	350.6	171.5	65.0	32.2	3596.1
270402	4.7	0.0	9.1	9.3	157.3	1122.0	1588.6	1090.9	400.6	147.2	69.3	8.3	4607.2
270403	17.9	0.0	7.3	27.3	166.1	1006.8	1123.6	799.2	360.9	188.3	65.1	21.2	3783.6
270603	6.1	22.6	26.8	22.6	138.0	1074.0	1234.2	725.8	378.6	172.9	66.9	32.4	3900.9
270601	17.9	9.4	34.0	24.0	135.6	944.5	1035.6	632.1	321.9	208.5	86.0	20.0	3469.6
270903	28.3	0.0	30.6	29.5	127.2	1220.3	2210.6	1541.8	468.6	197.7	117.6	37.1	6009.2
270907	9.3	5.6	31.3	33.4	72.1	615.8	1058.6	652.3	208.9	145.5	68.5	19.2	2920.4
270902	8.3	11.0	46.4	22.8	97.2	527.8	1034.9	617.7	223.4	181.8	69.8	21.5	2862.6
270904	22.7	10.7	37.7	52.6	62.3	283.1	534.3	320.1	137.5	146.5	98.6	25.6	1731.7
270908	33.2	9.9	39.3	67.0	91.3	374.2	806.5	531.3	160.7	129.0	73.5	17.8	2333.7
270909	12.3	12.1	16.4	25.2	71.1	530.7	857.6	516.9	203.0	131.2	66.9	21.5	2465.0
270910	5.0	14.3	18.5	31.6	65.8	511.8	925.5	502.6	186.2	132.9	61.7	21.5	2477.3

Thank you