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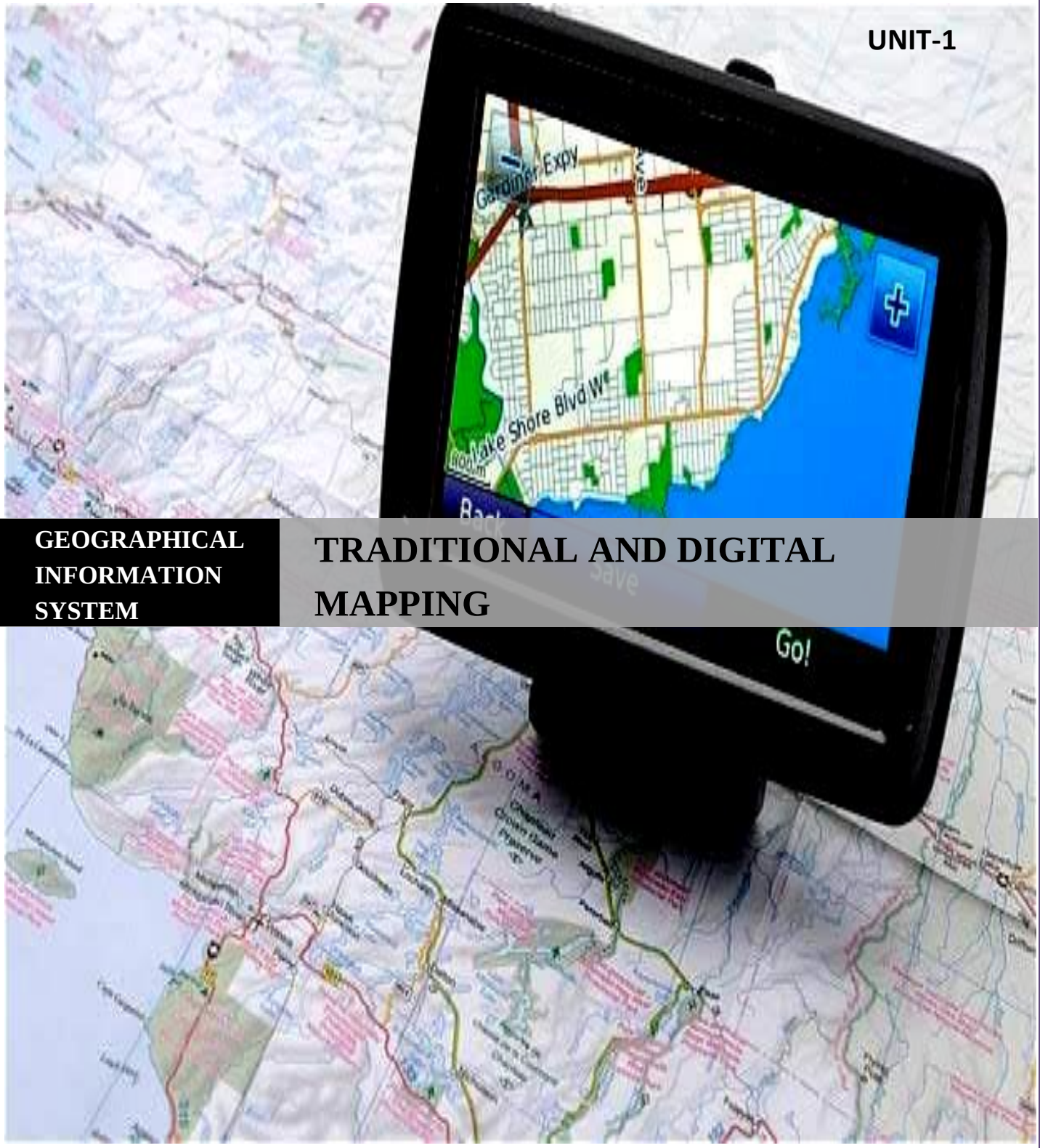
SEMESTER –IV

UNIT-1



GEOGRAPHICAL INFORMATION SYSTEM

TRADITIONAL AND DIGITAL MAPPING

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INTRODUCTION

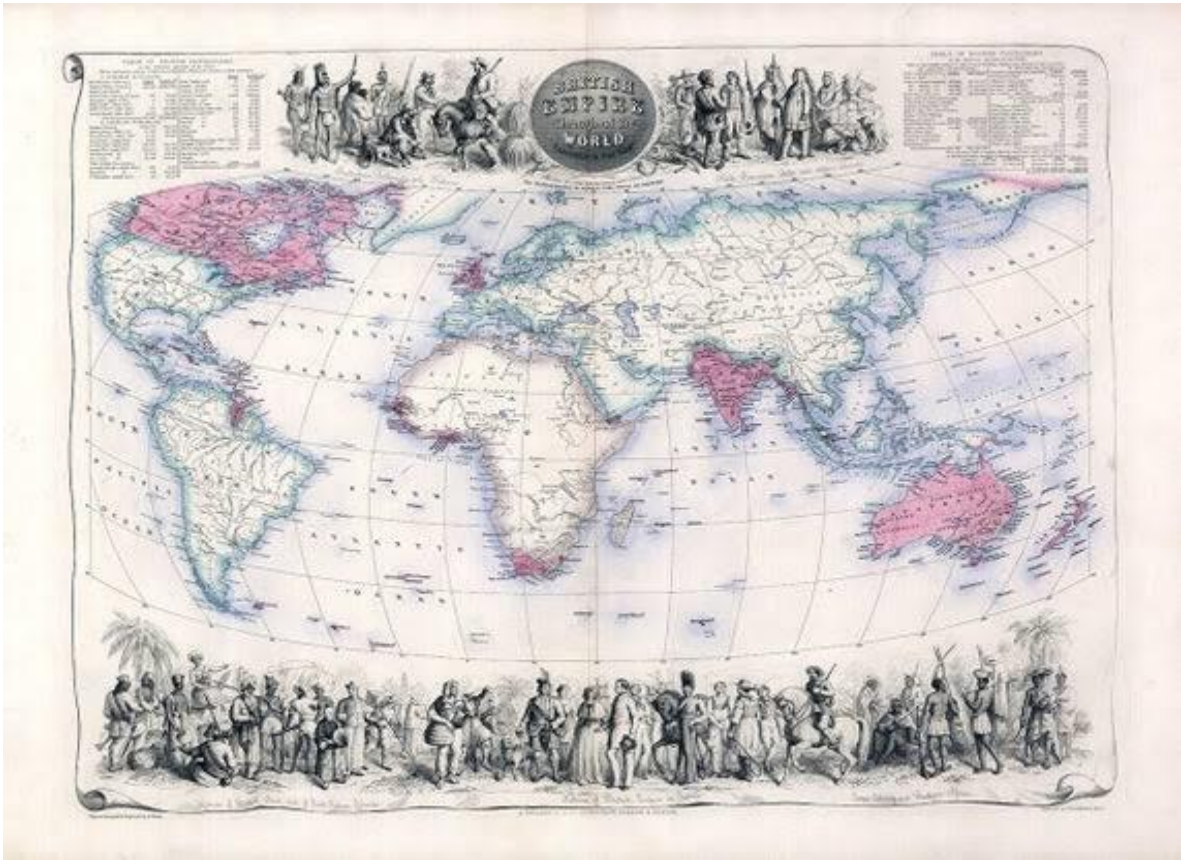
The purpose of a map is to express graphically the relations of points and features on the earth's surface to each other. These are determined by distance and direction. In early times 'distance' might be expressed in units of time, or linear measures- so many hours' march or days' journey by river, and these might vary on the same map according to the nature of the country. The other element is direction, but for the ordinary traveller, whose main concern was 'Where do I go from here, and how far away is it?' The history of cartography is largely that of the increase in the accuracy with which these elements of distance and direction are determined (G.R Crone, 1968, pg-13).

More recently, analysis of mapped data for decision-making has become an important part of re- source and land planning. During the 1960s, manual analytic procedures for overlaying maps were popularized (McHarg, 1969). Geographic information systems (GIS) technology provides a means for quantitative modelling of spatial relationships. In one sense, this technology IS Similar to conventional map processing involving map sheets and drafting aids such as pens, rub-on shading, rulers, planimeters, dot grids, and acetate sheets for light-table overlays. In another sense, these systems provide an analytic "tool- box," enabling managers to address complex issues in entirely new ways (Dangermond, 1986).

The quantitative treatment of geographic space has analogies in traditional statistics and algebra Quantitative approaches to digital map processing are described and potentials and pitfalls of map analysis are identified. Digital map analysis provides a means for evaluation of error introduced by both processing and modelling considerations.

TRADITIONAL MAPPING

Geographical traditional mapping means graphically representation of the earth's surface features on a flat surface or plain paper. This mapping technique used from prehistoric depiction of hunting and fishing. This old cartographic technique prepares maps for different purpose which is very helpful in any kind of discoveries, innovations and developments. ***Geographical traditional mapping may be defined as cartography***. Cartography is known as the art or science of graphically representing geographic and non-geographic features, usually on a flat surface as a chart or map. And a map is "A graphic depiction of all or part of a geographic realm in which the real world features have been replaced by symbols in their correct spatial location at a reduced scale." (Clarke, 2001)



CARTOGRAPHY

Cartography can be concisely and classically defined as “the art science and technology of making maps”. The popular associations of the word, with techniques of map making are a reflection of its lexical routes in cart (French for map) and graffiti (Greek for writing). More specifically cartography is a unique set of transformations for the creation and manipulation of visual or virtual representations of spatial information, most commonly maps, to facilitate the exploration, analysis, understanding and communication of information about that space. Maps are a symbolized representation of a spatial reality designed for use when spatial relationships are of primary interest. This sweeping definition would encompass all types of maps, plans, charts and sections, three-dimensional models and globes representing spatial (i.e. information) or geospatial (i.e. information tied to the earth) or any celestial body at any scale. Cartography therefore has many of variables of meaning, but can be broadly considered as the process and study of map making. It is more than an art/craft, or a technology for producing artifacts (maps); it is a science seeking to abstract general truths and principles about this process.

The old cartographic technique prepares maps for different purpose which is very helpful in any kind of discoveries, innovations and developments. But after a long period these maps becomes referenced data because in our dynamic world, many aspects of land cover and land use things on the earth’s are constantly changing over time to time.

PROBLEMS OF GEOGRAPHIC TRADITIONAL MAPPING OR CARTOGRAPHY

1. Represent the terrain mapped object on a flat media. It concern with map projections. Eliminating characteristics of the mapped object that are not relevant to the map's purpose. It concern with generalization.

2. Out of date (updating problem)

3. Expensive and time consuming

4. Spatial analysis by this is Time and energy consuming

5. Display is Slow Tedious and time consuming

6. Storage problem

7. Maintains problem

8. Complexity of data retrieval

9. Overlay (expensive and consuming)

10. Data collection

11. Colours / patterns difficult to apply

These are the main causes which replaced the geographical traditional mapping into new word ***digital mapping***.

DIGITAL MAPPING

Not long ago, people drew and colored their maps by hand. Analyzing data and creating the resulting maps was slow and labour intensive. Digital maps, thanks to the ever-falling cost of processing power and storage, have opened up a whole new range of possibilities. With the click of a mouse or a few lines of code, a computer analyzes draws, and colour-themes that map data. From the global positioning system (GPS) in your car to the web site displaying local bus routes, digital mapping has gone mainstream.

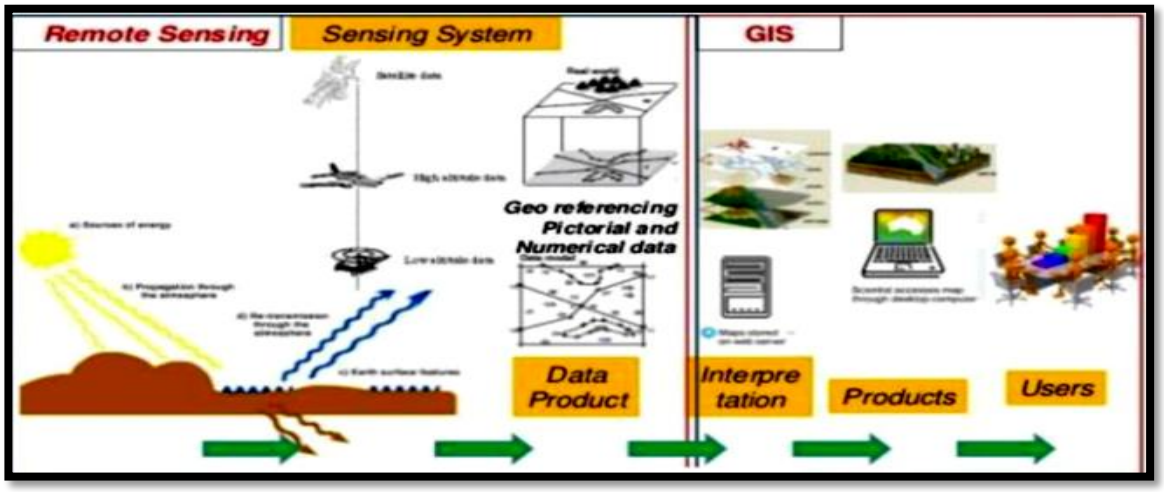
Spatial technology such as ***Remote Sensing***, ***Geographical Information System (GIS)***, ***Global Positioning System (GPS)*** and ***computer cartography***. In map making, technology has continually changed in order to meet the demands of new generations of mapmakers and map users. In the mid-to-late 20th century, advances in electronic technology have led to further revolution in map making. Specifically computer hardware devices such as computer screens, plotters, printers, scanners(remote and document) and analytic stereo plotters along with visualization, image processing, spatial analysis and database software, have democratized and greatly expanded the making of maps, particularly with their ability to produce maps that show slightly different features, without engraving a new printing plate.

Geospatial techniques are-

1. Remote sensing
2. GIS
3. GPS
4. Computer

1. REMOTE SENSING

For digital mapping remote sensing provides data in form of imageries, Aerial Photographs. The basis for multispectral collection and analysis is that of examined areas or objects that reflect or emit radiation that stand out from surrounding area. Remote sensing data is acquired by passive and active sensors.

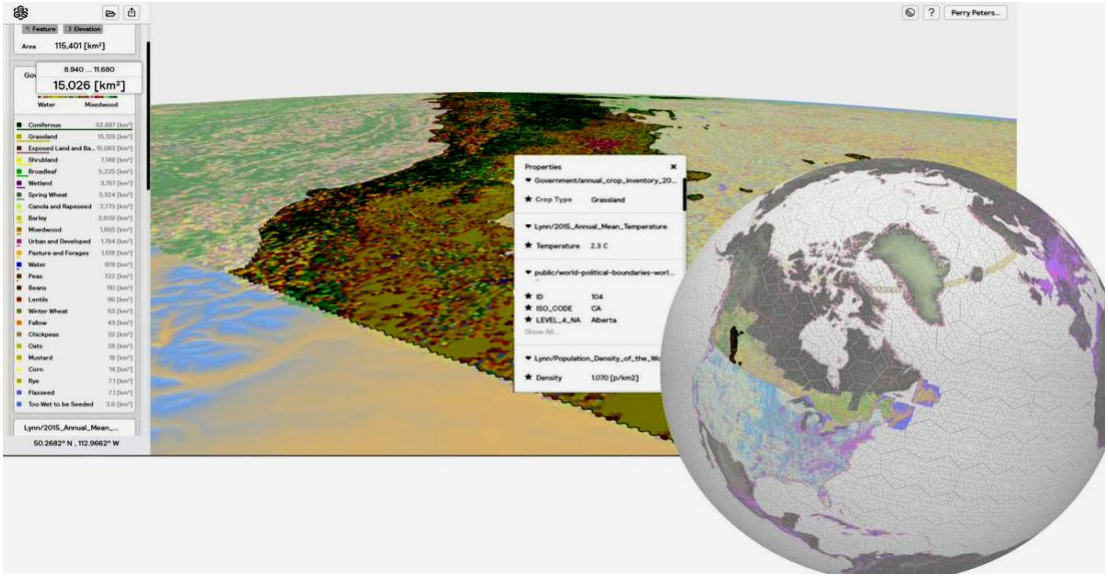


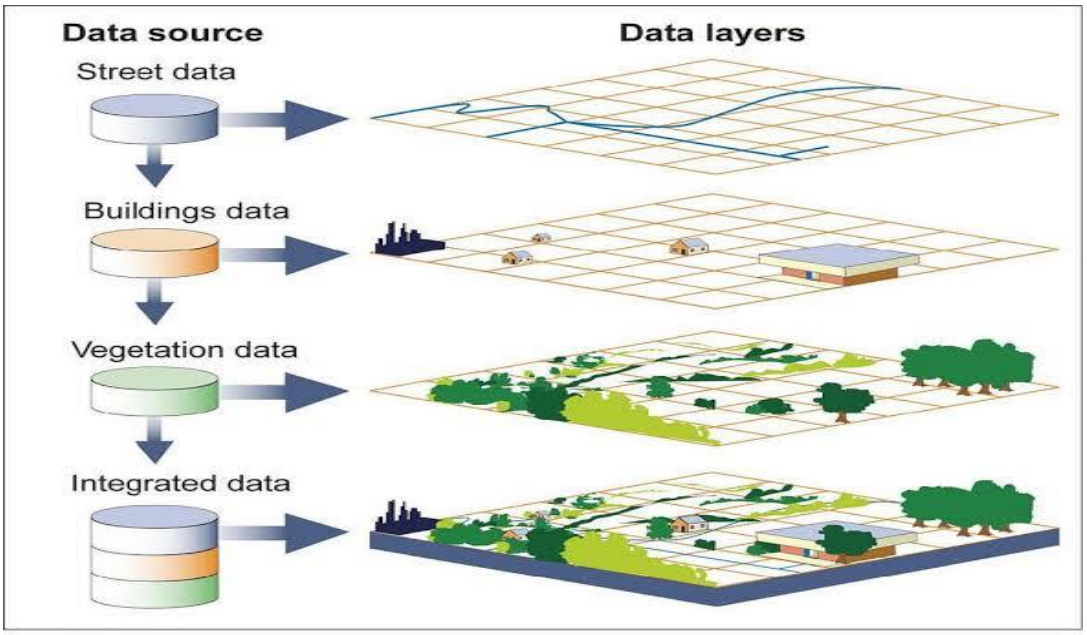
Remote Sensing and GIS process for digital mapping

2. GEOGRAPHICAL INFORMATION SYSTEM

A Geographic Information System is computer based system designed to store, retrieve, manage, display, and analyze all types of geographic and spatial data. GIS software lets you produce maps and other graphic displays of geographic information for analysis and presentation.GIS software produce maps and other graphic displays of geographic information for analysis and presentation. With these capabilities a GIS is a valuable tool to visualize spatial data or to build decision support systems for use in your organization. A GIS stores data on geographical features and their characteristics. The features are typically classified as points, lines, or areas, or as raster images. On a map city data could be stored as points, road data could be stored as lines, and boundaries could be stored as areas, while aerial photos or scanned maps could be stored as raster images. Geographic Information Systems store information using spatial indices that make

it possible to identify the features located in any arbitrary region of a map. For example, a GIS can quickly identify and map all of the locations within a specified radius of a point, or all of the streets that run through a territory.





Source: GAO.

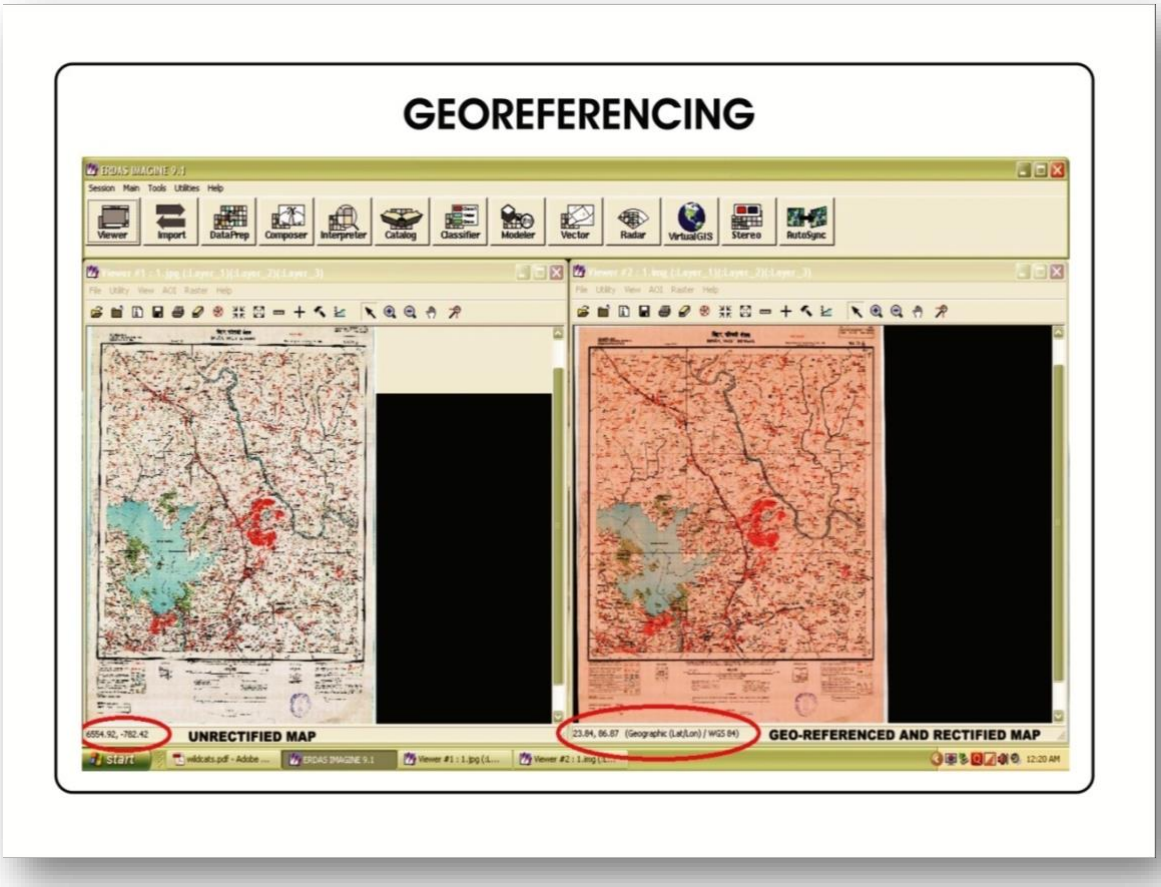
3. GLOBAL POSITIONING SYSTEM

GPS receivers collect data from at least for Satellite revolving around the earth and calculate position in 3 dimensions. They provide coordinates or exact points of latitude and longitude direction from satellites. The beginning point, entered via GPS coordinates, and the ending point, (address or coordinates) input by the user, are then entered into the digital mapping software.

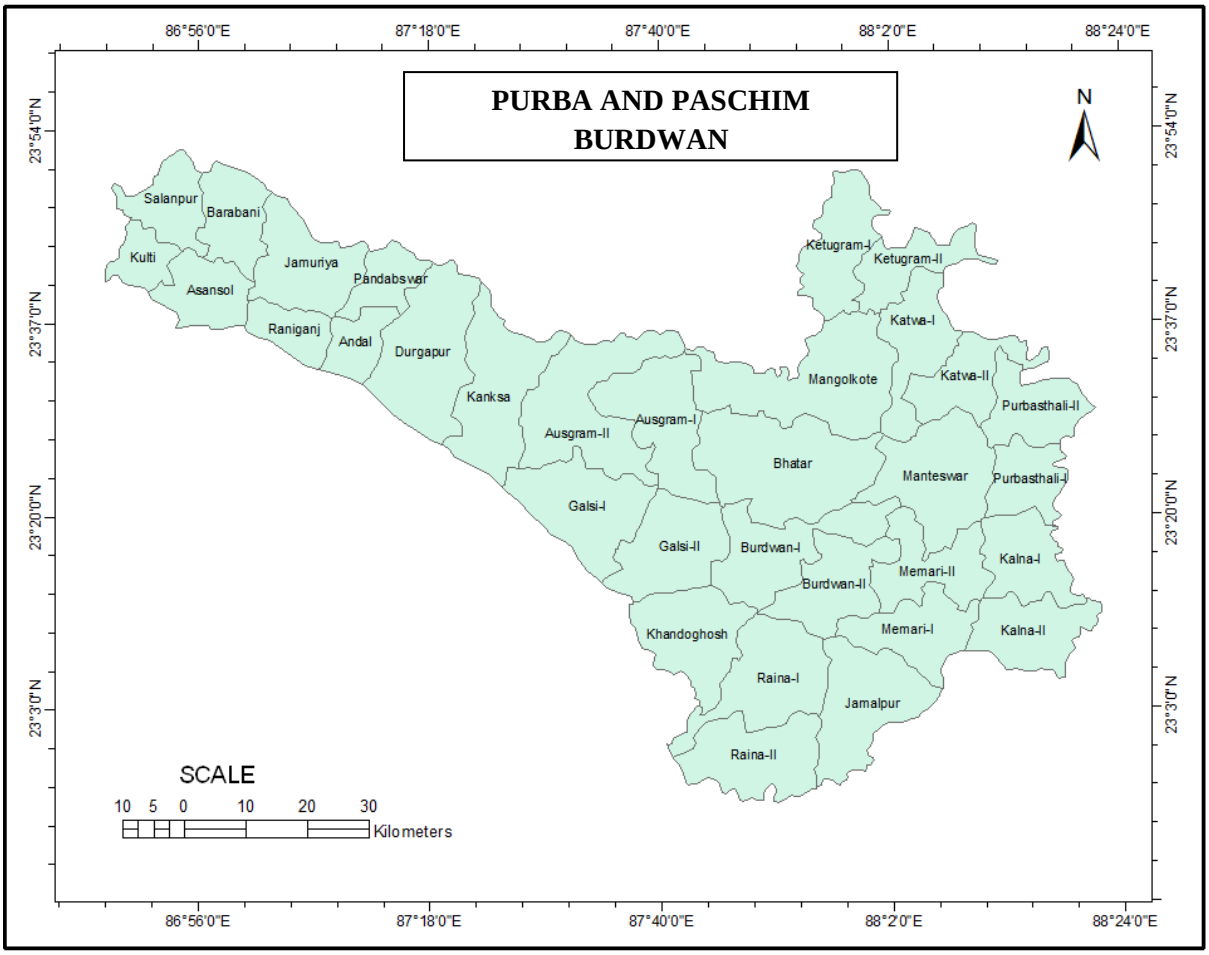
4. COMPUTER CARTOGRAPHY

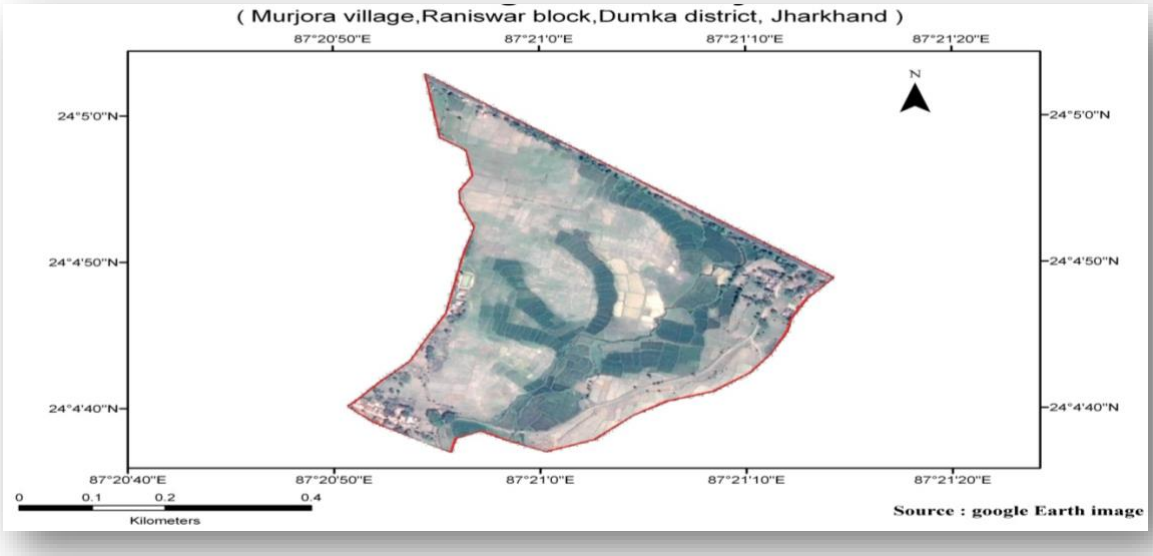
The computer has revolutionized the ways of communicating and analyzing information about the world, including decision-making. ***Geographic Information Technology*** (GIT) is now widely used for computer- assisted management and analysis of data concerning geographically related features. Since the 1960s cartography has become increasingly computer assisted, (i) **with the development of software and hardware to facilitate map production,** (ii) **the flexibility and user friendliness of the graphical user interface and widespread development of desktop publishing software**, (iii) the rise of the use of geographic information systems (GIS) has led to a renewed interest in cartography, and the power of maps as the critical

endpoint in the public display of complex and systematic geographic analysis. A GIS is a specialist information system that processes geographic/geospatial information combining software, hardware, data, data transfer systems, procedures and human beings, facilitating the analysis and display of geographic and related information. The advent of the internet and in particular the World Wide Web has led to proliferations of maps and mapping services.



LOCATION MAP





- **COMPARISON BETWEEN TRADITIONAL AND DIGITAL MAPPING**

ACTIVITIES	**DIGITAL MAPPING**	**TRADITIONAL MAPPING**
PREPARATION	Initial version tedious to prepare but quick and efficient to monitor.	Start from scratch every time.
STORAGE	Digital Database standardized and integrated,compact memory capacity.	Different scales on different standards, voluminous and bulky
RETRIEVAL	Quick retrieval	Paper maps and tables
UPDATING	Automatic search and replace by computer.	Manual check and revision.
OVERLAY	Systematically done, faster integration of complex,multiple spatial and non spatial data sets.	Expensive and time consuming.
SPATIAL ANALYSIS	Faster	Time and energy consuming, slow
DISPLAY	Easier and faster to prepare , better quality .	Slow, tedious and time consuming

CONCLUSION

The digital cartographic techniques proved to be of great use in the modern geographical fields. .Every day spatial-temporal features are changing in the world. Traditional mapping become helpless in providing accurate and up to date information. Today’s map users and map maker demand can be fulfilling by the way of digital mapping. That’s why geographical traditional mapping changed in digital mapping.

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