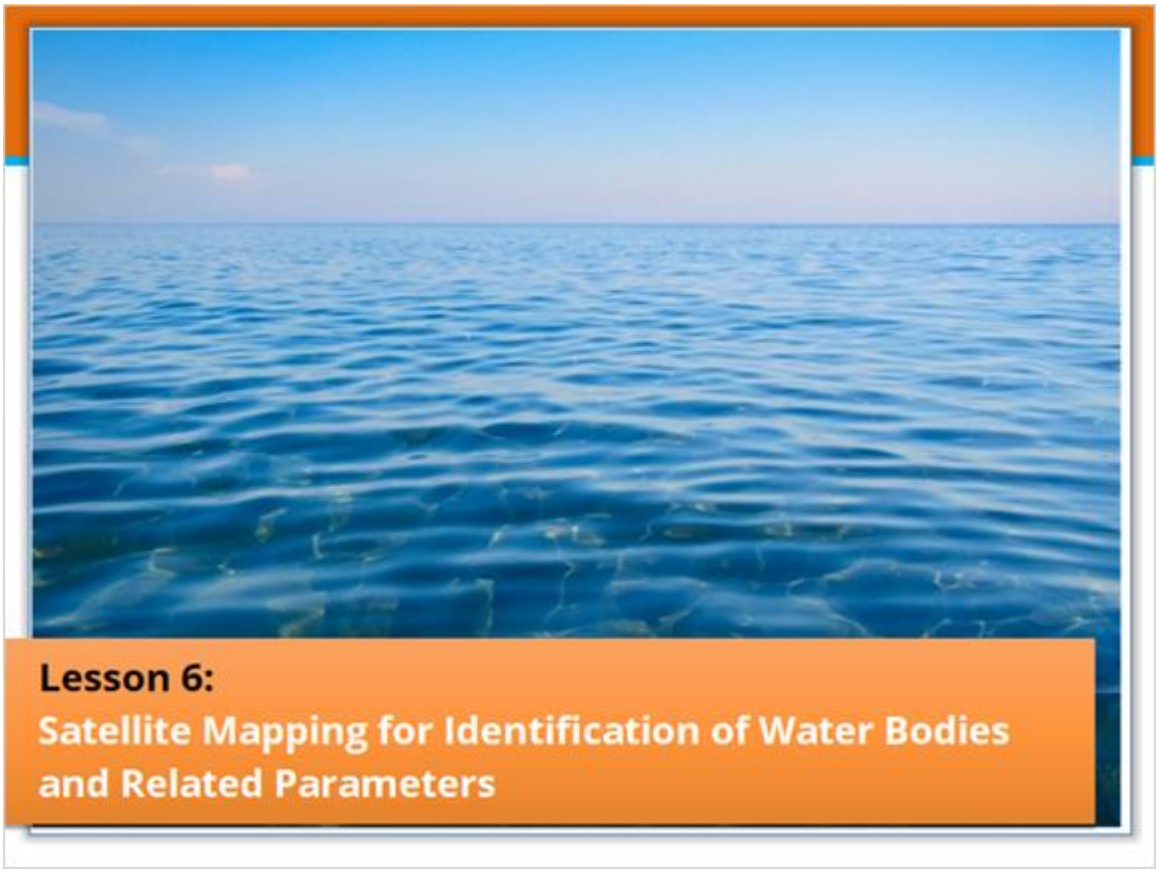
Fisheries and Aquaculture Statistics - Lesson6

Lesson6

6.1 Lesson6: Satellite Mapping for Identification of Water Bodies and Related Parameters

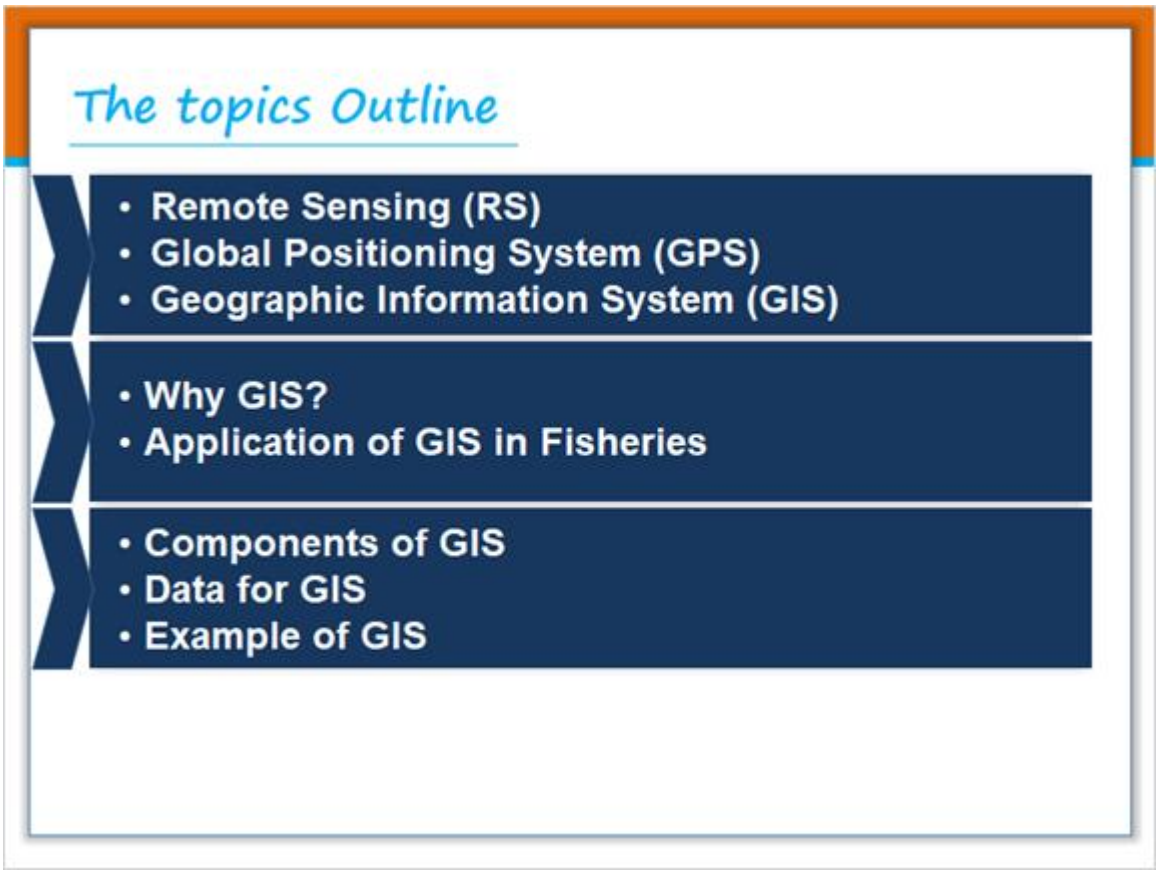


Notes:

The sea covers two thirds of the earth's surface. Man is largely dependent on the ocean for food resources, such as fish, shellfish, marine mammals, turtles, aquatic plants and algae. Variations in environmental conditions affect the recruitment, distribution, abundance and availability of fishery resources. To utilize these resources more effectively, fishermen must maximize catch quantity (within biological constraints) while, simultaneously, minimizing costs and optimizing operations schedules. Reliable environmental data from the scientific community is

needed for these optimization purposes. Remote sea surface observations can provide a significant portion of the information needed to assess and improve the potential yield of fishing grounds. Information on particular conditions and processes affecting fish populations, may be collected using measurements made by remote sensors, satellites, and similar tools.

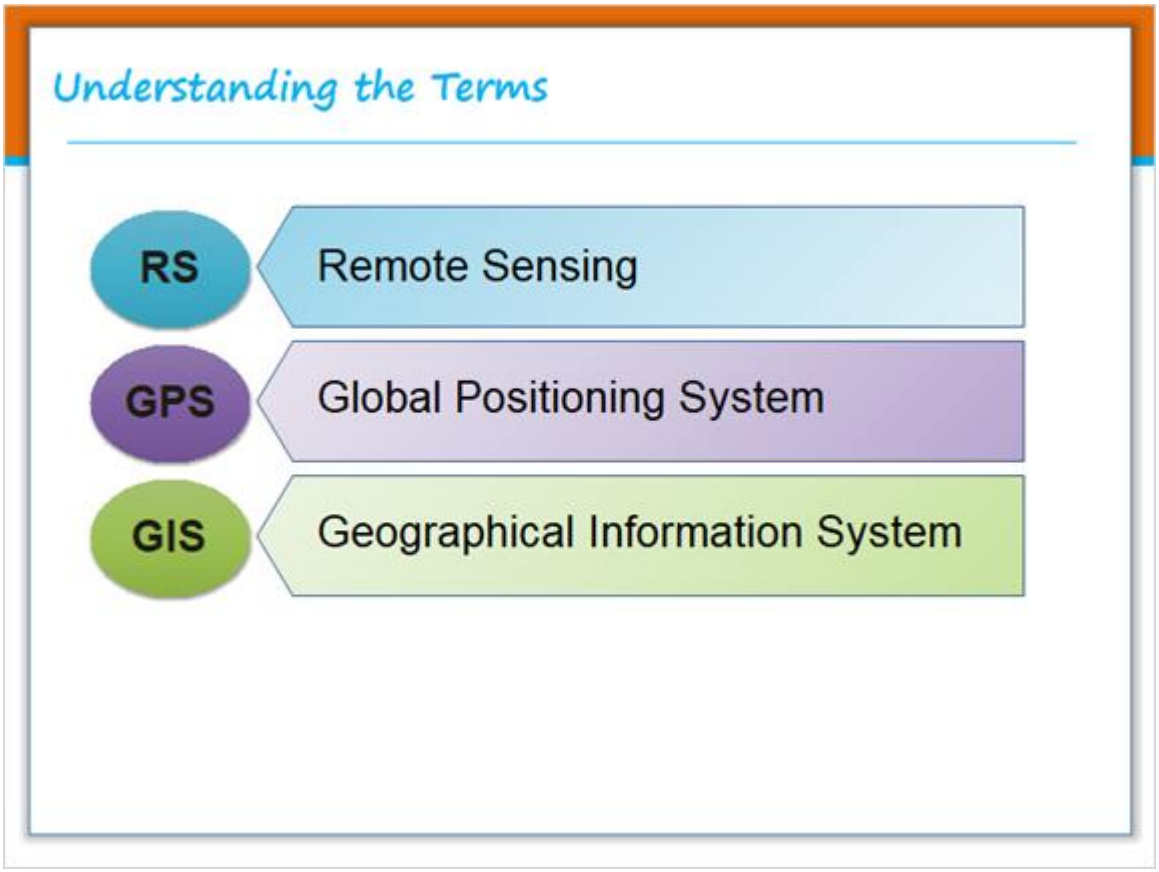
6.2 Contents



Notes:

In the upcoming slides we understand mapping and identification of water bodies and related parameters through use of satellites and software's for fisheries.

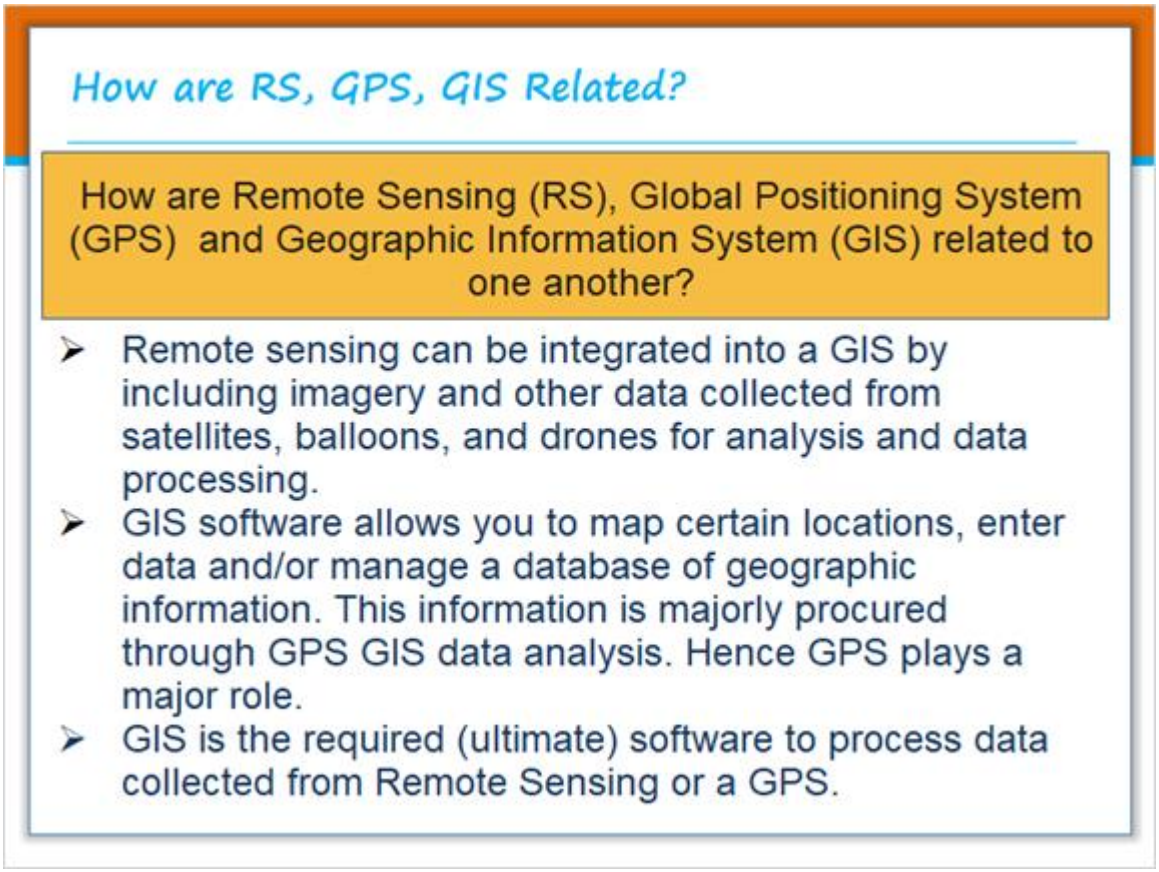
6.3 Understanding the Terms



Notes:

Let us first understand what the following terms - Remote sensing (RS), Geographical Information system (GIS) and Global Positioning System (GPS) mean in the upcoming slides before we move ahead to study satellite mapping using Geographical Information System (GIS): mean before moving on to the concept of GIS satellite mapping.

6.4 How are RS, GPS, GIS Related?



Notes:

More details and explanation for RS,GPS and GIS can be found in the upcoming slides

6.5 Remote Sensing (RS)

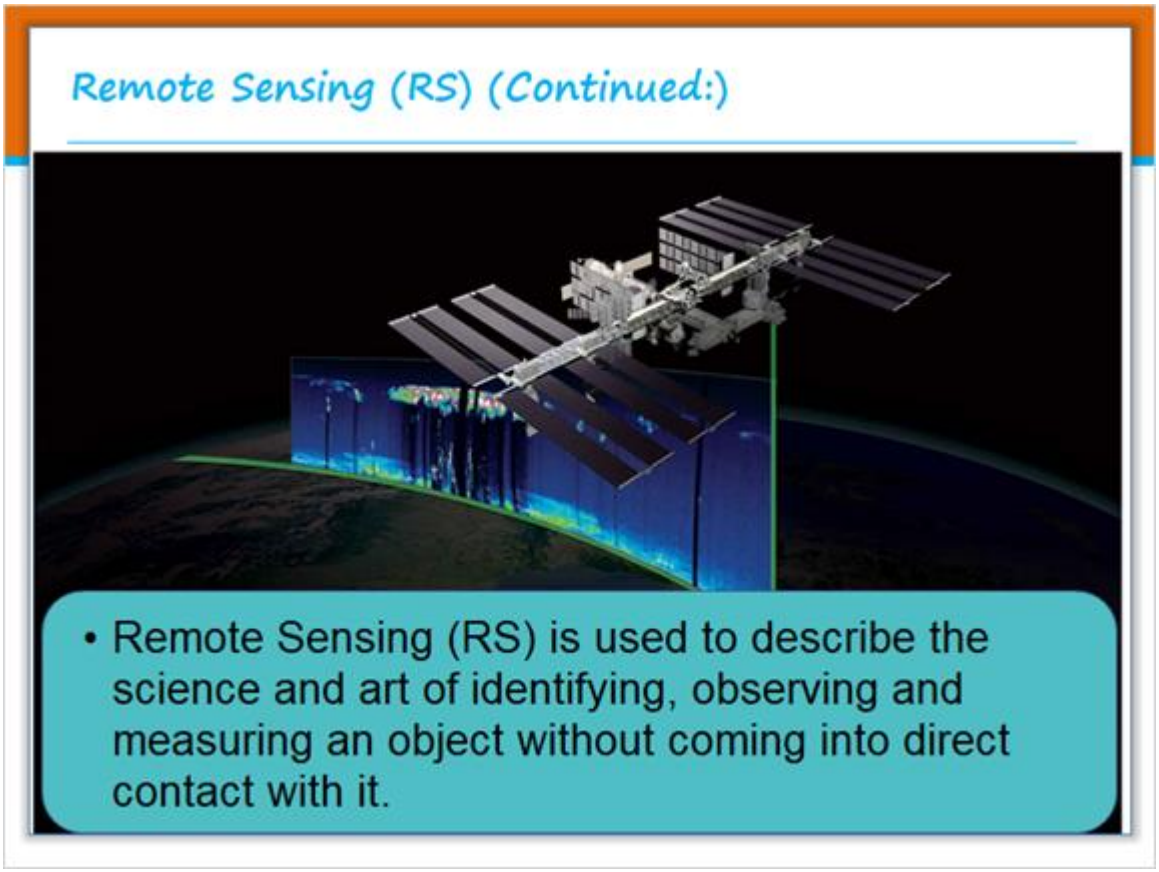
Notes:

Satellite imagery and geo spatial data are collected from satellite censors. Satellite imagery enhances GIS mapping projects and serves as a source of information and data to support analysis and classification of geo spatial assessments.

Application of Remote Sensing in Fisheries :

- Regular management of water resource
- Detention and monitoring of water pollution
- Apply to fishery surveillance, ocean features coastal region and storm forecast operations
- Continuous monitoring of land use and land cover provides information on temporal & spatial changes in areas under aquaculture mangrove areas (coral reef mapping etc.).

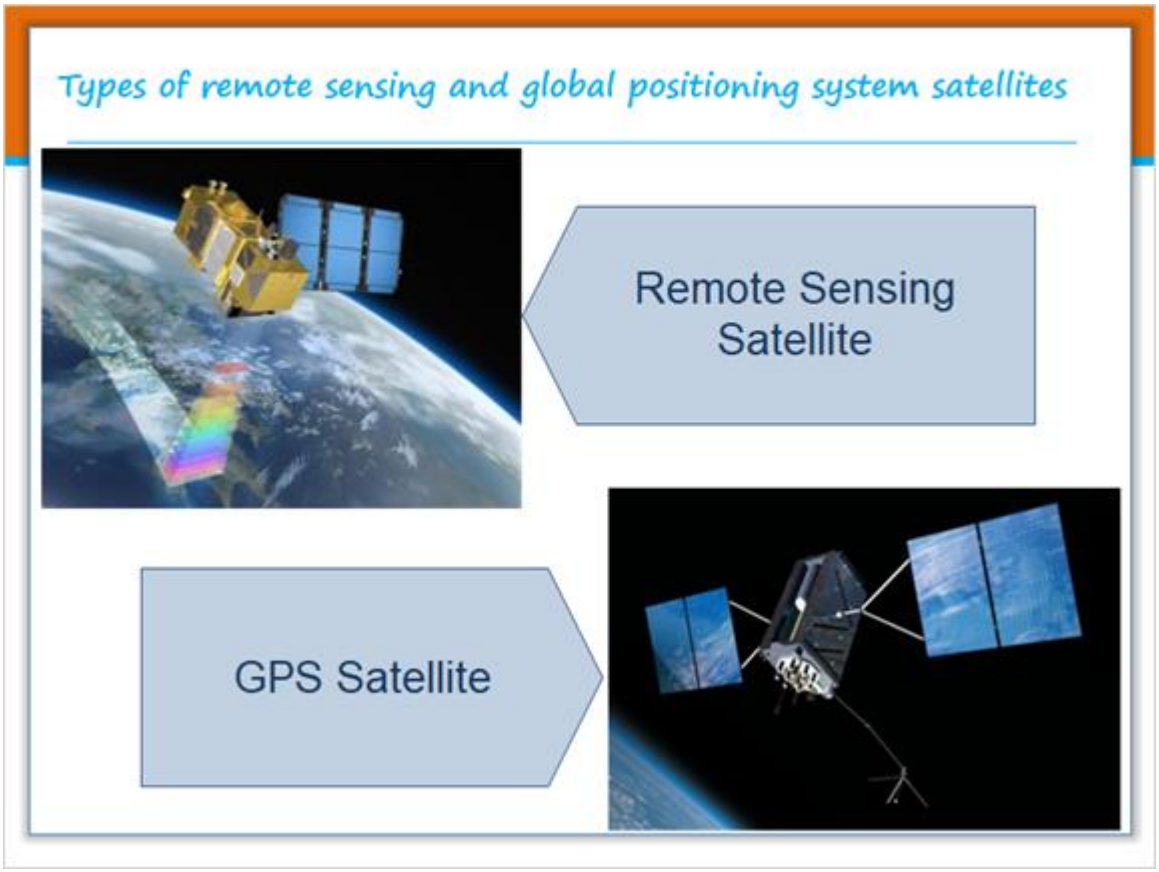
6.6 Remote Sensing (RS) (Continued:)



Notes:

Remote Sensing (RS)-detects and measures radiation reflected or emitted from distant objects or materials. The measurements may be identified and categorized by class, type and substance and spatial distribution. Many remote sensing devices are on space satellites monitoring Earth.

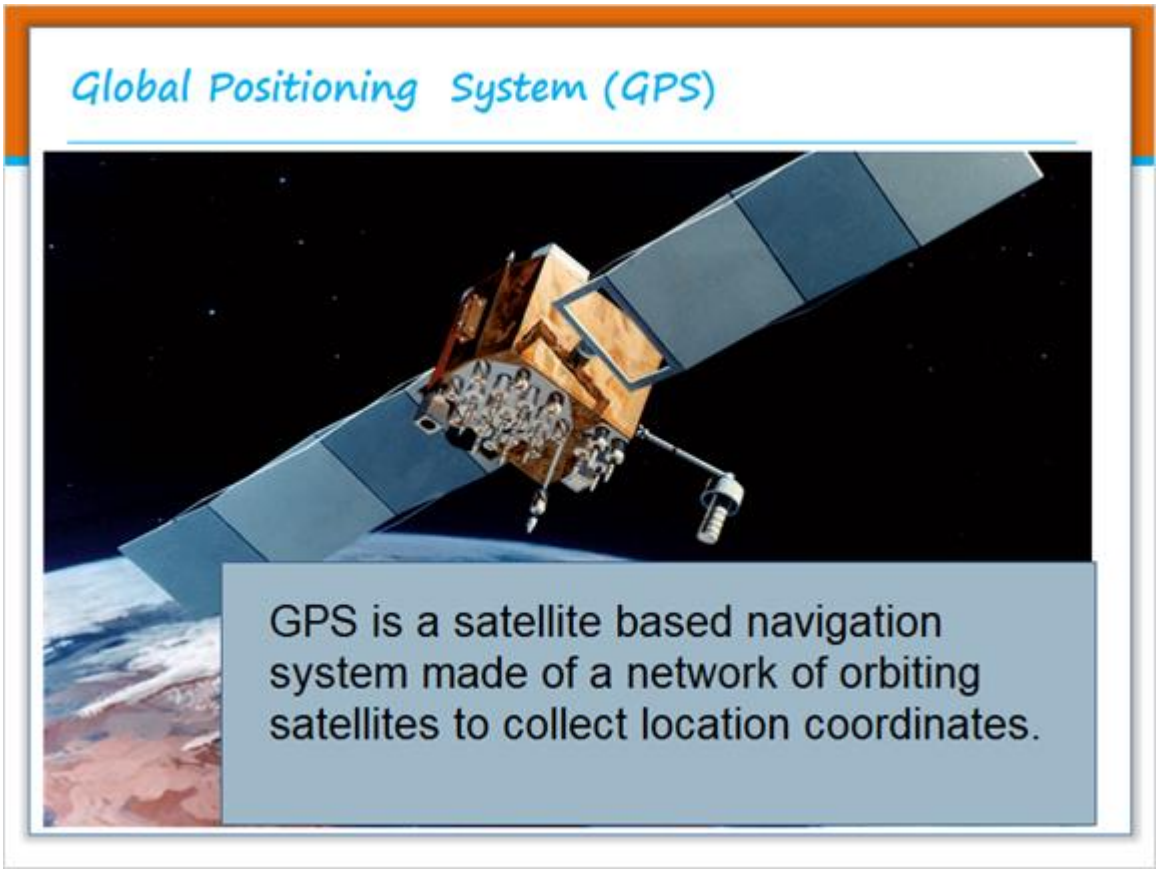
6.7 Types of remote sensing and global positioning system satellites



Notes:

On this slide, we see some types of remote sensing and global positioning system satellites.

6.8 Global Positioning System (GPS)

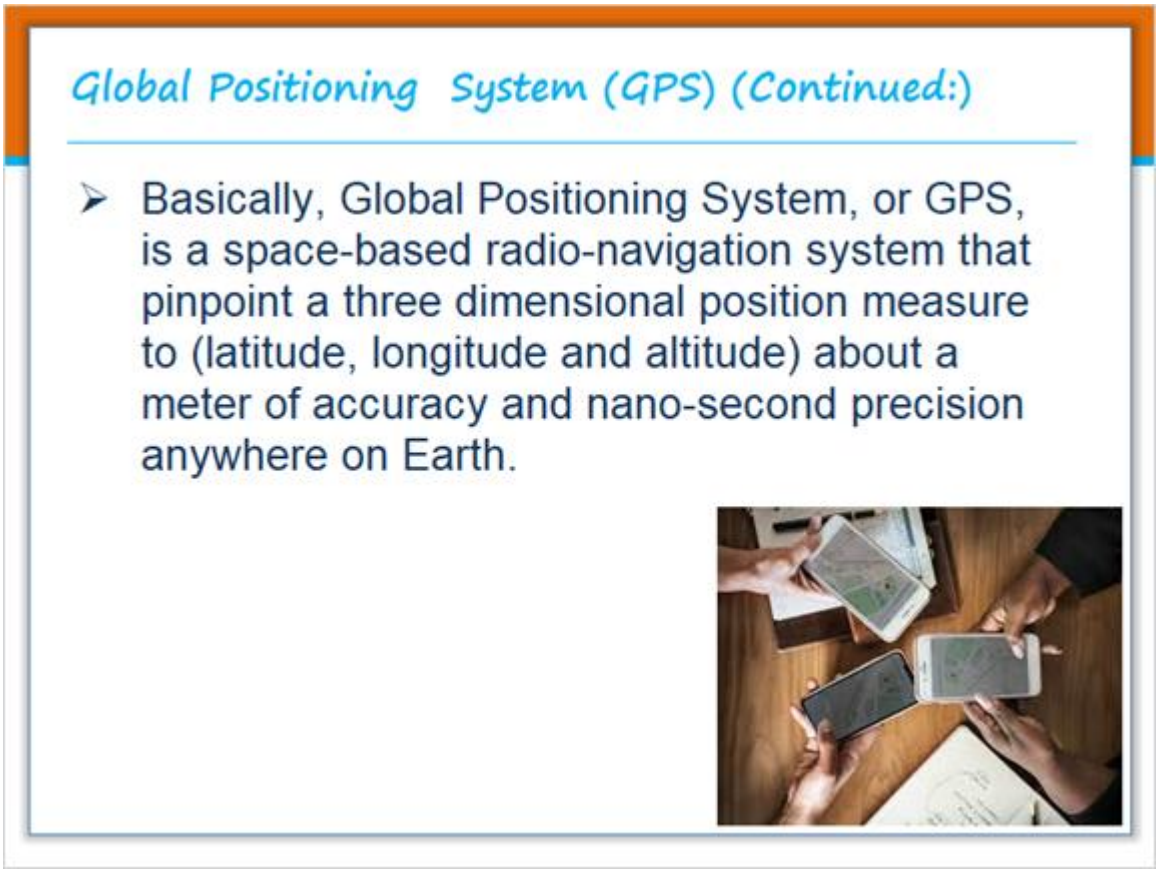


Notes:

Application of Global Positioning System (GPS) in Fisheries :

- Useful tool in generating cost -efficiency data to create and update GIS
- Provide control points for remote sensing applications
- Allows a survey vessel to continuously monitor water quality along any transect while recording the exact location

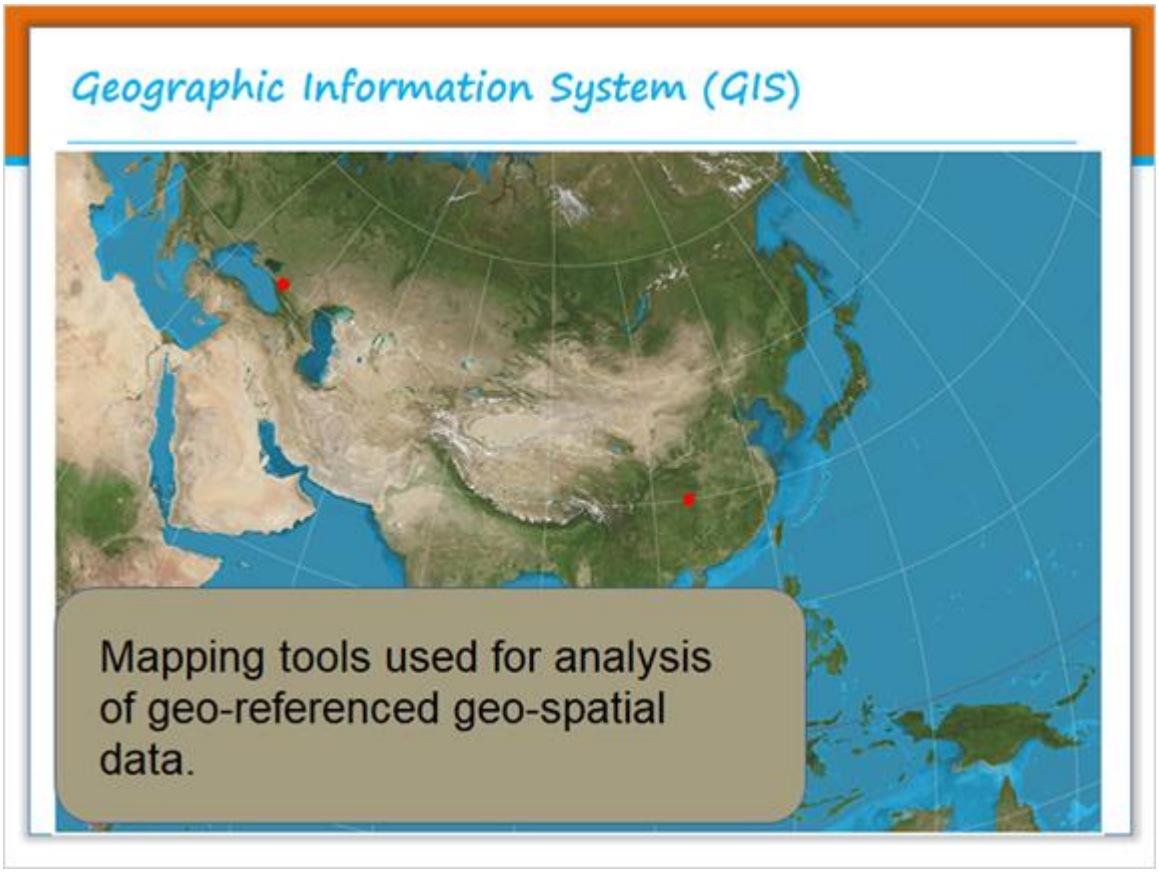
6.9 Global Positioning System (GPS) (Continued:)



Notes:

Many cell phones use data to navigate and get a quick GPS signal without having to use a wireless connection.

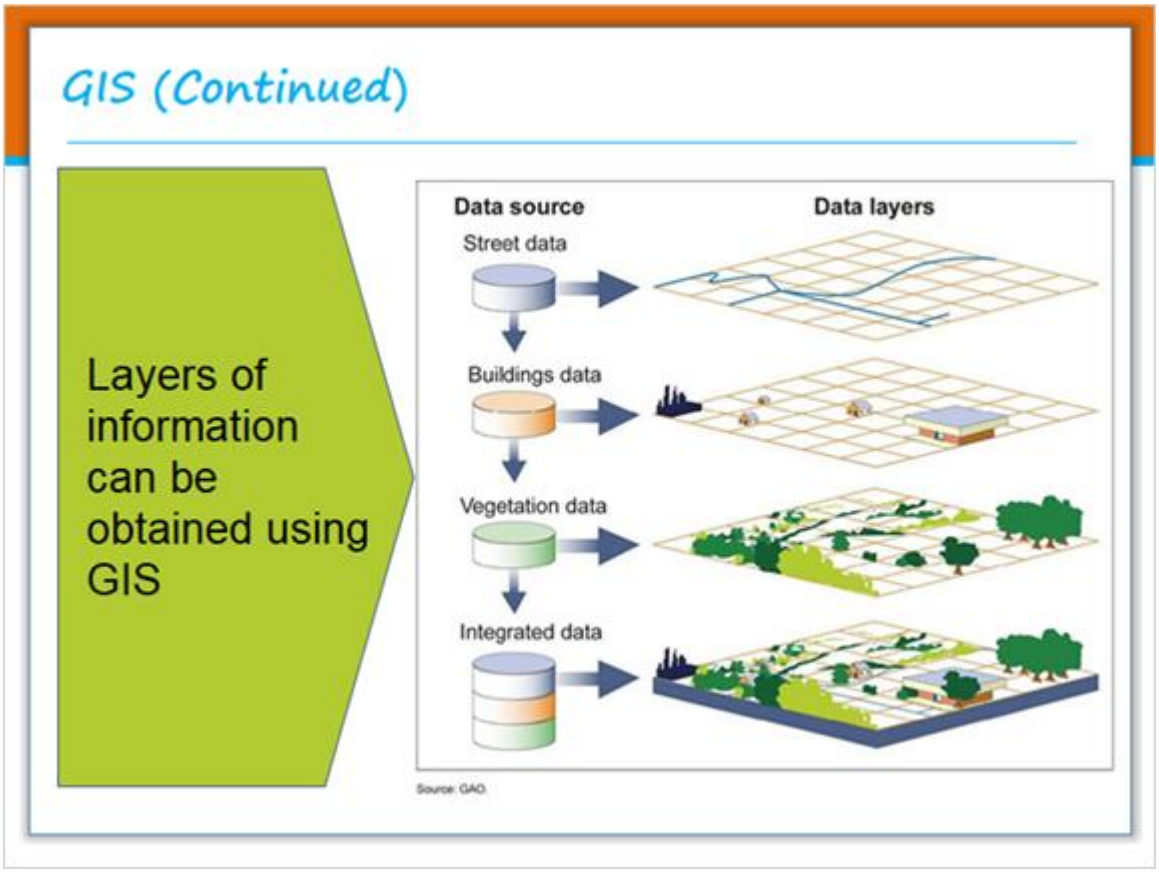
6.10 Geographic Information System (GIS)



Notes:

Identification of the target population for small-scale fisheries will depend on the census, administrative, and GIS data available. The completeness, accuracy and recency of the data will also influence the identification of the geographic area targeted by the investigation.

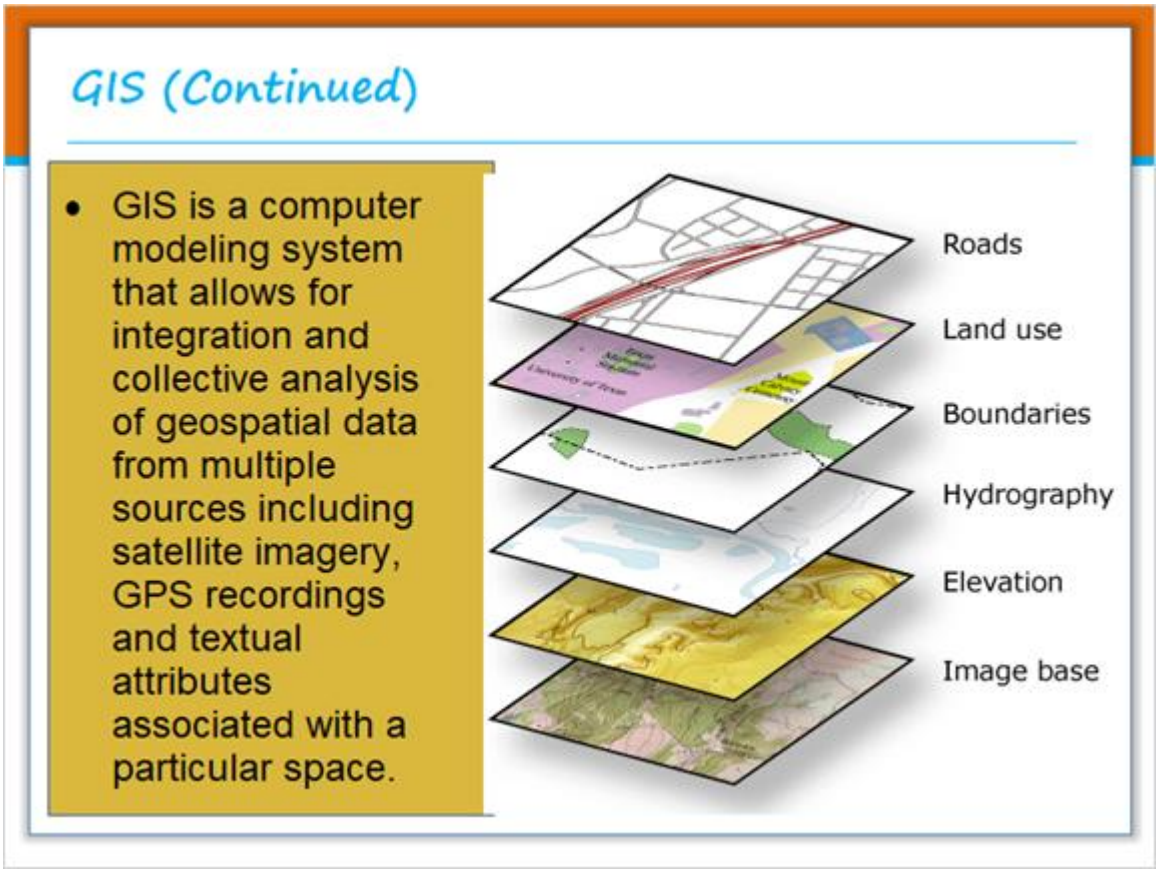
6.11 GIS (Continued)



Notes:

A geographic information system (GIS) is a computer system for capturing, storing, checking, and displaying data related to positions on the Earth's surface.

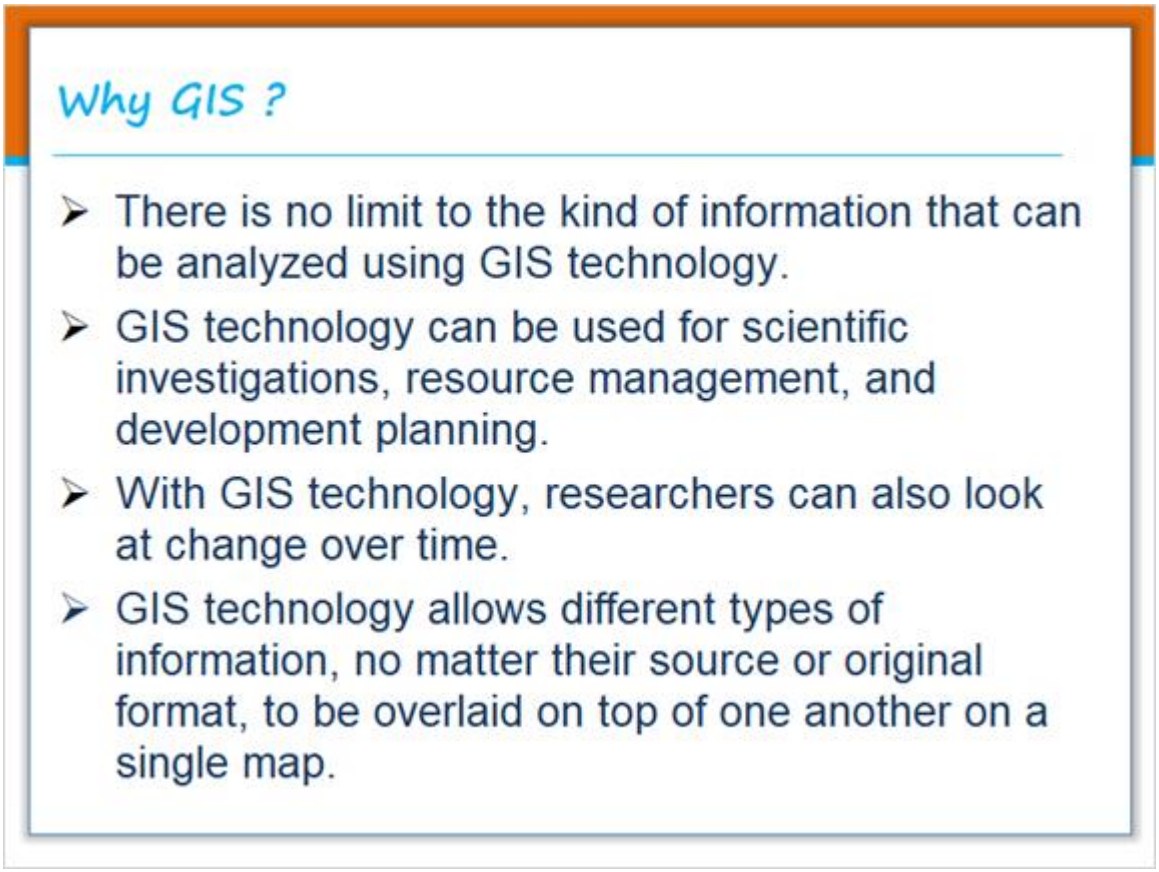
6.12 GIS (Continued)



Notes:

GIS applications include both hardware and software systems. These applications may include cartographic data, photographic data, digital data, or spreadsheet data.

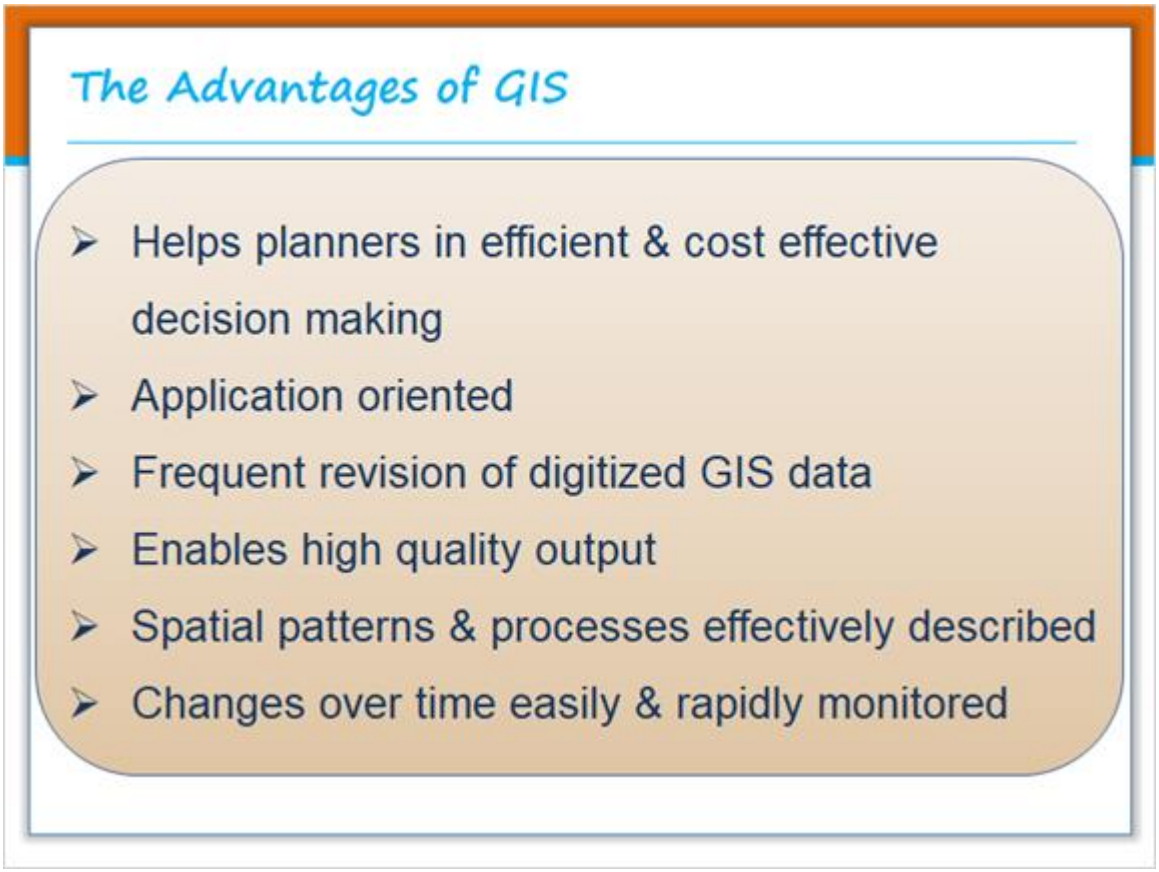
6.13 Why GIS ?



Notes:

GIS is comprised of a collection of integrated computer hardware and software which together are used for inputting, storing, manipulating and presenting geographical data.

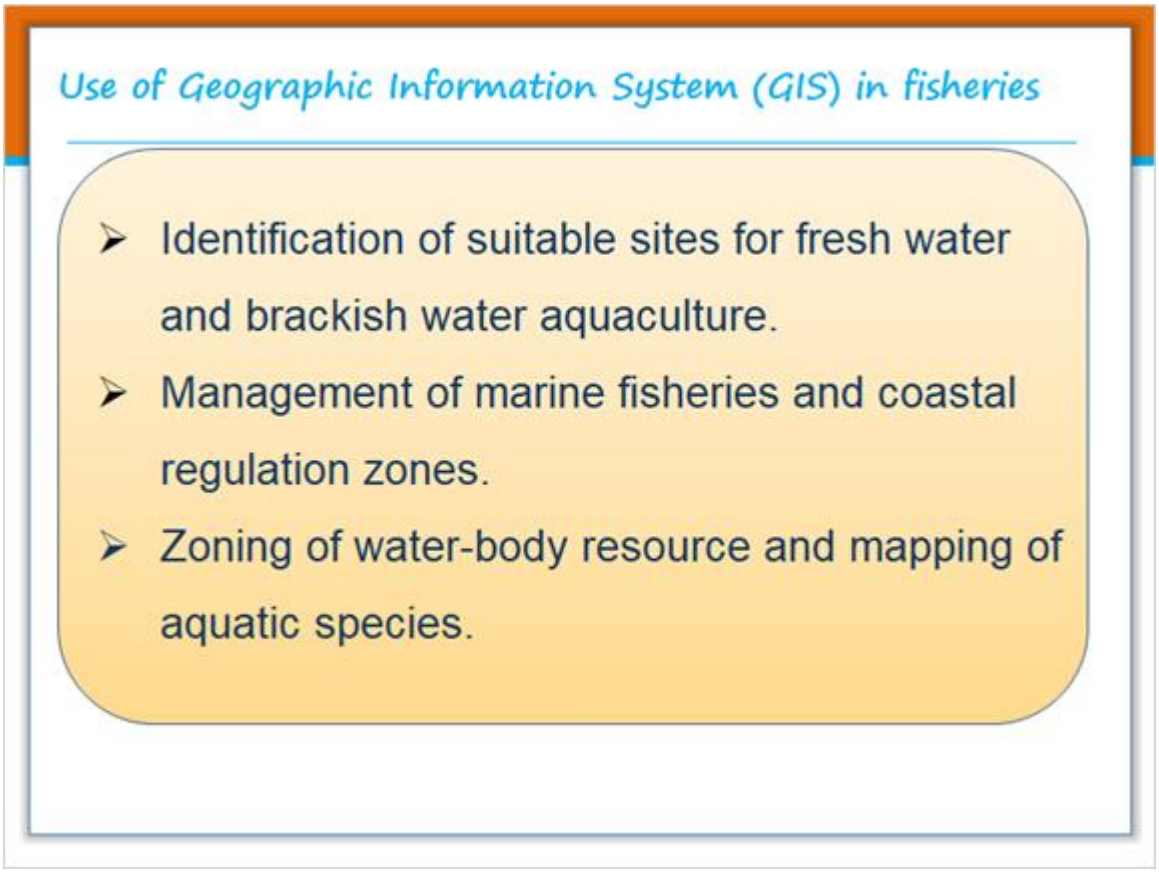
6.14 The Advantages of GIS



Notes:

GIS is a powerful tool to collect, store, retrieve, transform and display spatial data for specific purposes. The advantages of GIS are presented on this slide.

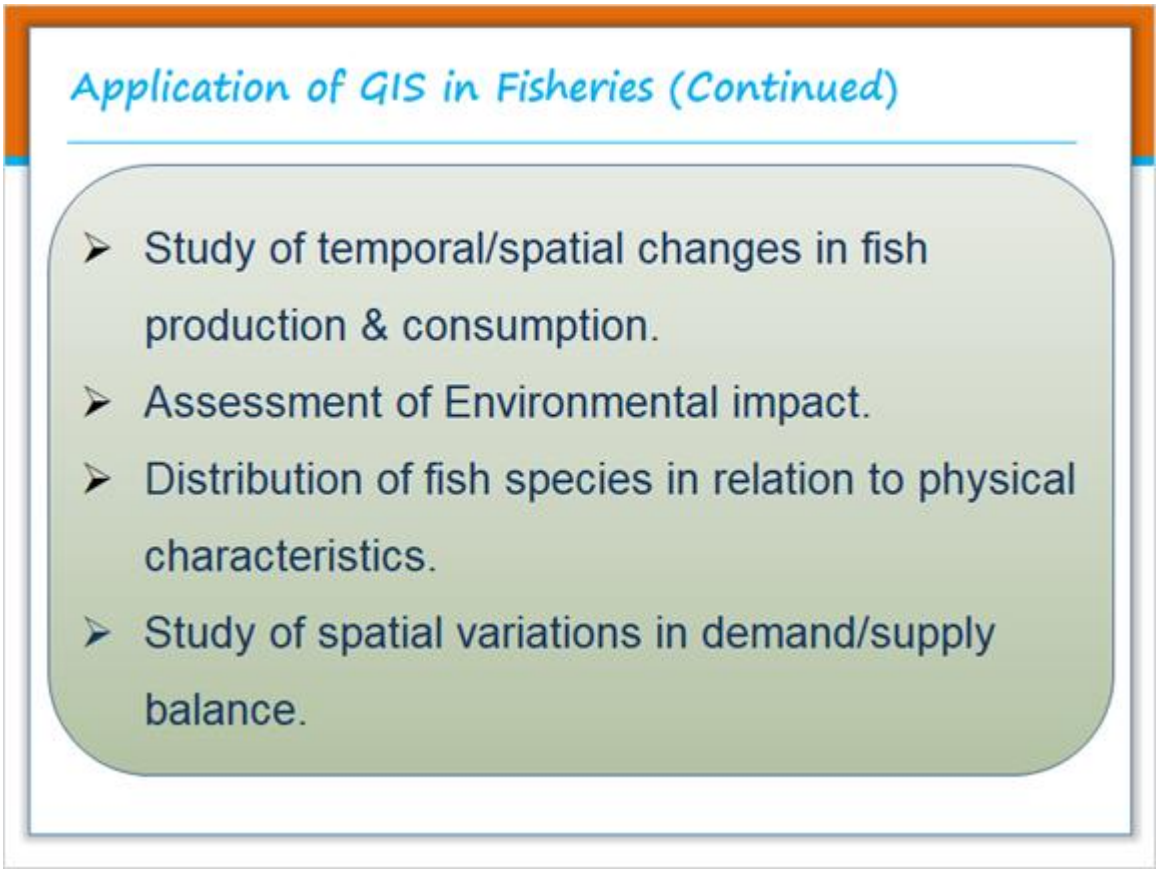
6.15 Use of Geographic Information System (GIS) in fisheries



Notes:

One of the strengths of GIS is its applicability to various technical scenarios.

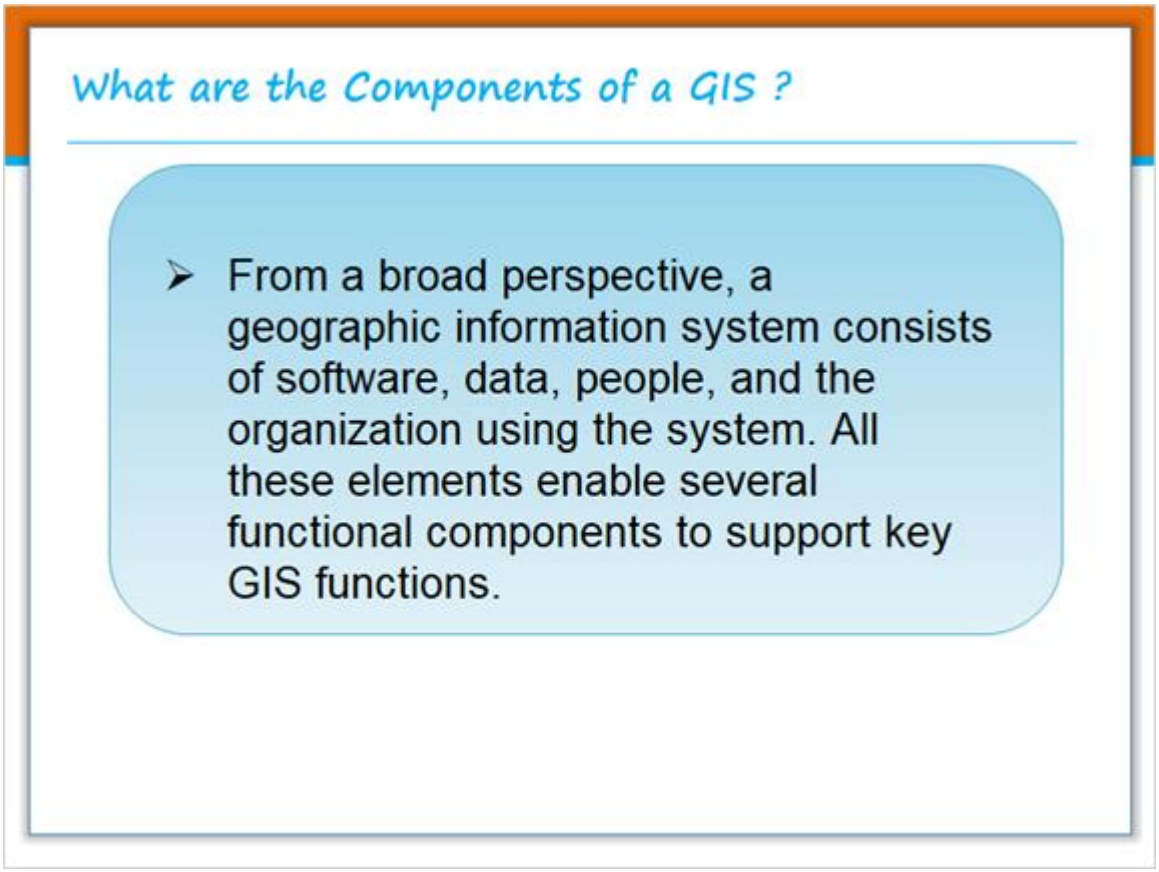
6.16 Application of GIS in Fisheries (Continued)



Notes:

The strength of GIS is that it can be used in many different applications.

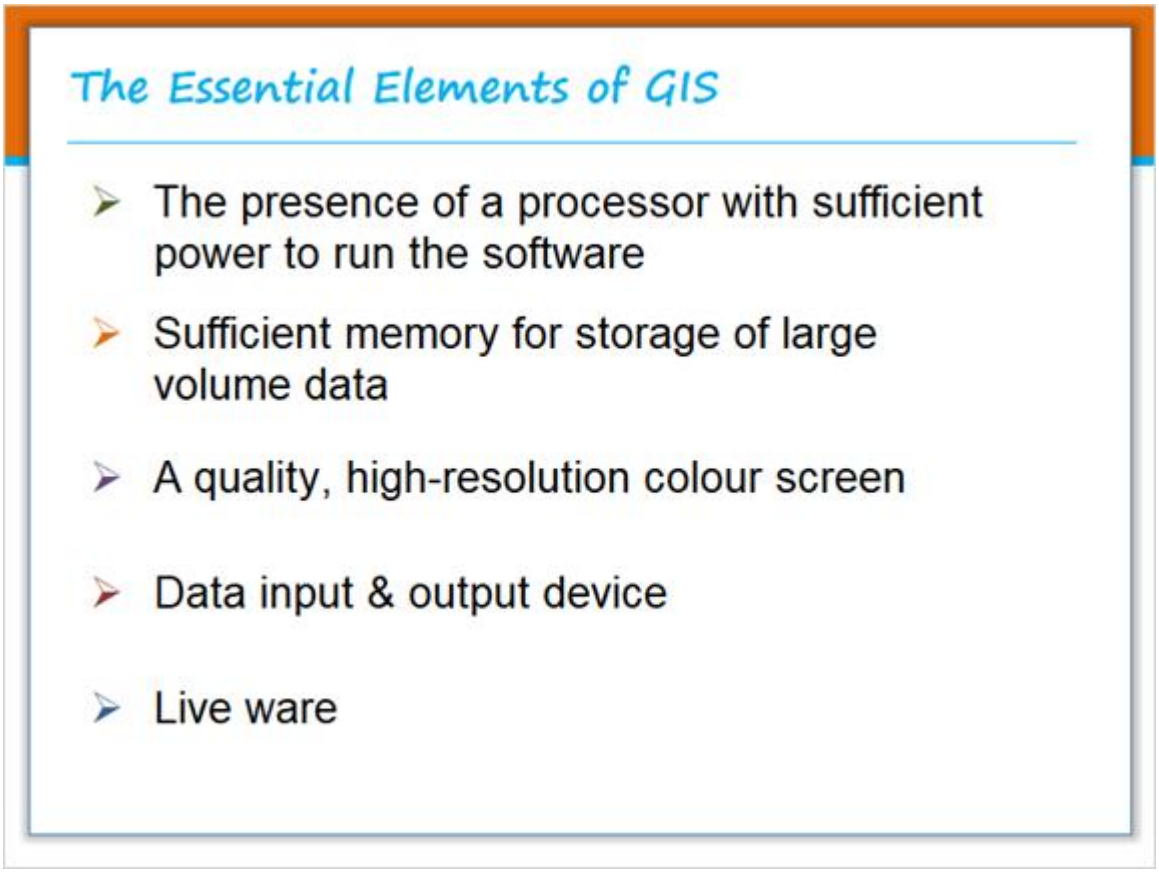
6.17 What are the Components of a GIS ?



Notes:

Geographic Information Systems (GIS) are impacted by organizational factors. Organizations define the context and rules for capturing, processing and sharing geoinformation, and the role GIS plays in the overall organization.

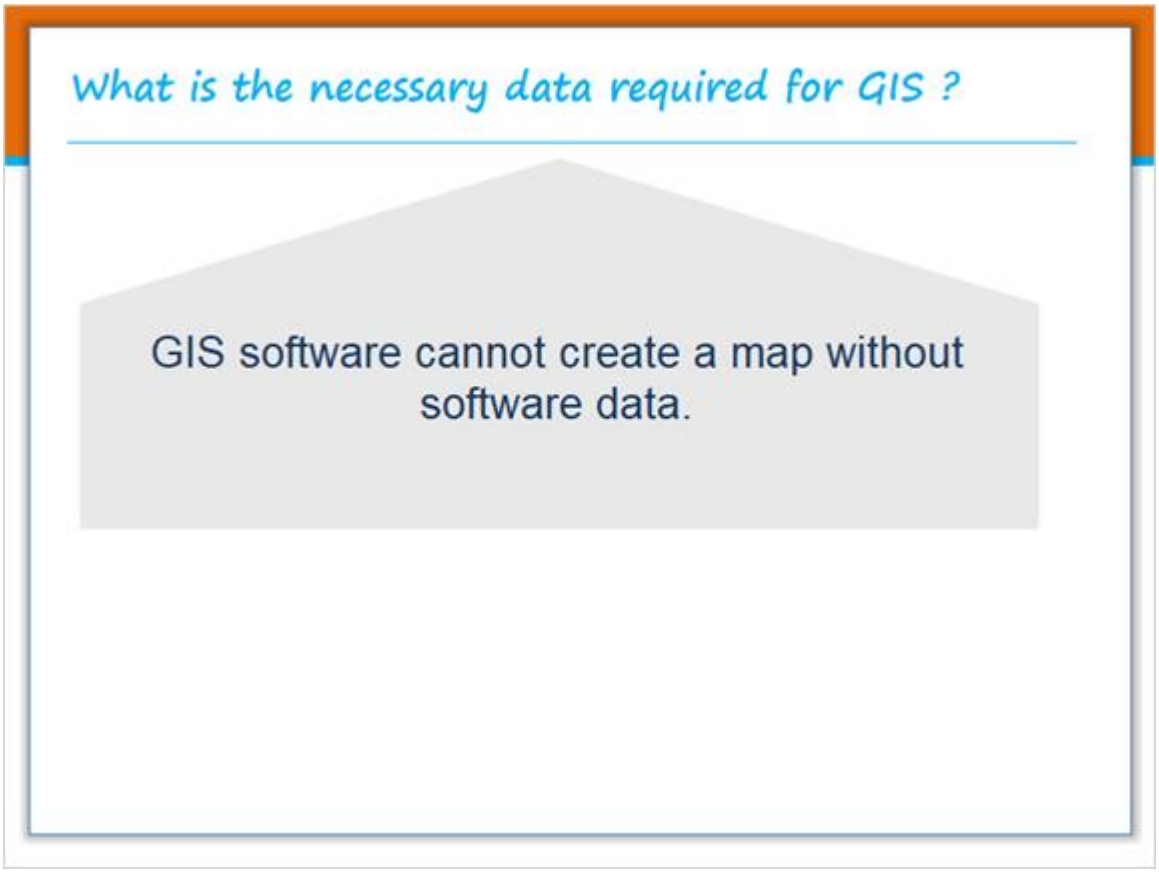
6.18 The Essential Elements of GIS



Notes:

GIS can be ran on a whole spectrum of computer hardware ranging from portable, personal computers to multiuser, super computers. GIS is also programmed in a variety of software languages.

6.19 What is the necessary data required for GIS ?

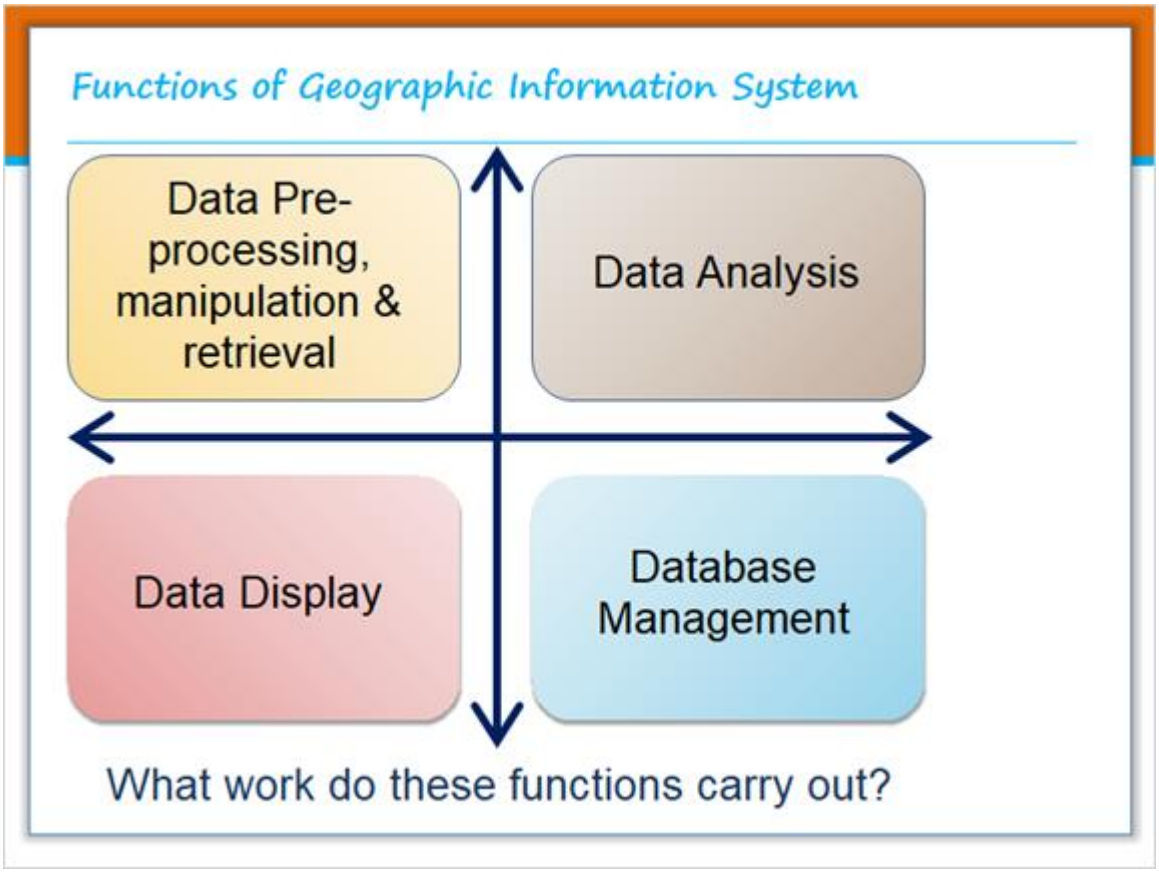


Notes:

There are two kinds of data necessary for GIS computation:

- Spatial data: Spatial data specifies existing land features or features that are imposed by the area's people. These might include roads rivers, coastlines, ponds, canals etc.
- Attribute data: Attributable data give information about the area of interest and its people and existing features. These might be use of water bodies, population, anything provided with useful information about aquatic animals & human beings also.

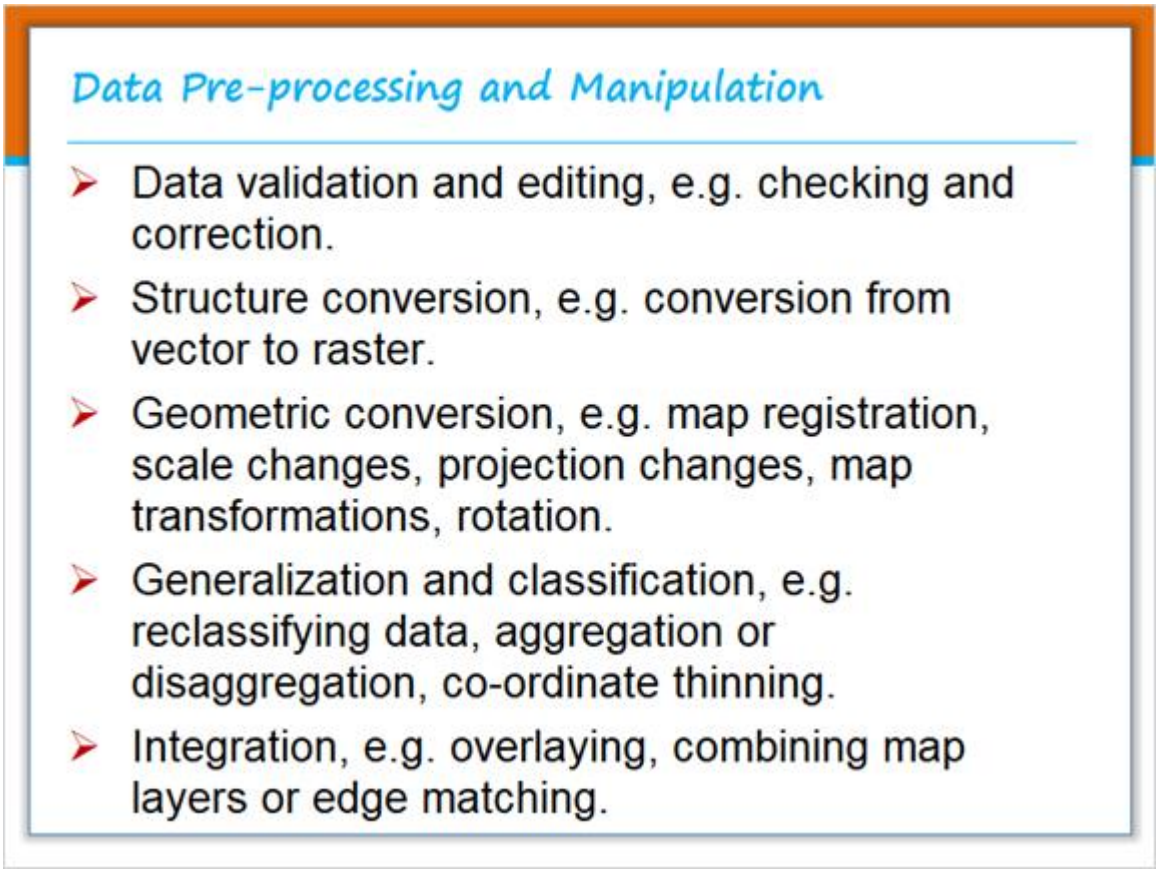
6.20 Functions of Geographic Information System



Notes:

The purpose of these GIS functions is explained in the upcoming slides.

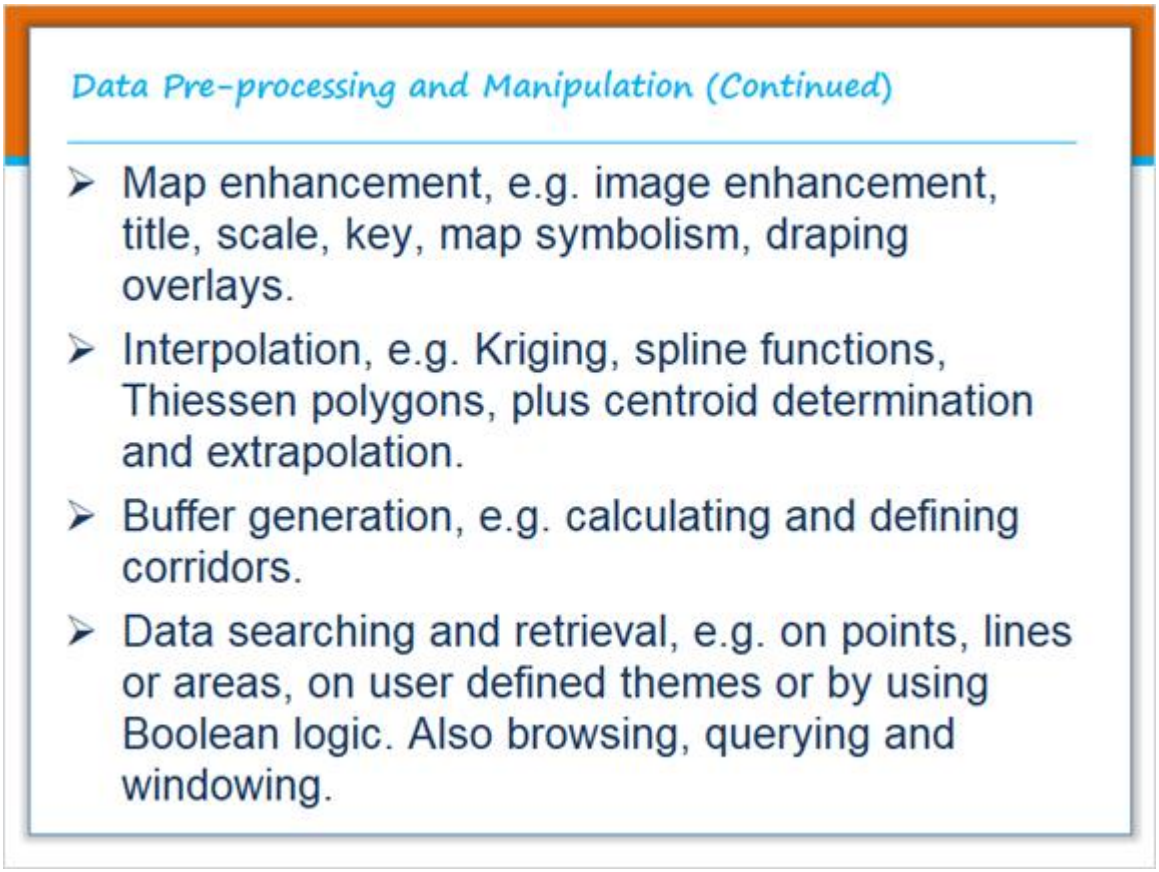
6.21 Data Pre-processing and Manipulation



Notes:

Under this category, we consider several GIS functions required to get digitally mapped data into the desired format to obtain a requisite map or for subsequent data analysis. Essentially, the original digital data collected may need to be changed in some way (i.e. either by correcting it, updating it, refining it or by altering it into the desired format.

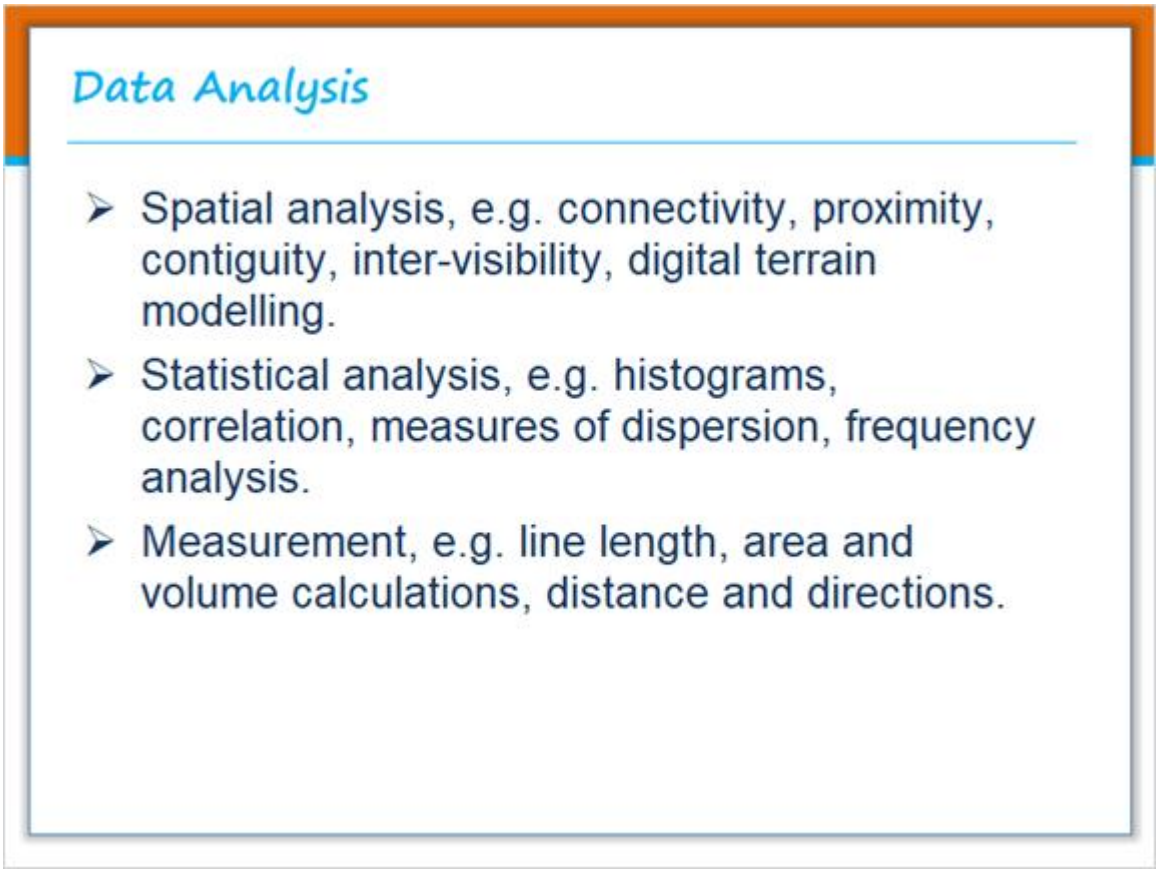
6.22 Data Pre-processing and Manipulation (Continued)



Notes:

The capacity of a GIS to perform data pre-processing means the user has an opportunity to "interactively experiment" with the available data and can thus derive the data appropriate for the task at hand. The efficiency of GIS's manipulations will depend on the particular algorithms used and the structure of the data.

6.23 Data Analysis



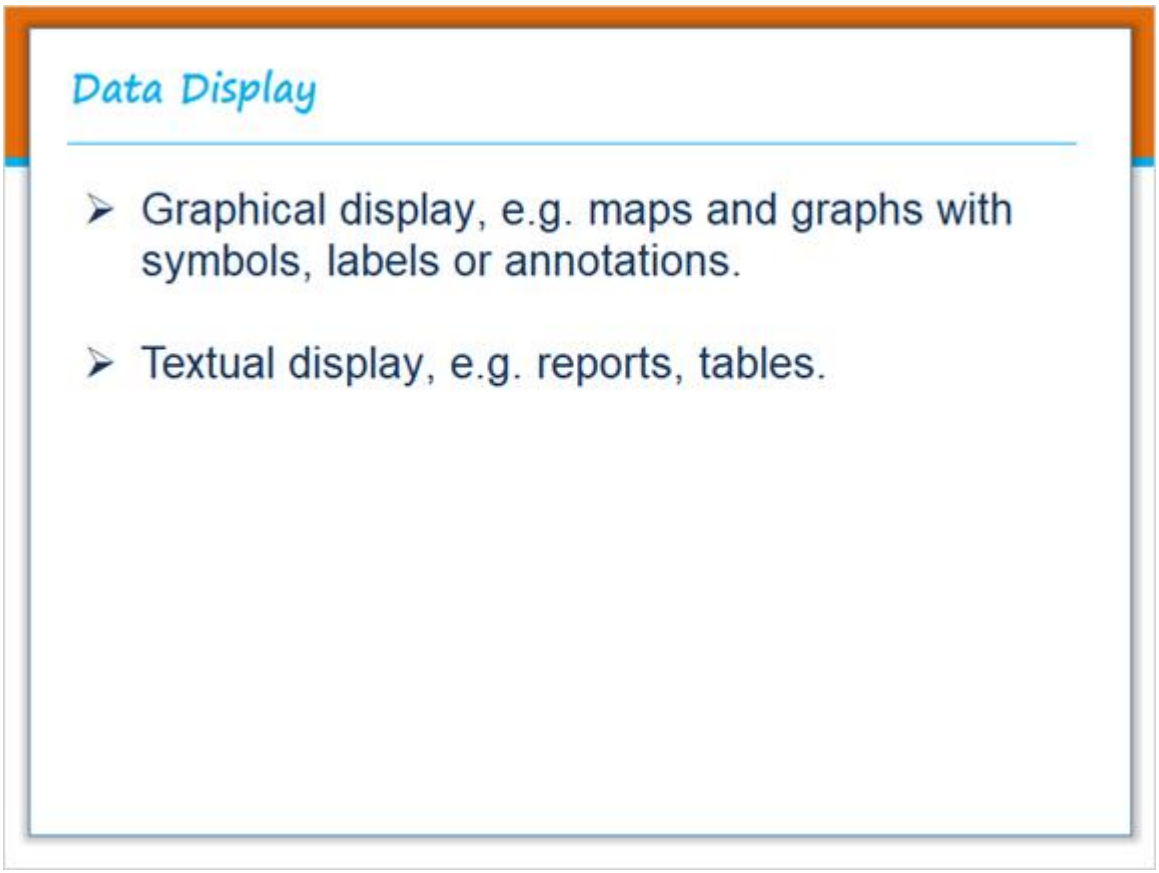
Notes:

A true GIS as opposed to other mapping systems, can be distinguished by the incorporation of analytical functionality.

Recently criticism has revolved around the lack of sufficient analytic functions in several GIS packages. However, the most resent mapping packages do have a limited range of such functions. It is also now easier to link a GIS package to a specialized analytical software programme which conducts the analysis before reverting the data back to the GIS software for mapping. Typically, it is not worth the time and financial expense to integrate analytical functions since most are only required for research purposes.

The analytical functions of most GIS software operate on both spatial and attribute data (or a combination of these). A majority of the analysis can be conducted on vector or raster structured data, though eventually one will be more efficient depending on the analysis.

6.24 Landing Surveys



Notes:

A fundamental use of GIS is its ability to display output at any stage of data processing. GIS is capable of incrementally building up maps and modifying map data inputs and the visual representation.

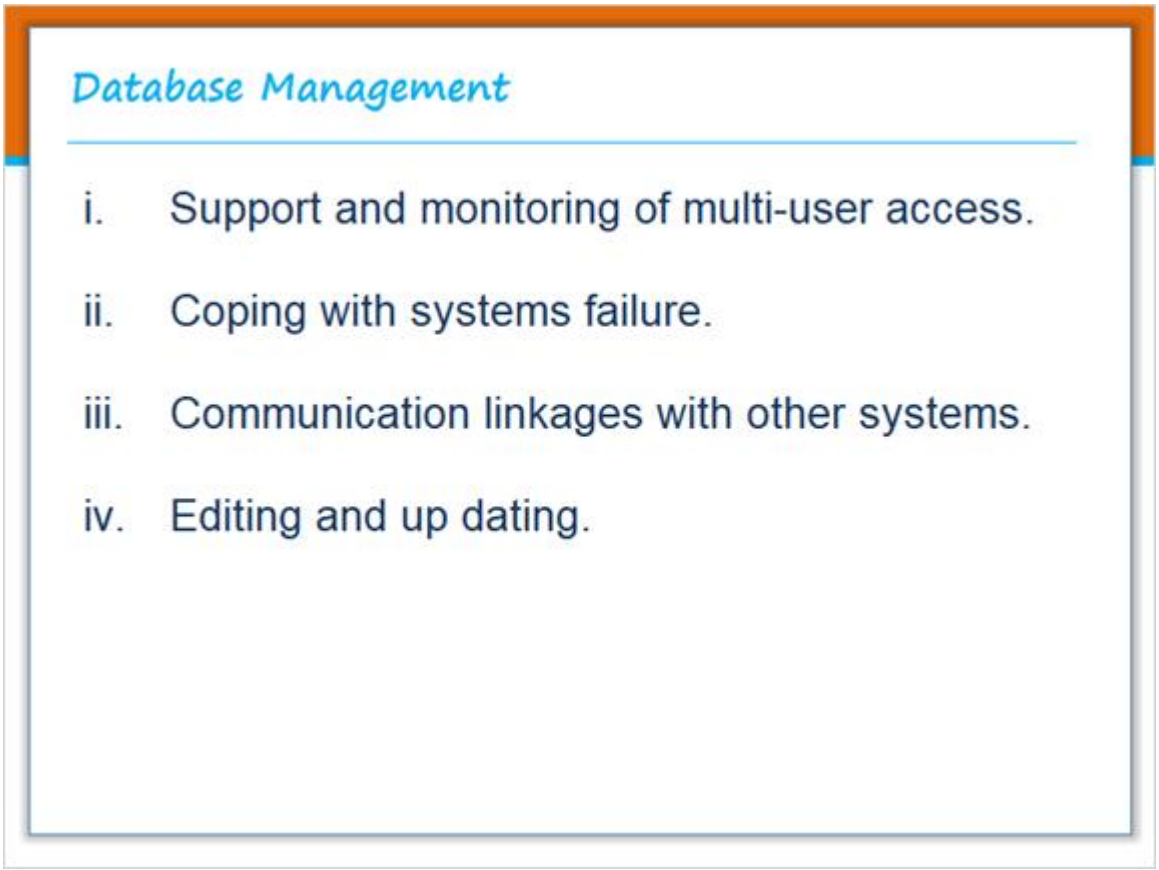
The GIS user can control, review or experiment at any stage to obtain a meaningful, final output. Any good GIS software will have a range of graphic display options such as label size, fonts, colour, shading ranges, line widths, symbolism, map feature positions, etc. The display format is not confined to mapping and may be presented in graphical, tabular or textual forms.

A permanent hardcopy display may be obtained through the use of an internal hard drive, transferable disk or networking facilities. A hardcopy display may be black and white or multi-coloured on paper or film. The display will vary in quality depending on GIS capability, data details, mapping scale, paper quality, use of vector or raster

structuring and, most importantly, the output hardware and the printing resolution (in dpi) in use. Quality, digital output is now superior to output which can be achieved by manual methods.

In the near future it is likely that GIS output, and indeed its full range of functionalities, will be capable of display and/or use while aboard suitably equipped fishery vessels. Many vessels currently have sophisticated navigation systems which utilize electronic charts in conjunction with radar and plotting capabilities. These navigation systems can display a variety of static information such as bathymetry, navigational features, land masses, restrictive areas, etc., in addition to vessel routs. Progressing to this level of functionality will be simple and enable integration of additional levels and interactive mode displays (such that the vessel has on-board ability to perform required GIS functions).

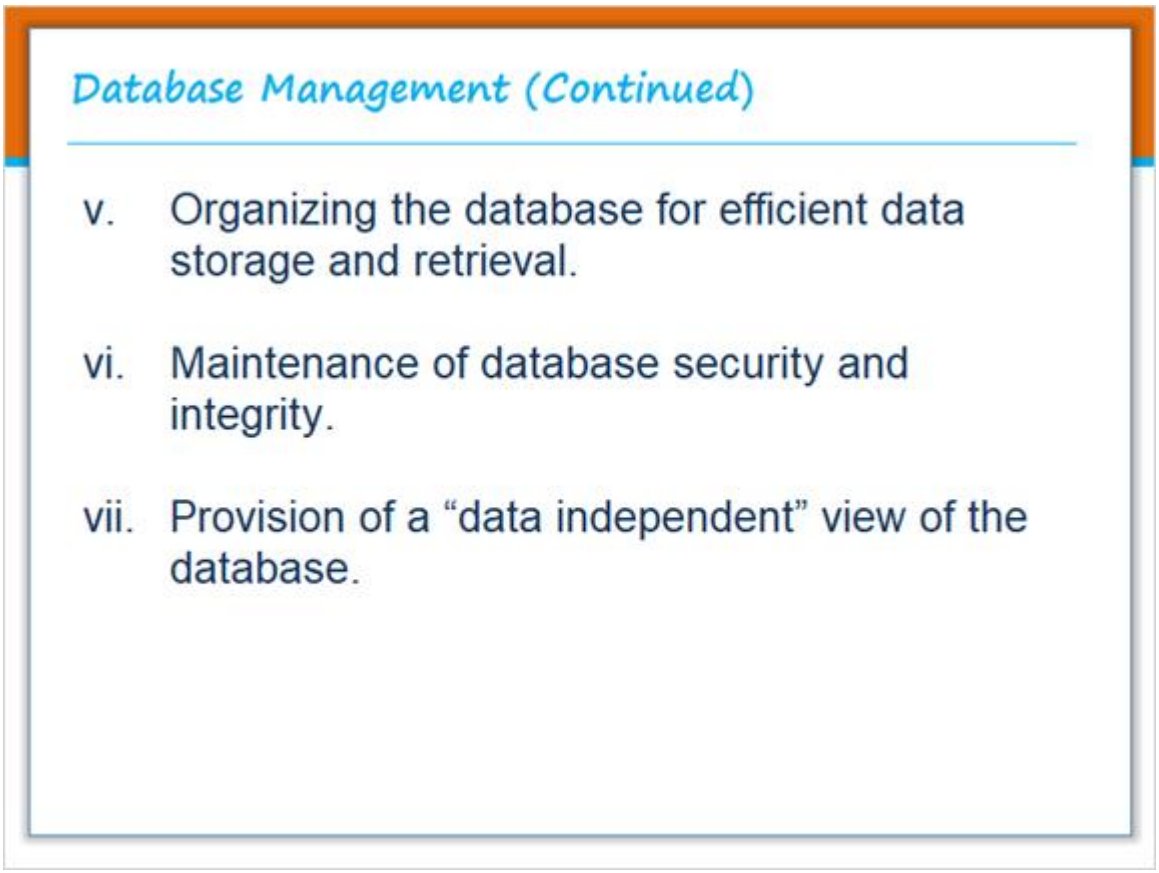
6.25 Database Management



Notes:

A database may be defined as a large collection of structured data independent of any particular application. For GIS purposes this collection of data may be stored externally in digital form via a computer software database package (e.g. Oracle or dBase) or internally as part of the GISs database. Attribute data is frequently stored externally while geographic data are more commonly stored within the GIS software.

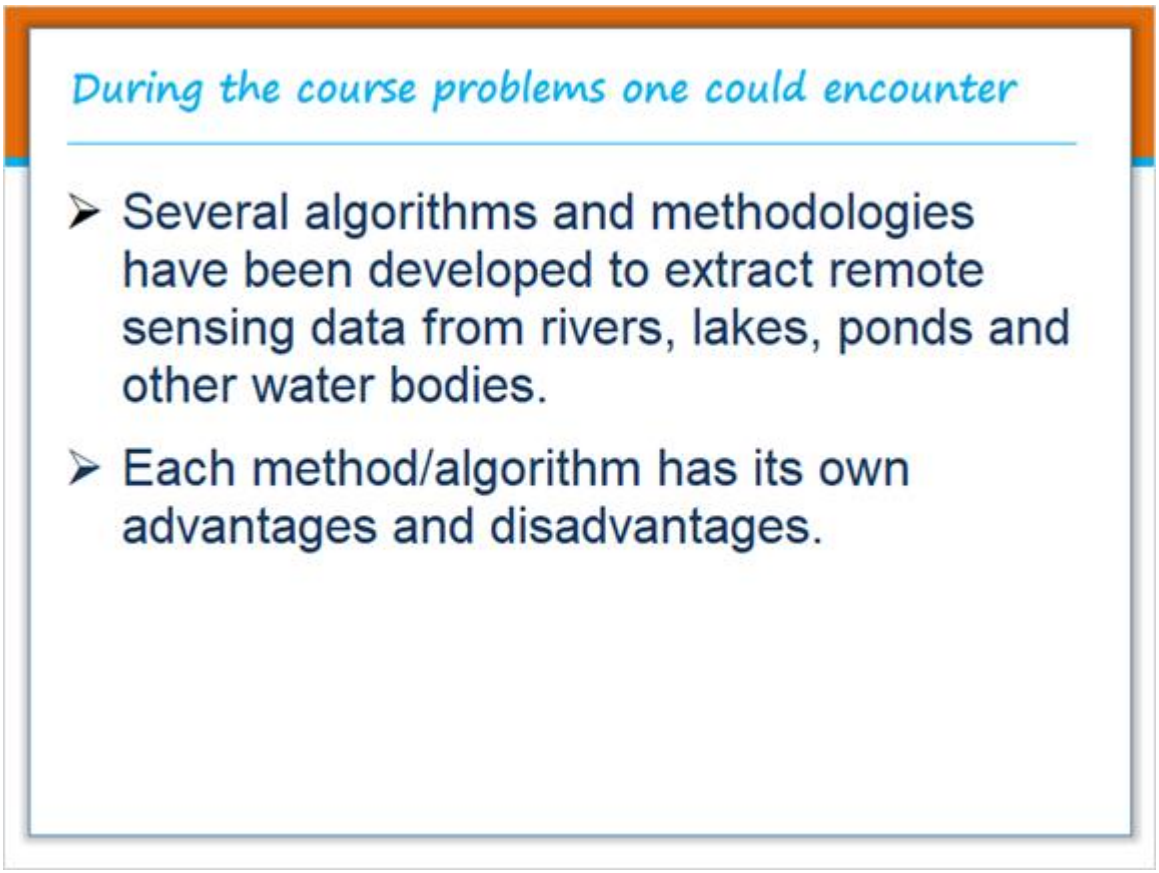
6.26 Database Management (Continued)



Notes:

Distributed databases are becoming -increasingly common in GIS. In this case, data may be stored in disparate sources within or outside an organisation. If a GIS has access to such databases then a vast amount of extra data becomes available to the system. It is easy to envision how a GIS could offer greater functionality in the fishery context if it where to have direct access to oceanographic, meteorological and environmental databases, all of which are likely to be separate from fishery GISs.

6.27 During the course problems one could encounter

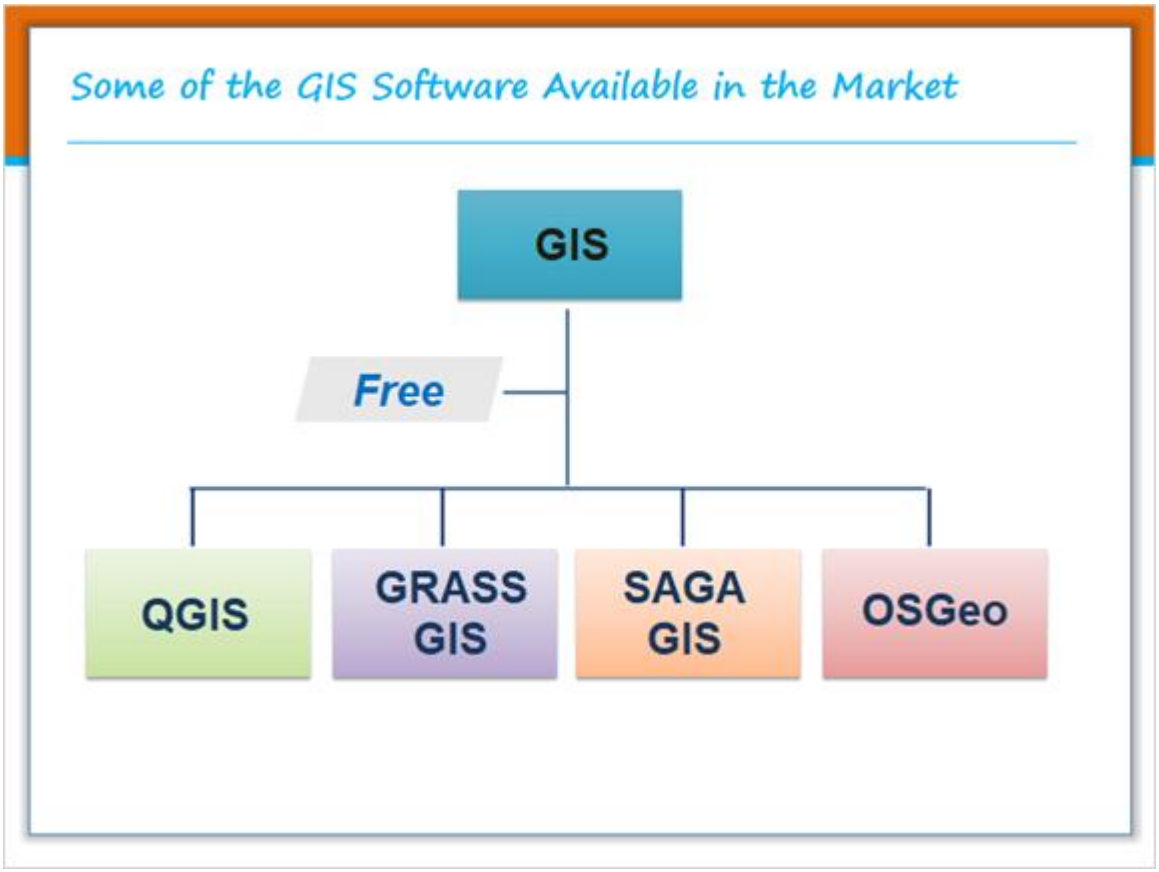


Notes:

Additional problems one could encounter:

- A method successful in one region may not be useful for the same purposes in another region. This is due to variability in environmental and geographical characteristics, complex topographic, availability of data and data quality.
- Many new techniques incorporate several methods in data spectral resolutions to overcome water pixels associated with snow, barren land, vegetation built up and shadows. Many remote sensing techniques, have been applied in mapping and monitoring water bodies such as ponds, lakes, reservoirs, glacial lakes, watersheds, wetlands etc.

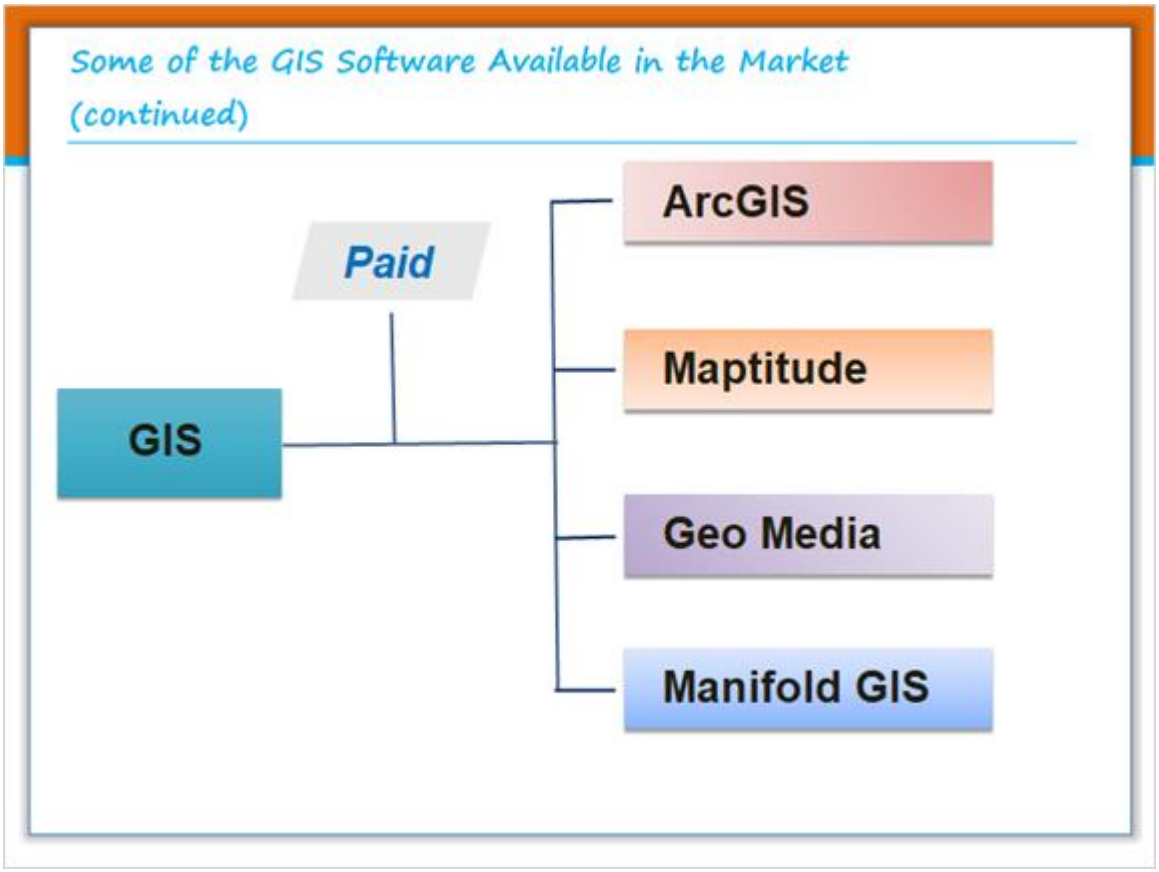
6.28 Some of the GIS Software Available in the Market



Notes:

Some software is readily available free of charge while other software needs to be purchased from their respective websites.

6.29 Some of the GIS Software Available in the Market (continued)



Notes:

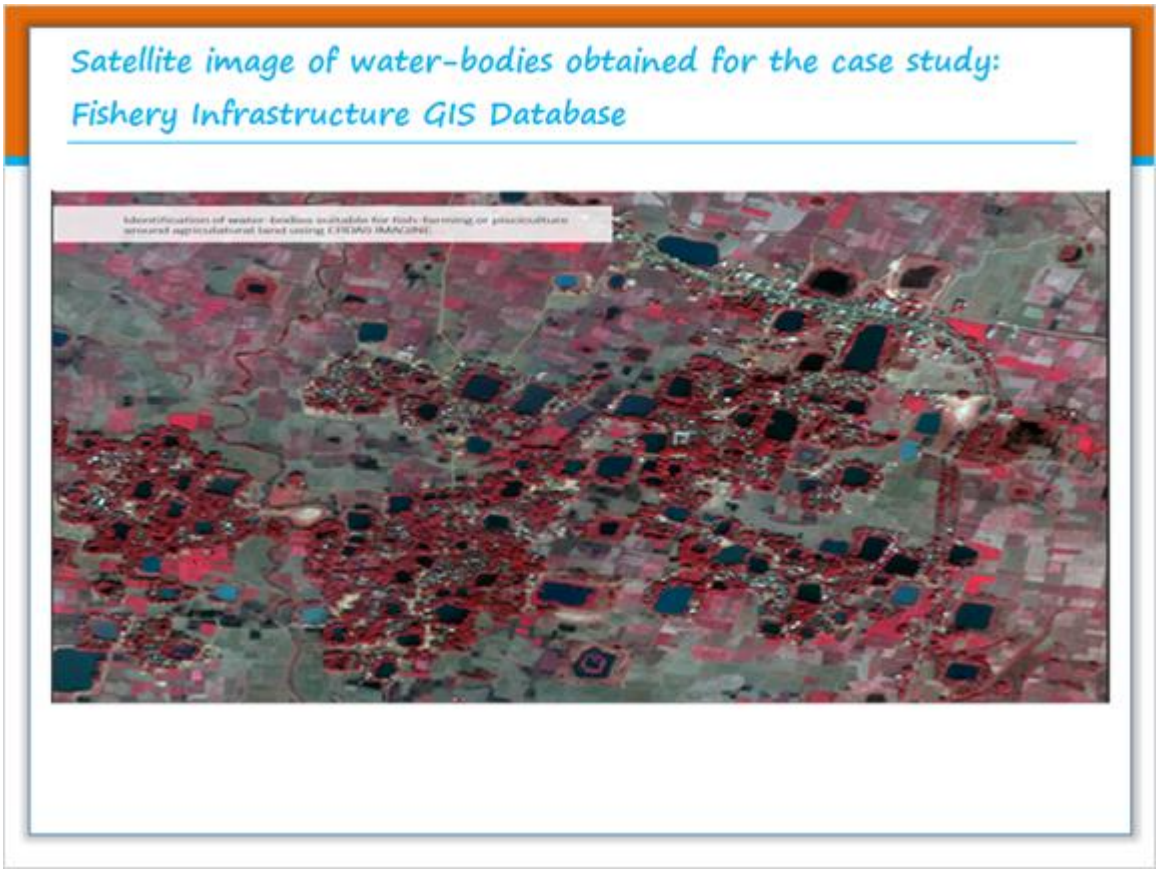
The most expensive GIS programs are capable of performing over 2,000 separate functions while the inexpensive GIS perform hundreds of functions.

6.30 Application of GIS in West Bengal (WB) India

Notes:

The state of West Bengal in India is the largest producer of fish and fish products in the country. West Bengal covers more than 20 million impounded water bodies comprised of rivers, canals, streams, tributaries, etc. within a geographical area of about 88,000 square kilometers. The Fisheries Mapping Project Office in the Department of Fisheries of the Government of West Bengal helps manage the state's increasing fish demand by using its existing water resources. Additionally, the Department provides micro-financing services to encourage alternate livelihood for fishermen.

6.31 Satellite image of water-bodies obtained for the case study: Fishery Infrastructure GIS Database



Notes:

More information on this case study is available on the following website- www.geospatial-insight.com/wp-content/uploads/Case-Study-West-Bengal-Fisheries.pdf

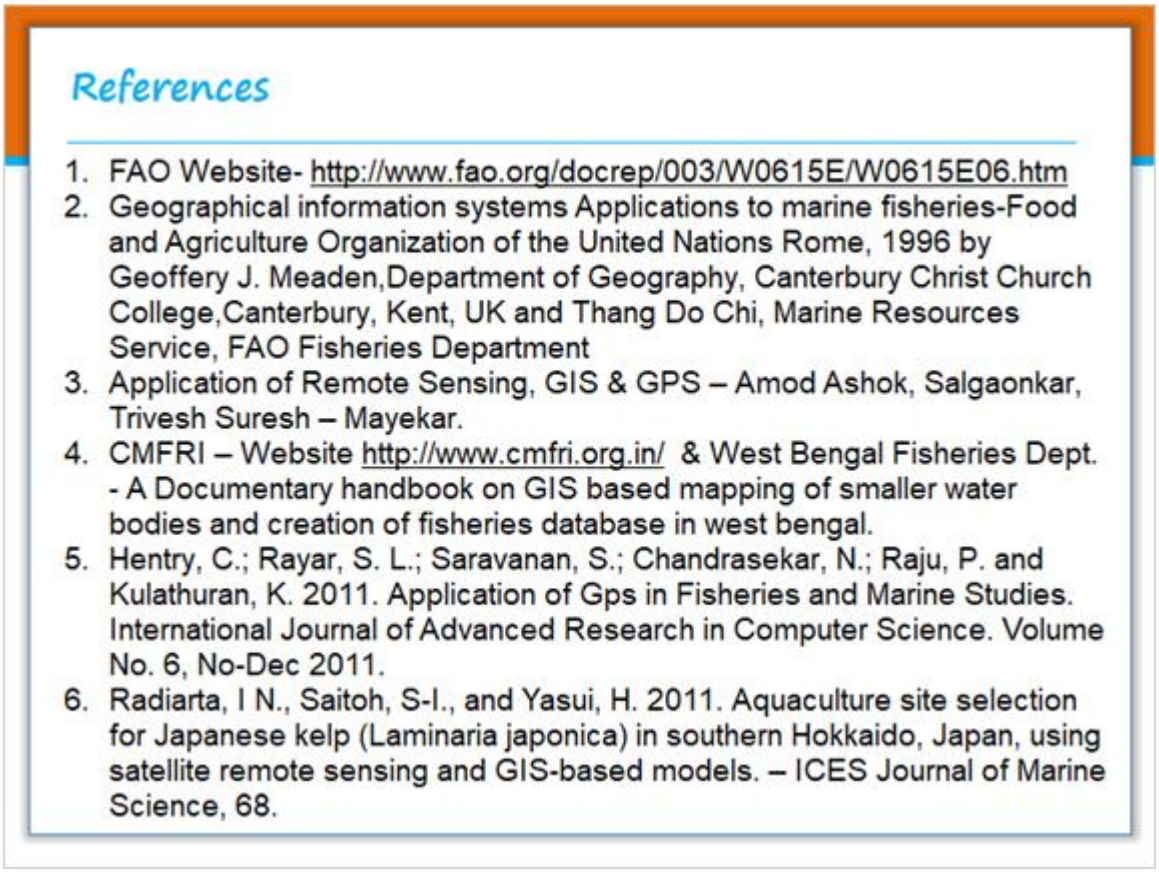
For our future reference we can also find such cases of application of GIS in West Bengal on one of the following websites.

A documentary handbook on GIS based mapping of smaller water bodies and creation of fisheries database in West Bengal-

(https://www.wbfisheries.in)

https://www.wbfisheries.in/files/Handbook%20on%20GIS%20based%20mapping%20of%20smaller%20water%20bodies%20and%20creation%20of%20fisheries%20database%20in%20West%20Bengal.pdf

6.32 References



Notes:

6.33 End of Lesson

Notes: