

THEMATIC MAPS

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- **What is a Map**
- Visualization of geographic and georeferenced information is normally made through maps
- A map is drawn/printed representation of the Earth
- Cartography is the study and the making of maps
- A person who makes maps is called a cartographer
- Most maps are flat representations of a region
- A globe is also a map, but it's shaped like a sphere

▶ What Are Maps Used For?

▶ Locating places

▶ Measuring distances

▶ Planning trips

▶ Visualization of georeferenced data

▶ Many types of maps...

▶ Political Maps

▶ Physical Maps □ Contour Maps □ Road Maps □ Street Maps □ Transit Maps □ Thematic Maps □ Resource Maps □ Inventory Maps □ ... They can be classified into three main types:

▶ 1) General reference maps 2) Mobility maps 3) Thematic

Thematic Maps

- ◉ A thematic map shows georeferenced data, numeric or character, by colours or symbols.
- ◉ Specific data displayed in this manner is referred to as a theme □ Different types of thematic maps, useful for showing different types of thematic variables
- ◉ Commonly used to show natural resources, vegetation areas, population, types of soil, climate, temperature,

How Does One Read a Map? □ Need to understand the following:

- ◉ Map Legends
- ◉ Scale
- ◉ Geographical grids
- ◉ Map indexes
- ◉ Latitude and Longitude (map projections)
- ◉ Map Legends and Symbols
- ◉ Map legends list and explain the symbols and colors found on a map □ Sometimes the map symbols look like the features they represent (tree represents a forest)
- ◉ Map Scale □ The scale on a map shows the relationship between the distances on a map and the distance on the earth's surface □ Scale is

WHAT ARE THEMATIC MAPS

- A thematic map is a map that emphasizes a particular theme or special topic such as the average distribution of rainfall in an area. They are different from general reference maps because they do not just show natural features like rivers, cities, political subdivisions and highways. Instead, if these items are on a thematic map, they are simply used as reference points to enhance one's understanding of the map's theme and purpose.
- Normally however, all thematic maps use maps with coastlines, city locations and political boundaries as their base maps. The map's specific theme is then layered onto this base map via different mapping programs and technologies like

Information Extraction And Thematic Mapping

- Thematic mapping, generally understood as the extraction of value-added information from raw or pre-processed data, is one of the most common and relevant application fields in remote sensing.
- It can be divided into sub-categories, such as pattern recognition, feature extraction, and thematic classification. Thematic and land cover maps derived from remotely sensed imagery can support land and environment monitoring, as well as management and planning activities.
- Proper response actions to environmental and climate emergencies - floods and landslides, earthquakes and fires, food and water security - are based on updated spatial-temporal thematic knowledge, especially if accessible in a digital cartographic format. This knowledge is useful to the deployment of preliminary actions, the quantification of damage extension and the planning of recovery and prevention measures).

- The availability of thematic maps is relevant not only in disaster management, but is also a crucial information source for land and environmental management: for example in forestry, mapping is important for both global monitoring of fires and their implications on climate and environment. In some policy sectors, such as agriculture in the European Union, thematic maps derived from satellite imagery are used to rule the distribution of support funding and for the confirmation of beneficiaries' declarations, with a significant economic impact (Common Agricultural Policy counts for 45 up to 50 % of the EU annual budget)
- Further examples of the relevance of remote thematic mapping in other application fields, include: urban and land planning, recognition of dangerous materials as asbestos or oil spills, soil sealing, water availability as connected to ice and snow melt, and complex ecosystems monitoring.

- ▶ Starting from 1972 - the year NASA launched the first Earth Observation satellite (ERTS/Landsat 1) - to the next generations of satellites and satellite constellations, specifically designed to provide continuous data for a global monitoring at a daily or weekly cycle (i.e. the Sentinel satellite series managed by ESA under the umbrella of the Copernicus-GMES programme, and NASA Landsat 8), remotely sensed data and imagery have grown a lot and will continue to grow and diversify in the future, from the spectral and spatial resolution point of view, thus requiring the development of novel analysis and information extraction methodologies for the provision of more refined and accurate value-added information.

- **Researchers can use their own existing** data sets within the GIS software to create thematic maps. The software allows you to present visual representations of statistical analyses of data in the form of a thematic map. For example, a researcher may instruct the GIS application to calculate the number of robberies per hundred residents for each census block group in a particular city. Once the calculation is performed, the GIS application provides different options for presentation of the results in a thematic map. The differing rates may be presented using different colors to allow the audience to easily distinguish between the rates of robberies in different block groups with a single glance.

The accuracy of the map is dependent upon the accuracy of the data, as with geocoding. Thus, the major work on the part of the researcher lies in data preparation as with any type of analysis. The researcher who creates a thematic map depicting the differences in the number of robberies per one hundred residents between census block groups must be sure that the data set used to provide information about robberies is accurate to begin with. If the data incorrectly reports the number of robberies, the resulting thematic map will subsequently report the incorrect number of robberies as well.

- ▶ **An additional consideration with GIS** is the accuracy of the underlying reference map data. This is the data used by the application (as specified by the researcher) to represent the applicable geographic location. Typically, the reference data consists of maps of countries, states, cities, or any other geographic region. ArcGIS comes with some geographic map data that can be used as reference data. However, there are many third-party sources for data of this kind (including ESRI, the manufacturer of ArcGIS) that extends far beyond that of the data provided in the sample data sets with ArcGIS. Data of this nature may be divided along a variety of borders, including but not limited to: country borders, census boundaries, state lines, county lines, political boundaries, and so on. It is essential for the researcher to be aware of the nature of the boundaries of the reference data as this will have an effect on the analyses and subsequent results as presented in the thematic map.

HISTORY OF THEMATIC MAPS

- Thematic maps did not develop as a map type until the mid-17th Century because accurate base maps were not present prior to this time. Once they became accurate enough to display coastlines, cities and other boundaries correctly, the first thematic maps were created. In 1686 for example, Edmond Halley Thematic maps did not develop as a map type until the mid-17th Century because accurate base maps were not present prior to this time. Once they became accurate enough to display coastlines, cities and other boundaries correctly, the first thematic maps were created. In 1686 for example, Edmond Halley, an astronomer from England, developed a star chart. In that same year, he published the first meteorological chart using base maps as his reference in an article he published about trade winds.
- In 1854, John Snow, a doctor from London created the first thematic map used for problem analysis when he mapped cholera's spread throughout the city. He began with a base map of London's neighbourhoods that included all streets and water pump locations. He then mapped the locations where people died from cholera on that base map and was able to find that the deaths clustered around one pump and determined that the water coming

THEMATIC MAP CONSIDERATIONS

- When cartographers design thematic maps today, there are several important things to consider. The most significant though is the map's audience. This is important because it helps determine what items should be included on the thematic map as reference points in addition to the map's theme. A map being made for a political scientist for example would need to have political boundaries, whereas one for a biologist might instead need contours showing elevation. The sources of a thematic map's data are also important and should be carefully considered. Cartographers must find accurate, recent and reliable sources of information in a wide range of subjects- from environmental features to demographic data to make the best possible maps.

TYPES OF THEMATIC MAPS

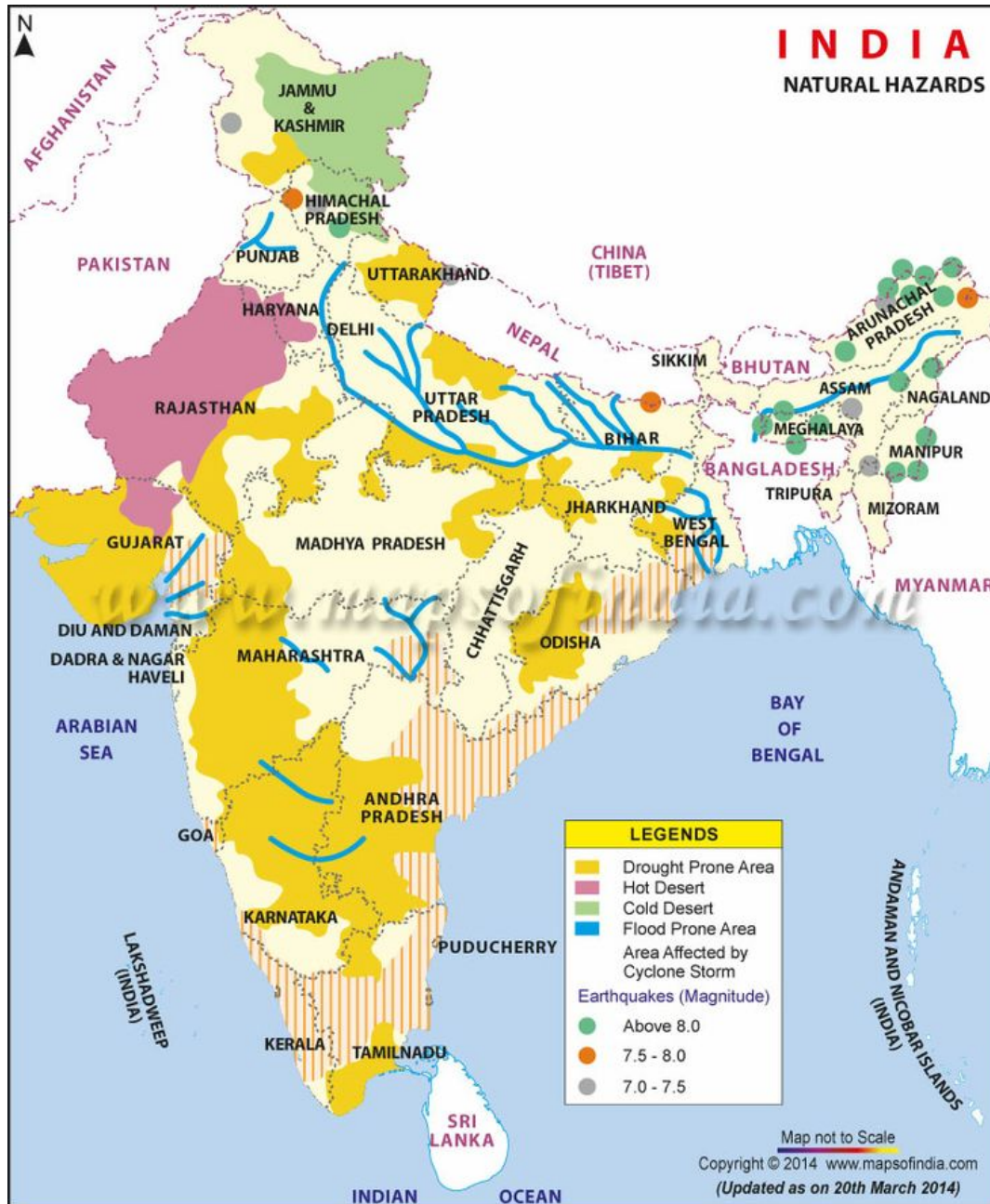
Although cartographers can use these datasets in many different ways to create thematic maps, there are five thematic mapping techniques that are used most often.

- **1. CHOROPLETH MAP** - This is a map that portrays quantitative data as a color and can show density, percent, average value or quantity of an event within a geographic area. Sequential colors on these maps represent increasing or decreasing positive or negative data values. Normally, each color also represents a range of values.
- **2. PROPORTIONAL OR GRADUATED SYMBOLS** - are the next type of map and represent data associated with point locations such as cities. Data is displayed on these maps with proportionally sized symbols to show differences in occurrences. Circles are most often used with these maps but squares and other geometric shapes are suitable as well. The most common way to size these symbols is to make their areas proportional to the values to be depicted with mapping or drawing software.

3. ISARITHMIC OR CONTOUR MAP - it uses isolines to depict continuous values like precipitation levels. These maps can also display three-dimensional values like elevation on [topographic maps](#). Generally data for isarithmic maps is gathered via measureable points (e.g. - weather stations) or is collected by area (e.g. - tons of corn per acre by county). Isarithmic maps also follow the basic rule that there is a high and low side in relation to the isoline. For example in elevation if the isoline is 500 feet (152 m) then one side must be higher than 500 feet and one side must be lower.

4. DOT MAP is another type of thematic map and uses dots to show the presence of a theme and display a spatial pattern. On these maps, a dot can represent one unit or several, depending on what is being depicted with the map.

5. DASYMETRIC MAPPING is the last type of thematic map. This map is a complex variation of the choropleth map and works by using statistics and extra information to combine areas with similar values instead of using the administrative boundaries common in a simple choropleth map.





RECENT RAINFALL TENDENCY

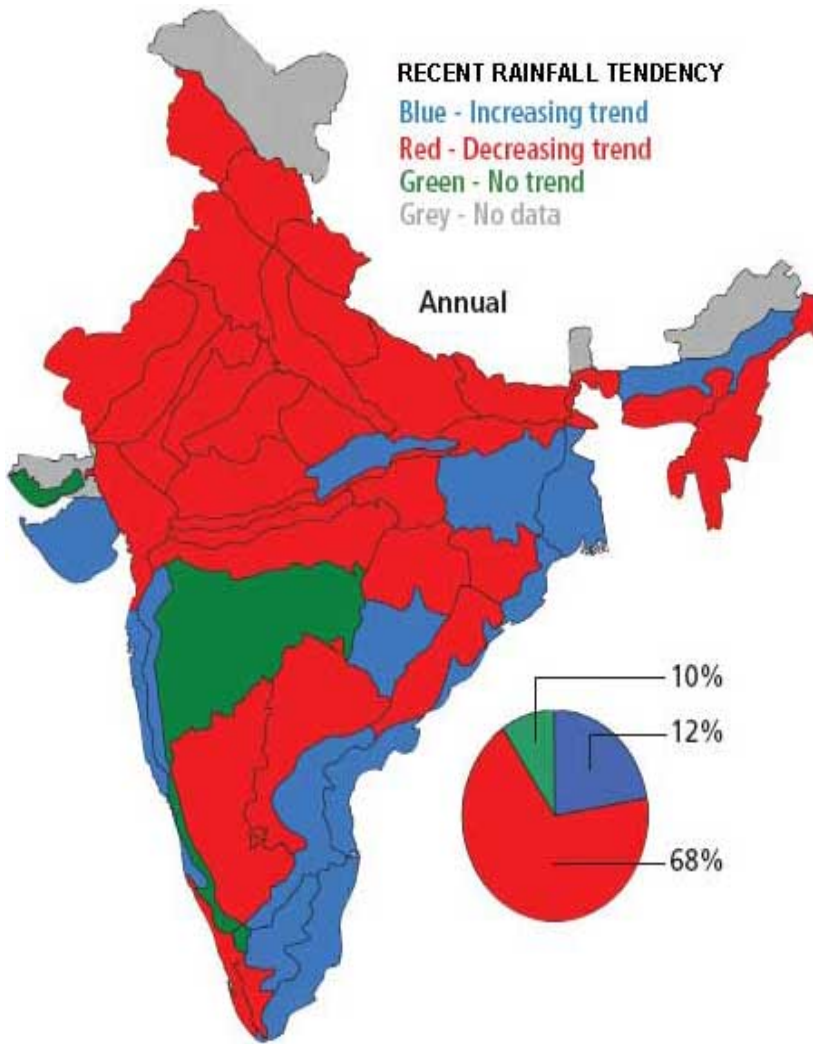
Blue - Increasing trend

Red - Decreasing trend

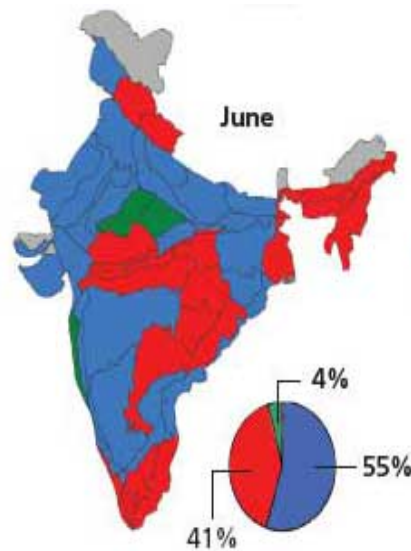
Green - No trend

Grey - No data

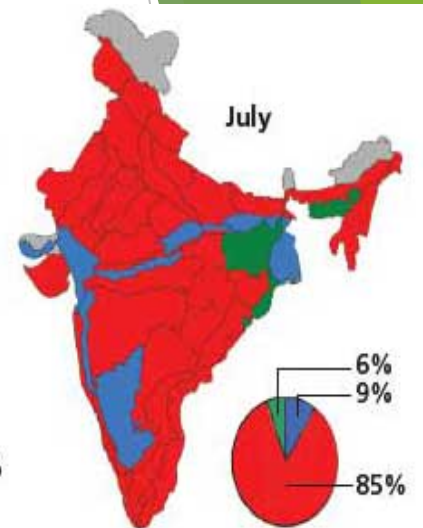
Annual



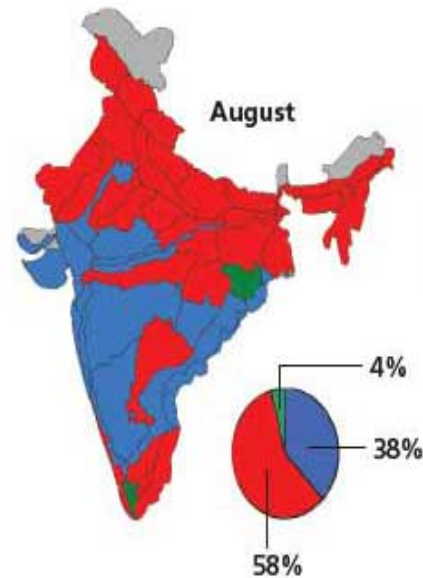
June



July



August



September

