Hunter College - CUNY
Dept. of Geography & Environmental Science
GEOG 101 Lecture Presentation Summary
Spring 2021

NOTE: In the absence of in-person lecturing and face-to-face explanation of the material presented in the PowerPoint lecture slides, I will summarize the content of each lecture presentation, stressing the concepts and interrelationships that are essential to an introductory geography course. In essence, it is like giving you a transcript of my classroom lectures.

If, after reading this summary and viewing the lecture presentation, the imbedded short videos and hot links to articles, you have any questions, or if you would like to contribute a comment or two, need clarification by other examples or have additional information on the topic, please do not hesitate to email me at agrande@hunter.cuny.edu.

LECTURE 06: Maps and Their Parts

- The purpose of this lecture is to introduce the essential parts of a map: map projection, map scale and map symbolization, and to categorize the types of formats used to present mapped information.

- **Slide 2-3: Transferring Information from the Earth to a Map.** As noted on the slide, there are three major obstacles to overcome when attempting to transfer information from Planet Earth to a small, flat surface without distorting it.
    1. Transformation of a sphere into a plane.
    2. Reduction of the earth's surface to fit on a small flat object.
    3. Depiction of information within the limited space that makes it clear to the reader.

  This done by utilizing *projection*, *scale* and *symbolization* tools to address the problems.

- **Slide 4: Globes.** Only a globe (a 3-D object), can most accurately represent the earth without distortion and preserve true shape, true relative area, true distance and true direction. Maps being flat (2-D) cannot show more than three advantages of a globe at a time. *(Some maps show less.)* But which three? And how do we select them?

- **Slide 5-6: Map Projections.** A map projection is used to transfer the earth's grid onto a flat surface. Each projection has a combination of unique characteristics that deal with the distortions that occur when transferring information from 3-D to 2-D space since this transfer distorts one or all of the truisms: *true shape, true relative area, true distance* and *true direction*. *(Be sure to read the section on maps and map projections in Goode's Atlas or any thematic atlas that is available to you).*

  The premise of a "projection" is the placement a light source inside a transparent globe that has an opaque grid and outline of landforms on its skin. The shadows cast by the opaque material onto a flat surface can be by traced on that surface to create a map. Modern map-making does not use real projected shadows but, instead, mathematically derived images. *View the two short videos accessed at the bottom of the slide.*

- **Slide 7: Map Distortion.** Again, we emphasize that all maps distort reality. This slide contains several illustrations showing how distortion takes place. Most atlases have an introductory section containing similar examples. Geometric shapes or a head of a person are commonly used to show the extent of distortion. *Look closely at the examples. Compare the spacing of lines of latitude and longitude on a globe to those in the examples.*

- **Slides 8-13: Geometric Map Projections.** The three geometrical projections are cylindrical, conical and planar.

- **Slides 8 and 9.** A **cylindrical projection** is created when a cylinder (tube) is placed around a globe. Least distortion is in the equatorial region with greatest distortion at the higher latitudes. The polar regions CANNOT be shown because the tube is open-ended. Notice that the meridians of longitude DO NOT converge at the higher latitudes, making those landforms appear much larger than they are. *Compare South America and Greenland*. Also notice that the scale has varying values to compensate for distortion.
- **Slides 8 and 10.** A **conical projection** is created by placing a cone on a globe (like a hat). Distortion occurs at the equatorial zone (meridians are too far apart) and polar region (meridians are too close together). Least distortion is in the middle latitudes. *Most maps of the US, Europe, and China are conical in nature.*
- **Slides 8 and 11.** A **planar projection** is created when a flat object (plane) is placed tangent to a globe. Least distortion is in the center of the map. The outer areas of the map have the spacing of lines of latitude and longitude exaggerated. This projection is best used for maps centered on the North Pole or South Pole. *Many classroom maps incorporate planar polar projection maps as insets to the main map.*
- **Slides 12 and 13** review the projections.

- **Slides 14-18. Mathematically Derived Projections.** The examples shown here are but a few of hundreds that exist. None can be "projected by a light source." If they are printed and the cut out from the page, many can be shaped into a globe. *View the 1.5 min video demonstration of interrupted projections.*

- **Slides 19-22: Scale.** Scale represents the relationship of distance as a **ratio** between distance on the map to distance on the earth's surface (map to earth). It allows us to make measurements and it influences the detail we can show on the map.
  - **Slide 20:** Scale can be shown in three ways: verbal, graphic and fraction. Of the three, the graphic bar or line is the best because we do not have to recalculate scale when the map is enlarged or reduced as the bar changes with the resizing. The other two methods entail a recalculation. Take a look at the presentation of scale on the area maps in Goode's World Atlas. Notice that the regional maps show scale in all three ways.
  - **Slide 21-22: Large scale vs. small scale.** Know the difference between a large-scale map (shows great detail within a small area) and a small-scale map (shows a large area with little detail). The largest scale map has a ratio of **1:1** or actual size; **1:2** is half size; **1:100** is a hundredth of the size; **1:1,000,000** is one millionth of the size; and **1:14,000,000** is extremely small scale and usually the scale on a globe. The Boston area map example shows scale coverage. Note the difference in area and detail as you go from Map A (1: 25,000) to Map D (1:1,000,000).

- **Slides 23-31: Symbolization**. Information is portrayed on maps through symbols. Symbols include shapes and colors, as well as words. The seven elements that should be included on all maps are listed. Unfortunately, many maps omit bits of important information.
  - **Slide 24** compares maps of Alaska. On the left is a simple outline map with a key that contains basic information. The center map is a black and white thematic map with detailed information and the one on the right is the same map in color. What a difference between the three. Notice how the one in color grabs your attention.
  - **Slide 25** emphasizes the importance of a "KEY" or "LEGEND" which tells the reader what the shapes and colors mean.
  - **Slides 26-31 focus on direction.** We need to know which way is north to be able to orient ourselves. *BTW: North does not have to be at the top of the page. We are just*

used to seeing it there. We just need an indication of direction from an arrow, compass rose, markings of lines of latitude and longitude and the like. See Slide 31 Australia.

- **Slides 32-44: Map Formats.** As presented in *Fig. 1.27 Examples of Thematic Maps* in the textbook, the five major categories with subgroups of mapped information discussed are: **1. Point Symbol** maps (dot and graduated circle); **2. Flow Line** maps; **3. Isoline** maps; **4. Choropleth** maps (qualitative and quantitative); and **5. Cartogram**.
  - **Point Symbol format** is used to show distribution and density. Dots locate data and graduated symbols (proportionally sized icons) both locate and show quantity. (see Slides 34-36).
  - **Isoline format** uses lines to connect points of equal value. (see Slide 37).
  - **Flow Line format** employs lines of different withs to indicate volume attached to arrowheads which indicate direction of movement. (see Slide 38).
  - **Choropleth format** relies on colors and shading to convey information. The qualitative version focuses on characteristics of a location while the quantitative version focuses on amounts. Both tend to be general in presenting data. (see Slides 39-40).
  - **Cartogram format.** A cartogram uses data other than land area to portray the size of a unit. (see Slide 41).

- **Slides 42-44: Presenting Topical Material in Different Formats.** The maps look different because of the format used to present the data.

- **Slide 45: Summary of Types of Maps from Textbook.** Be sure you can differentiate between the seven examples contained in Fig. 1.27 from the textbook.

- **Slide 46: Next lecture topic: Gathering Information**