

African Drone and Data Academy (ADDA)

Data Visualization and Cartography
Day 2



FURMAN
UNIVERSITY



Outline

Brief Introduction to GIS Data

Types of Maps

Basic Map Elements

Map Title and Subtitle

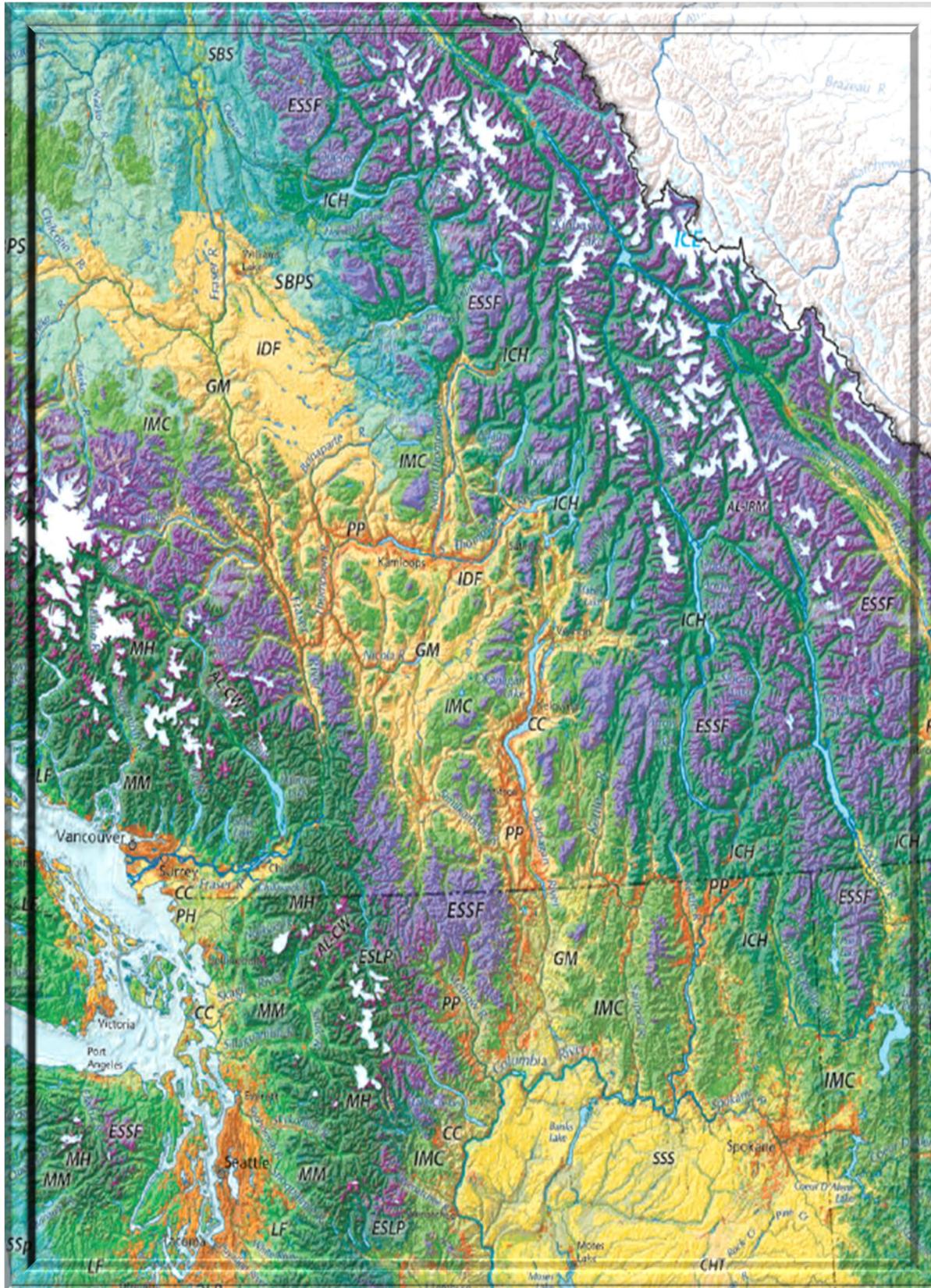
Map Legend and Symbols

Map Scale

Map Orientation

Map Composition / Layout

Additional Considerations





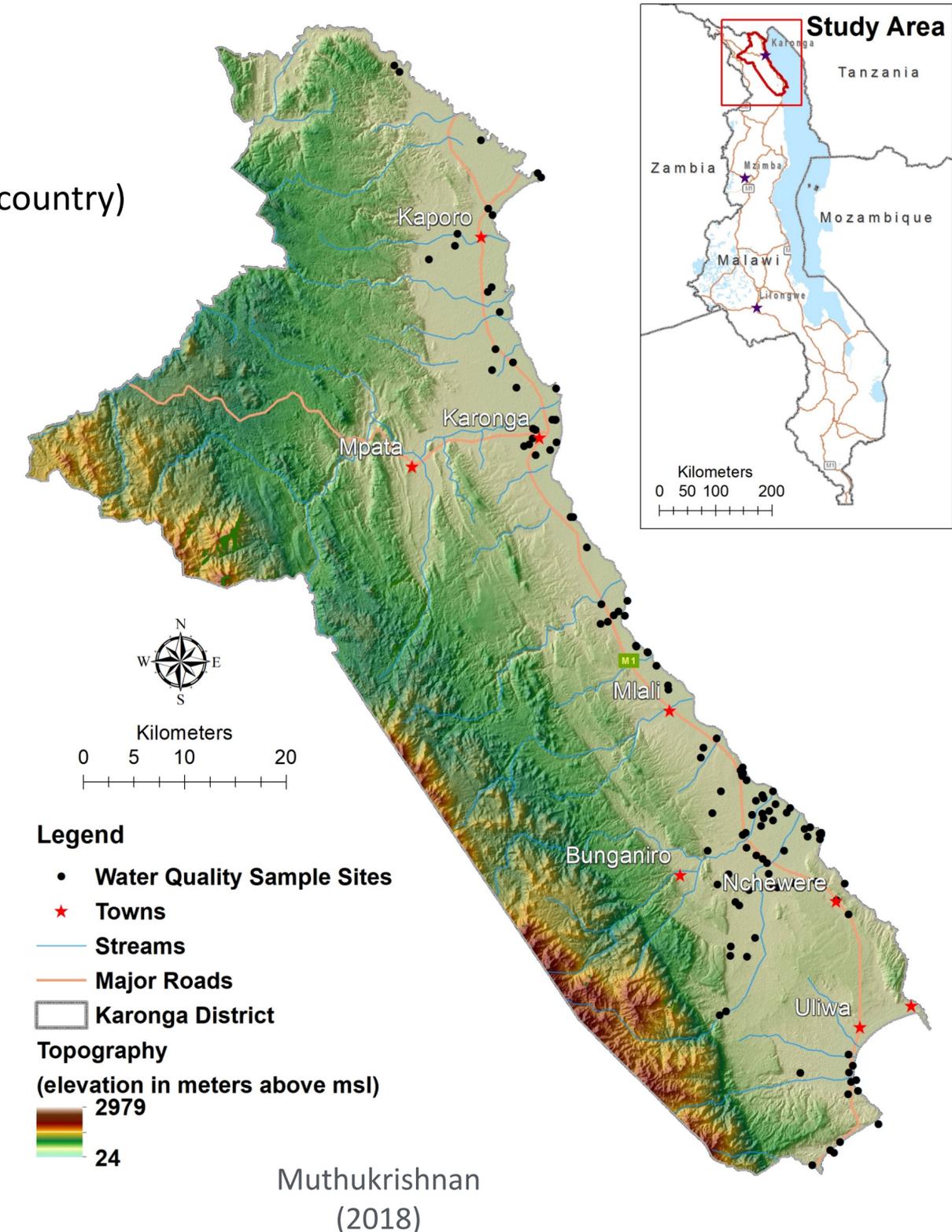
Basic Introduction to GIS Data

- There are three broad categories of data
 - Spatial Data
 - Vector – can be points (towns, sample sites) line (streams, roads), or polygon (district, country)
 - Raster (a grid of pixels) – represented by the topography data in the map here →
 - Attribute Data
 - Non-spatial properties associated with the location
 - Generally represented in the form of a table / database

OBJECTID_1	CaseID	Age	Sex	Functional	GlobalID	CreationDa	
1	21	285	82 Male	Yes	039ea149-f4d2-...	2018-08-14 00:00:00	mula
2	20	287	32 Male	Yes	0ffd84aa-e339-...	2018-08-13 00:00:00	mula
3	11	286	68 Male	Yes	c447f5fb-611c-...	2018-08-10 00:00:00	mula
4	10	291	9 Male	Yes	9e186a0d-a1bb-...	2018-08-10 00:00:00	mula
5	9	328	4 Male	No	1869eab1-3fbb-...	2018-08-09 00:00:00	mula
6	8	327	43 Male	No	c2e12d0c-a382-...	2018-08-09 00:00:00	mula

- Metadata
 - Provides background information about the data
 - Contains vital information that is necessary to use the data with confidence

Information from provider	
Name	Karonga_219
Path	E:\Box Sync\1_Malawi\2_Research\Karonga_Mapping\2018\Karonga.gdb
Source	E:\Box Sync\1_Malawi\2_Research\Karonga_Mapping\2018\Karonga.gdb layername=Karonga_219
Storage	OpenFileGDB
Comment	
Encoding	UTF-8
Geometry	Point (Point)
CRS	EPSG:32736 - WGS 84 / UTM zone 36S - Projected
Extent	587664.3225999996066093,8831035.82230000001162291 : 634199.73080000000193715,8937015.95130000007718801
Unit	meters
Feature count	219

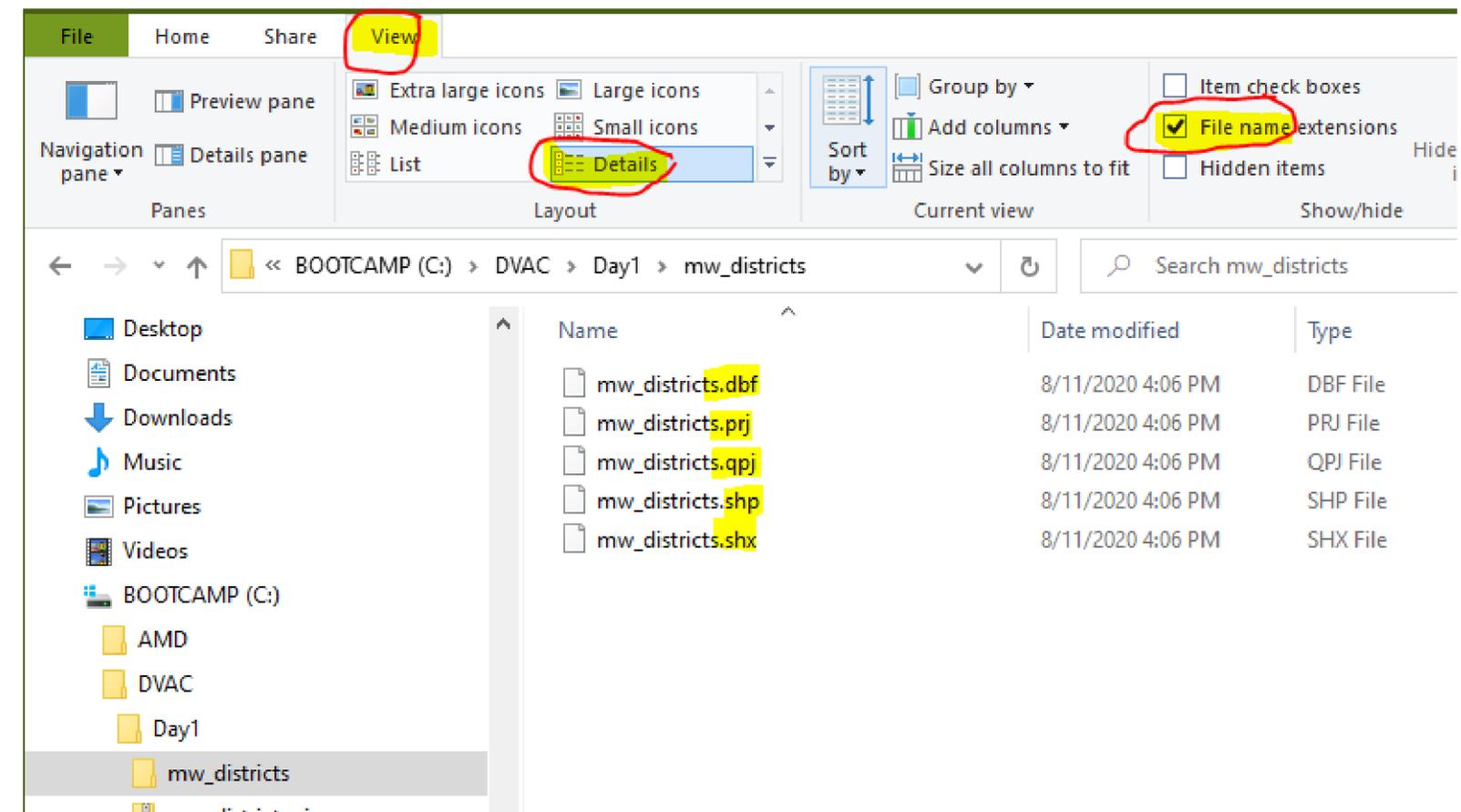




Vector Data Overview

- Point data are created using x-y coordinate values
 - Example: latitude and longitude of a specific restaurant
- Line / Polyline data are created by connecting several points
- Polygon data are created by closing lines to define specific area

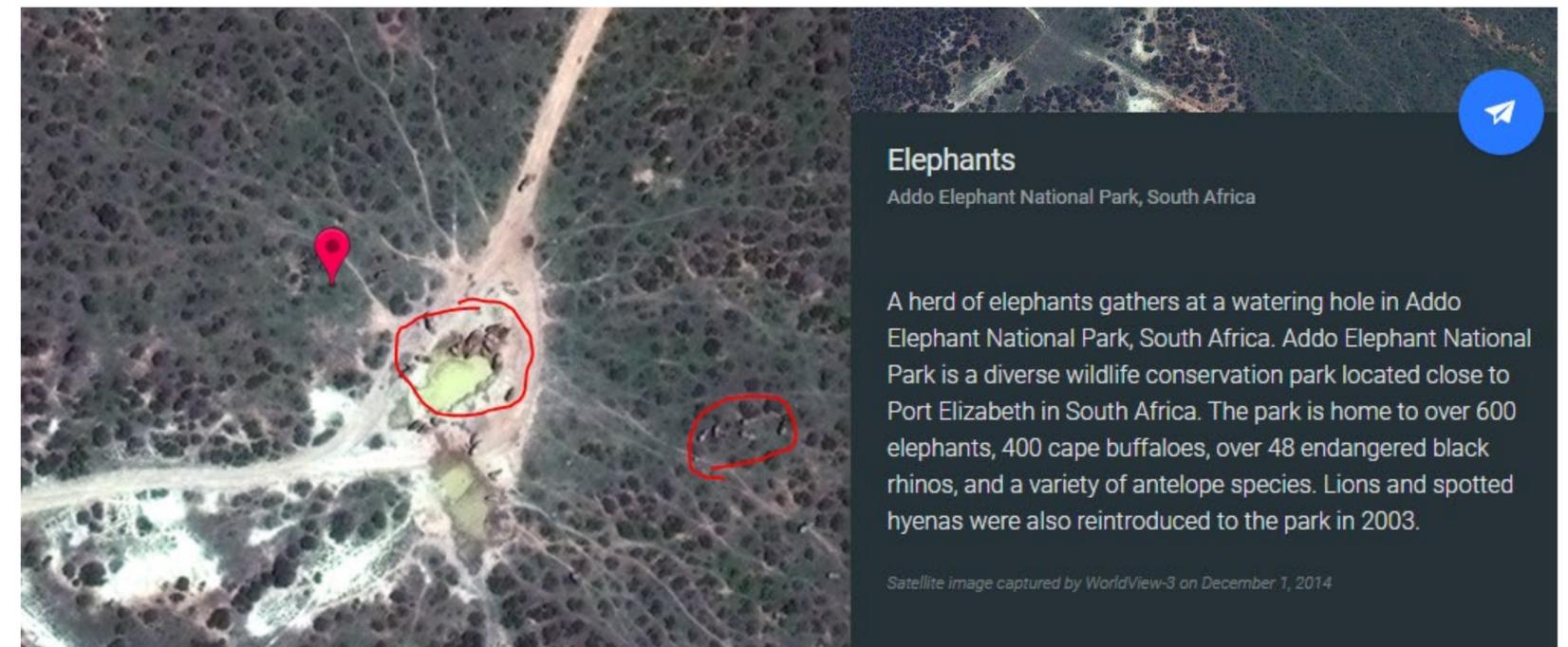
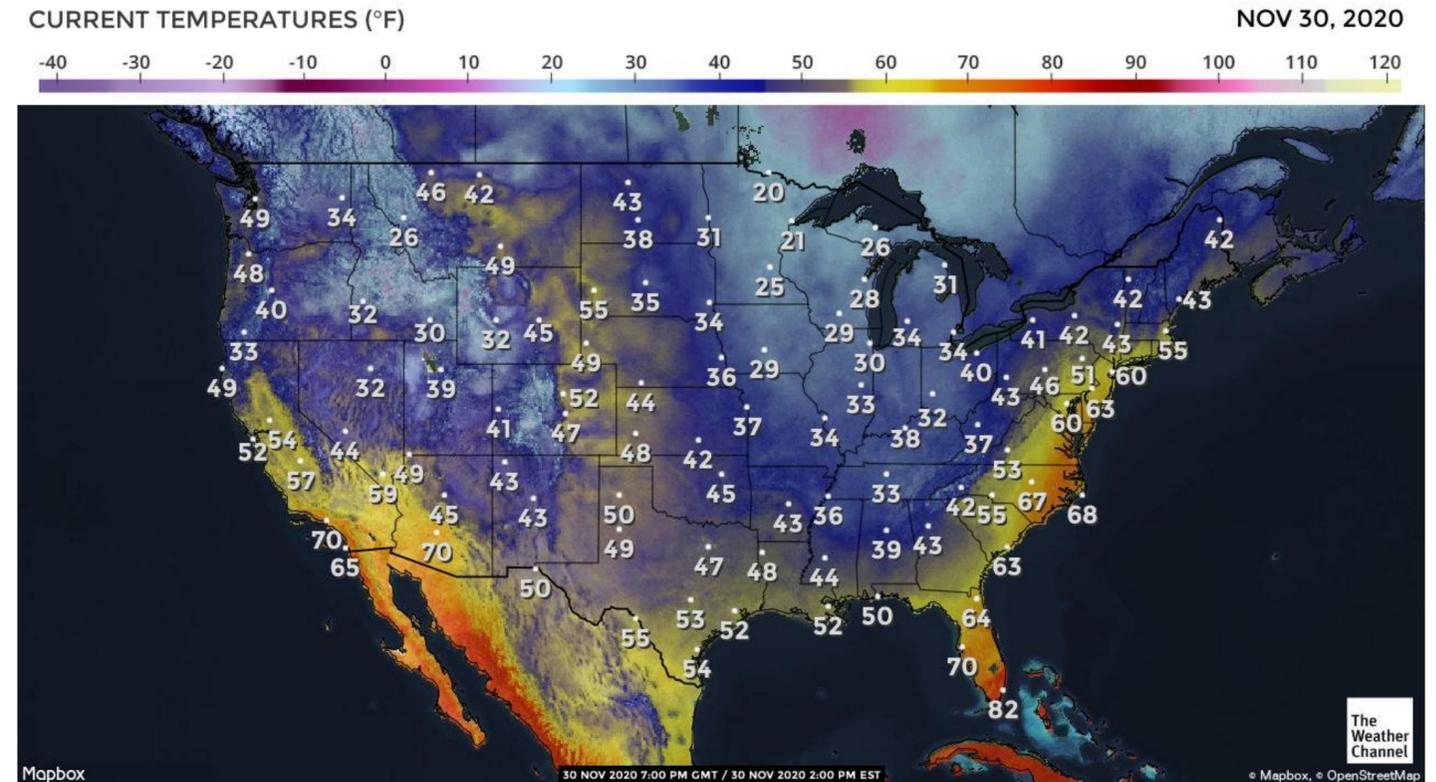
- To make the data more efficient to work with, the vector data were structured in a unique way. One vector GIS data is represented by many files with different file name extensions
 - **.dbf** file contains the attribute data (it's a database file)
 - **.prj** file contains projection information for the data (ESRI ArcGIS format)
 - **.qpj** file contains projection information for the data QGIS will understand how to display it on a map (QGIS format)
 - **.shp** file contains the coordinate values and the geometry relationships for the data (in this case polygon district boundary)
 - **.shx** file stores indexing data for the vector file. Indexing makes it faster to read (much like using an index page in a book allows you to get to your search topic faster)





Raster Data Overview

- Raster data is created using pixels in a grid format
 - Better suited when representing variables that are continuously changing spatially.
 - Example 1: Color-coded weather map showing temperatures across the country. The points with temperature values represent major urban locations.
 - Example 2: Regular photograph taken with a camera – is made up of pixels
 - Example 3: Satellite image showing a herd of elephants gathered around a water hole is also pixel based “raster” data

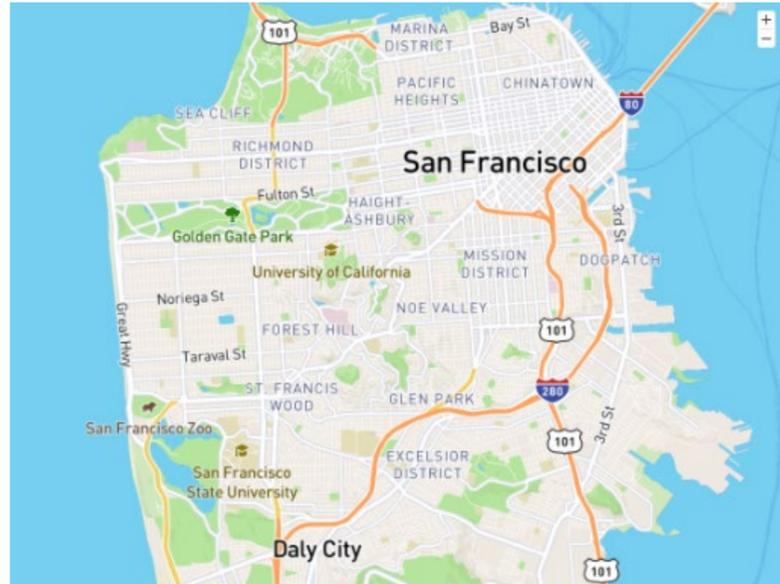




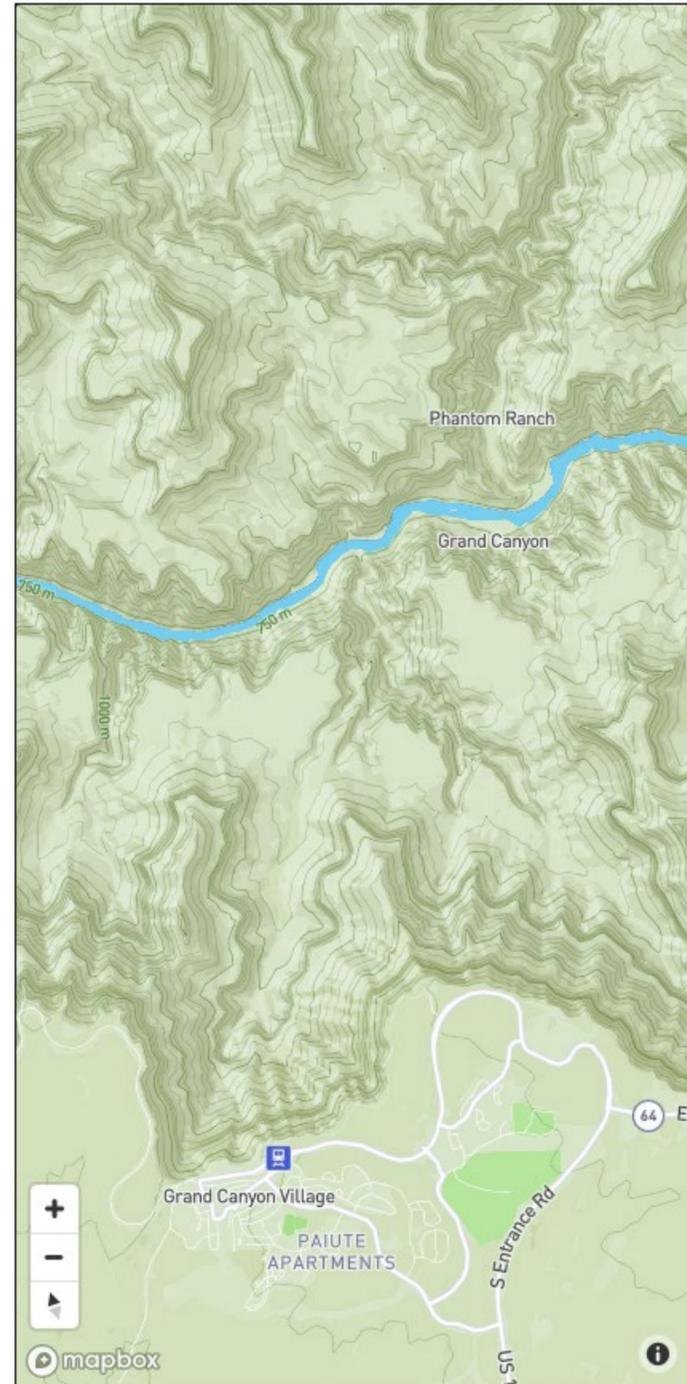
Types of Maps

- Reference maps

www.mapbox.com



www.findtripinfo.com

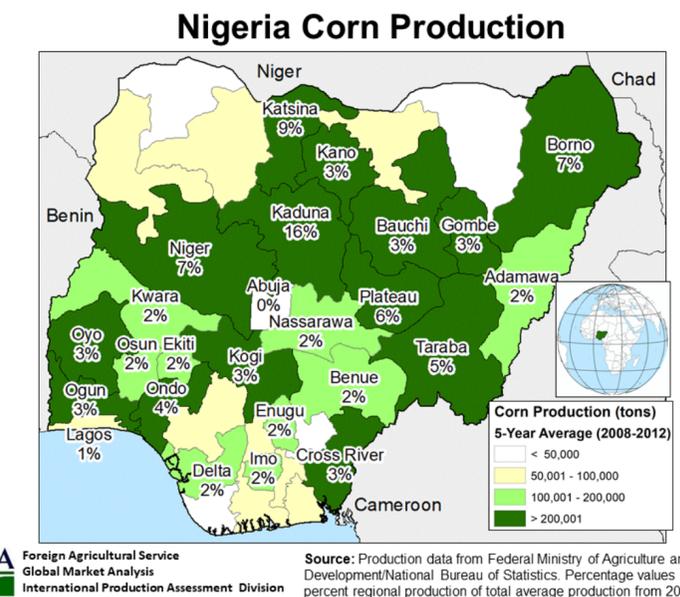


Copyright: CC-BY 2.5 UNICEF

- Thematic Maps



www.businessinsider.com

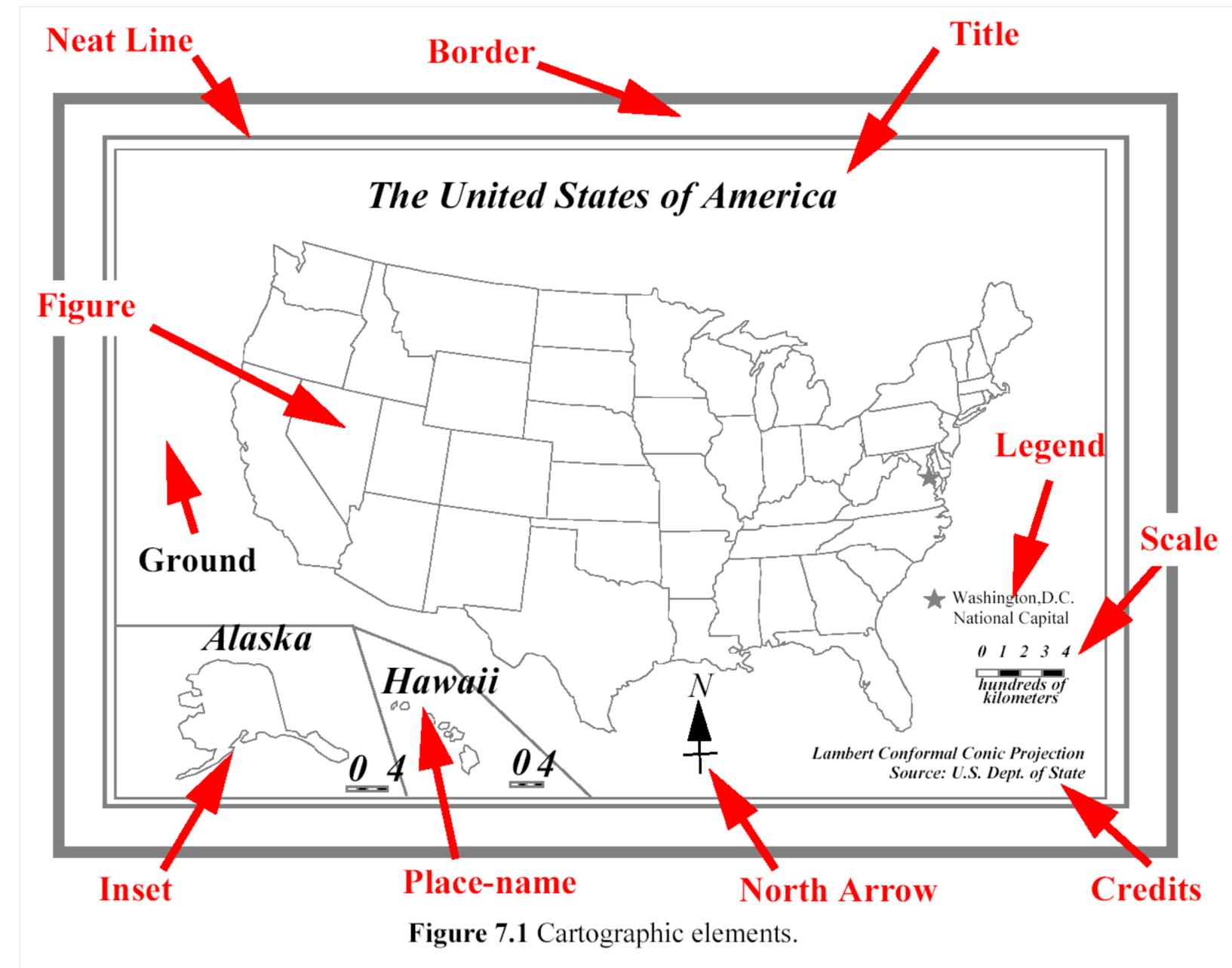


www.usda.gov



Basic Map Elements

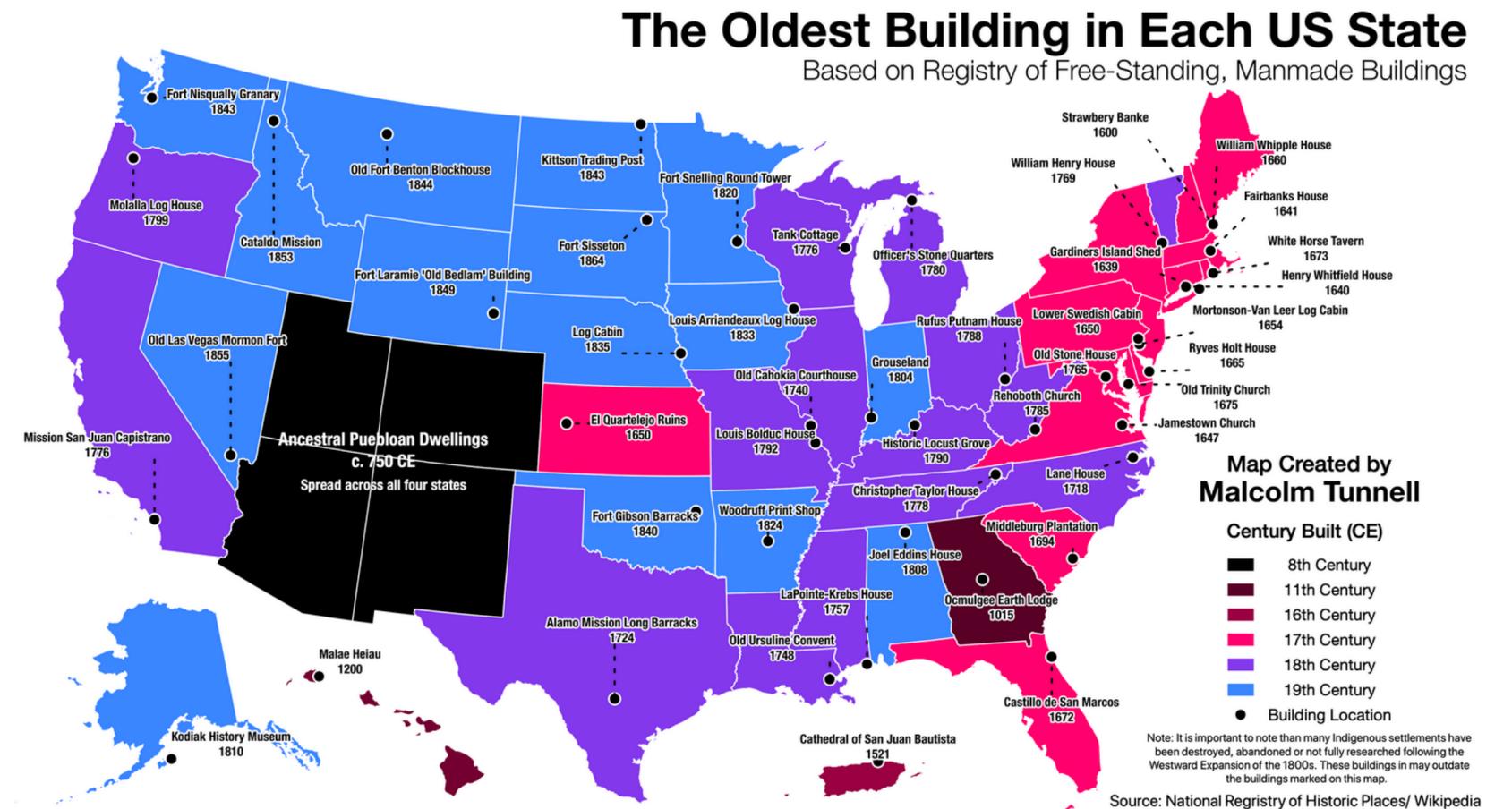
- Maps made for professional use generally should contain the following cartographic elements
 - Appropriate Map Title
 - Subtitle or Short Description
 - Main Map Area
 - Map Legend
 - Map Scale
 - North Arrow
 - Proper Labeling
 - Credit or Data Source Information
 - An Inset Map
 - Neatline
 - Border





Map Title and Subtitle

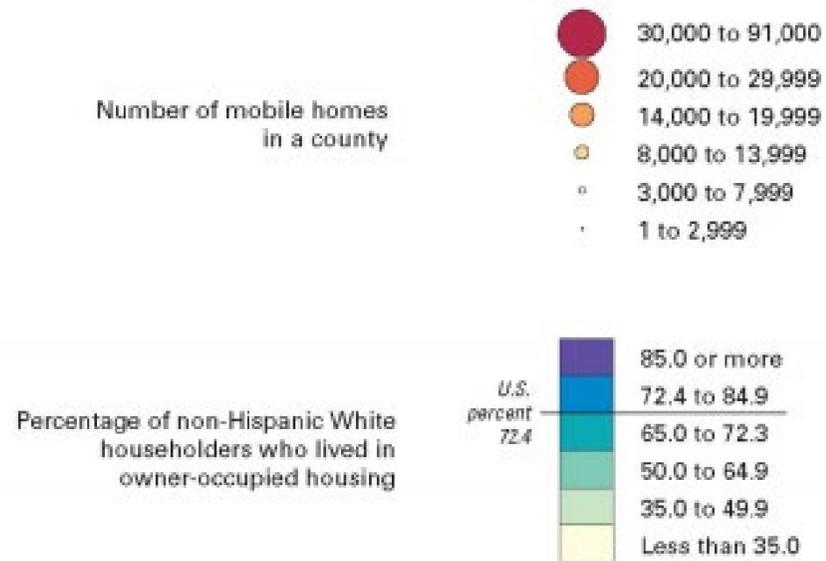
- Commonly positioned on top of the map
- Captivating yet relevant to the theme
- Short and sweet
- Conveys the essence of the map
- Don't use abbreviations
- Avoid using the word "Map"
- Size it appropriately so it is neither dominating nor hiding in the background
- Subtitle can be used to enhance map intent or information



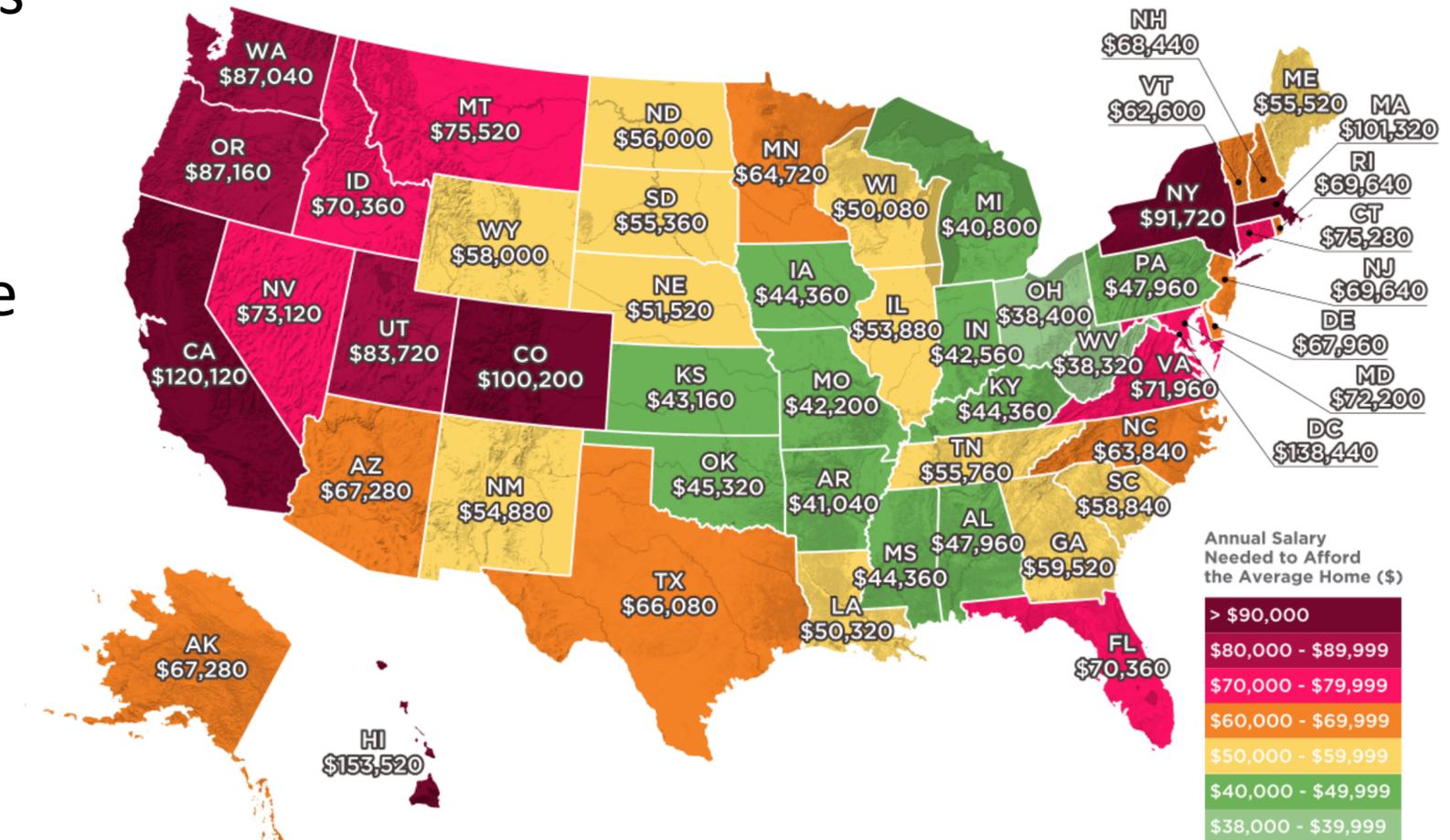


Map Legend and Symbols

- Map legend provides information that is helpful in making sense of the map
- It describes the thematic colors, symbols, and sizes
- It's okay to exclude self explanatory symbols
- It's always provided with thematic maps
- Generally provided on the right bottom part of the map, but it can be located in other places



Salary You Need to Afford the Average Home in Your State
(Based on a 30-year Mortgage with a 10% Down Payment)



Article & Sources:
<https://howmuch.net/articles/salary-to-afford-the-average-home-in-your-state>
<https://howmuch.net/sources/salary-to-afford-the-average-home-in-your-state>
<https://www.zillow.com/mortgage-calculator/>

howmuch.net

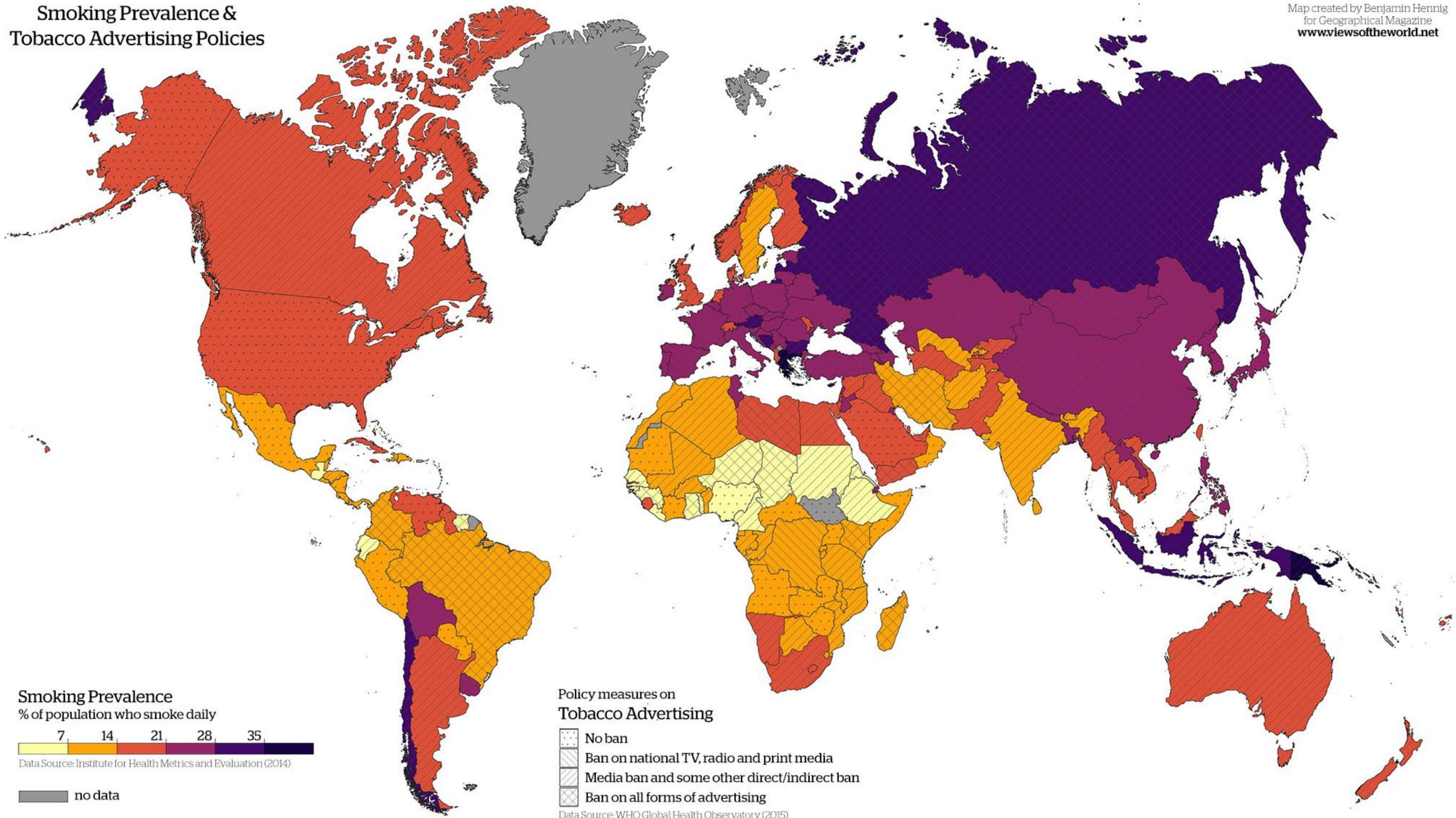


Map Legend and Symbols

Smoking Prevalence & Tobacco Advertising Policies

Map created by Benjamin Hennig for Geographical Magazine www.viewsoftheworld.net

Use of shades of colors and symbols (hash, lines, or dots) to show multiple variables is very effective in communicating the point here.





Map Legend and Symbols

A **Cartogram** Showing 2020 US Election Results, taking into consideration population in each county. Shapes of counties are distorted in accordance with the county population. This clearly brings out the Urban vs. Rural differences.

Note the “Reference Map”, which just shows the results by County – no indication of number of people living in urban and rural counties.

Understanding the different shades of blues and reds in the map is critical to understanding the US Political Landscape.

US Presidential Election 2020

Results mapped at county level showing the candidate with the largest vote share in each area

Preliminary results*

Biden

78,780,121 votes (50.9%)

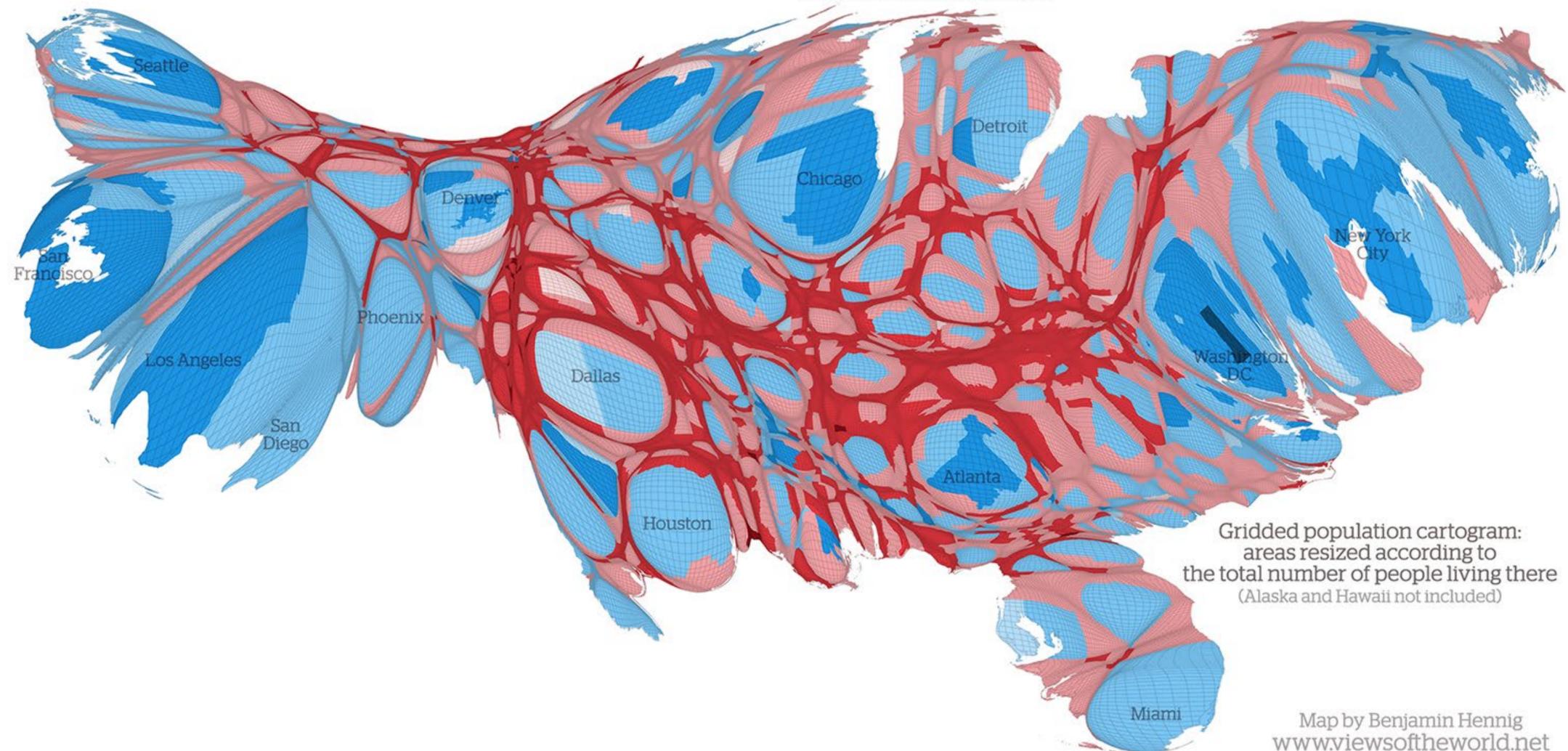
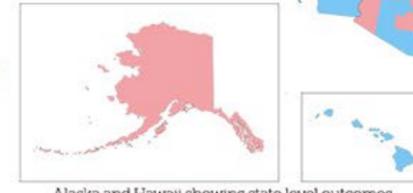
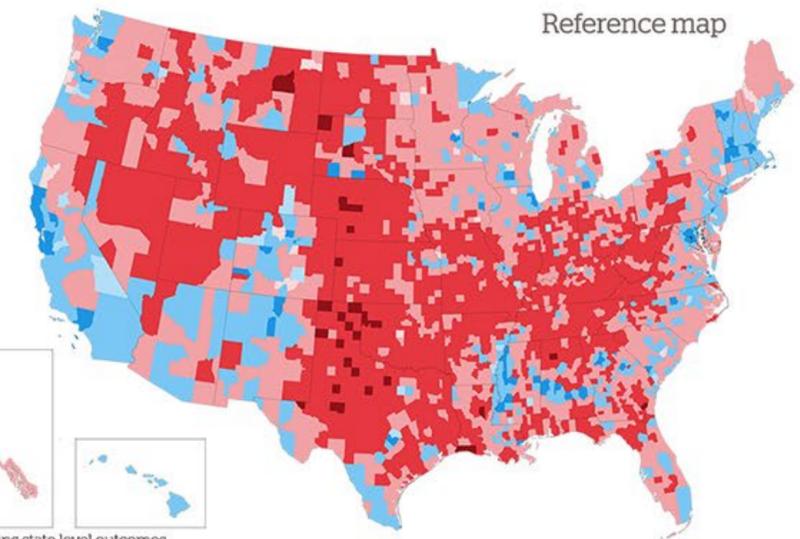
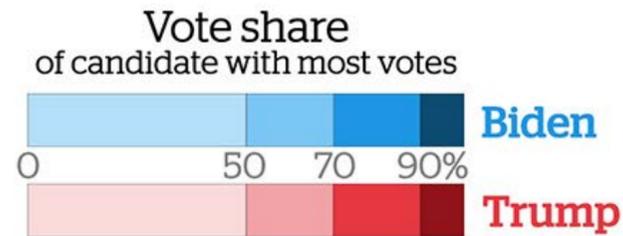
306 electoral votes

Trump

73,163,140 votes (47.3%)

232 electoral votes

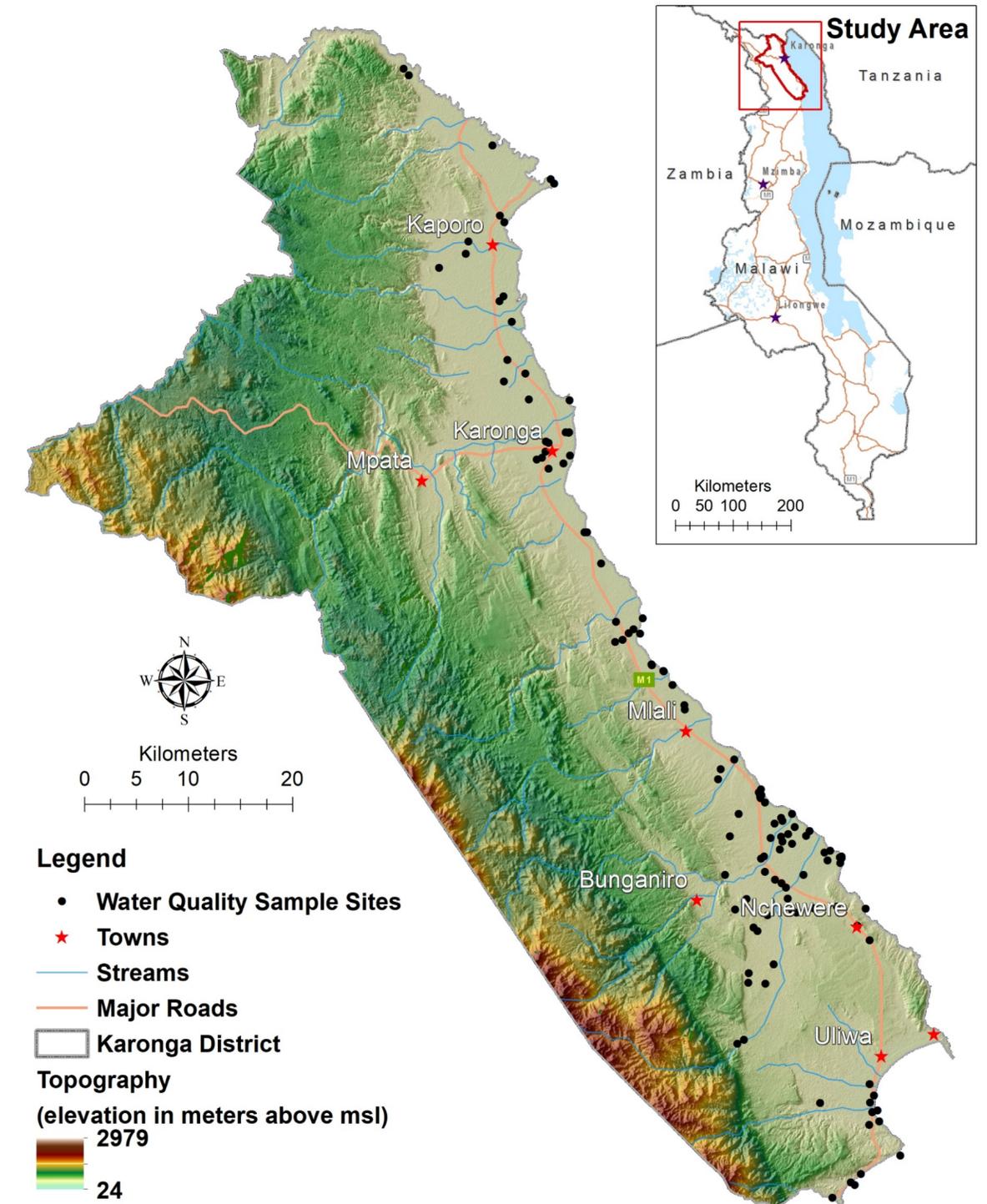
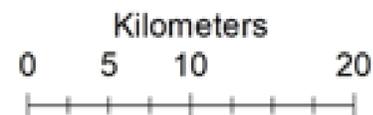
* not confirmed final result, last updated 16. Nov 2020
Source: <https://github.com/favstats/USElection2020-NYT-Results/>





Map Scale

- Map scale is useful in measuring distances and area on the map and translate to actual ground values
- There are three different types of scale representations
 - Fractional scale: represented as a ratio of map distance to real-world distance. Units are same on both sides. Becomes invalid then the map is enlarged or reduced.
 $1:100\ 000$
 - Verbal scale: explains the relation between the map and earth distances. Can use different units on both sides. Becomes invalid then the map is enlarged or reduced.
 $1\text{ cm to }100\text{ km}$
 - Scale bar: represents the map distance to Earth distance by using graphic.



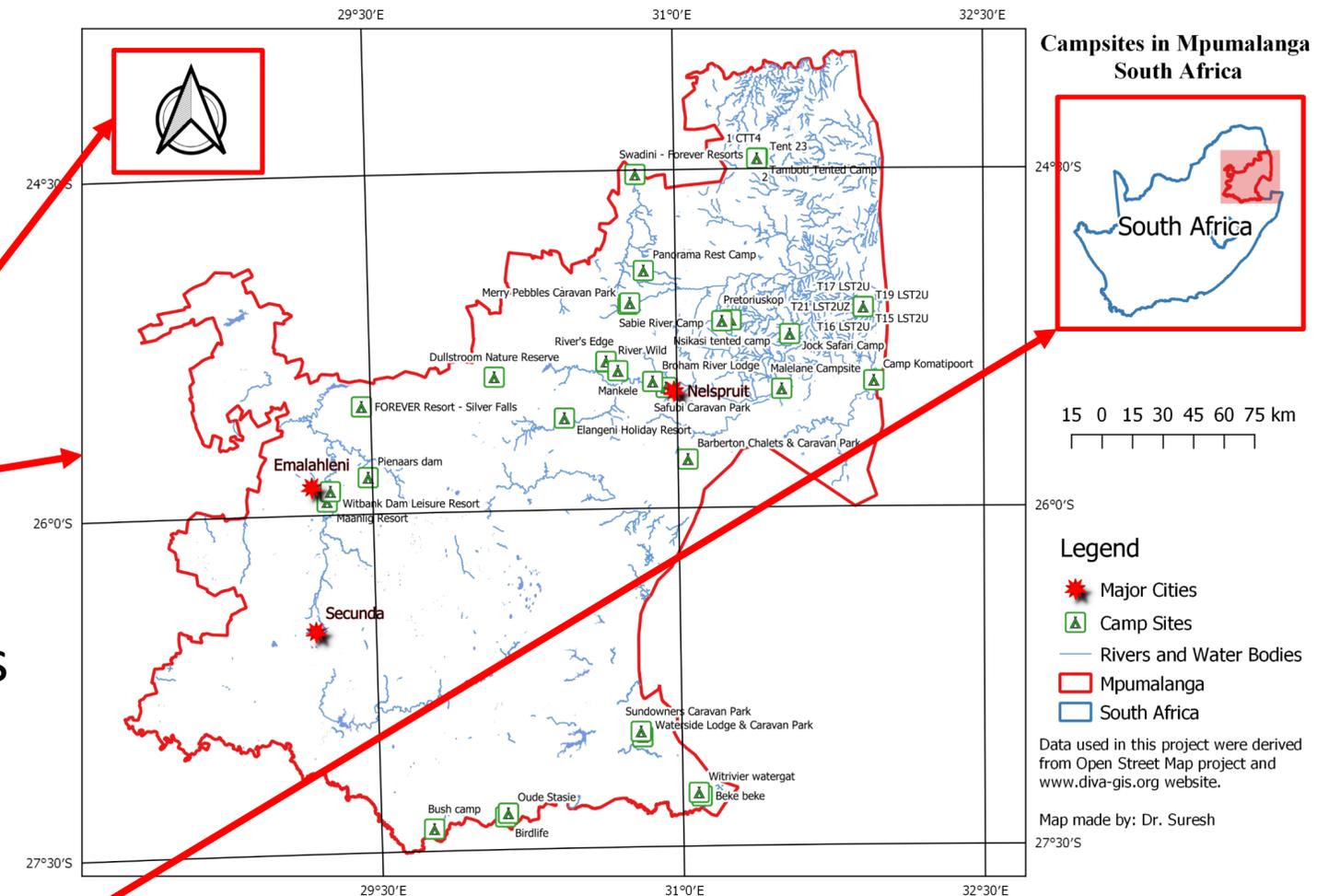


Map Orientation

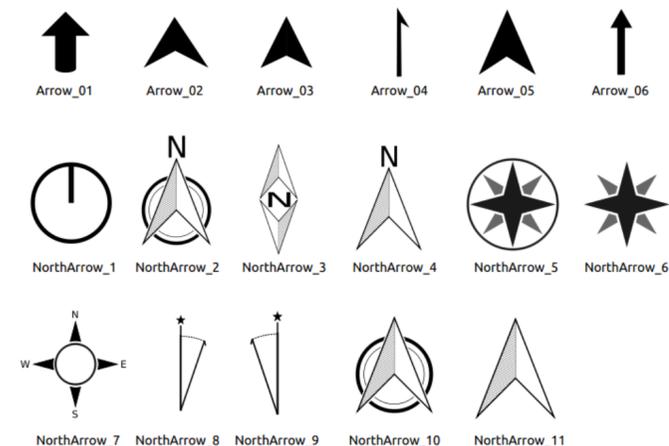
- Helps orient the map with respect to real world directions
- Most crucial in the past when navigation was done using compass and maps
- Generally, maps are made with north pointing to the top
- QGIS makes it easy to make maps with a variety of **North Arrows**

- **Graticules / Grid lines** also help orient by including grid lines representing standard coordinates such as latitude and longitude

- Inset map lets the user understand the larger geographic context for the main study area



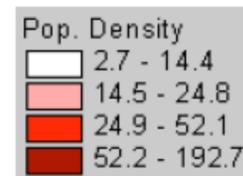
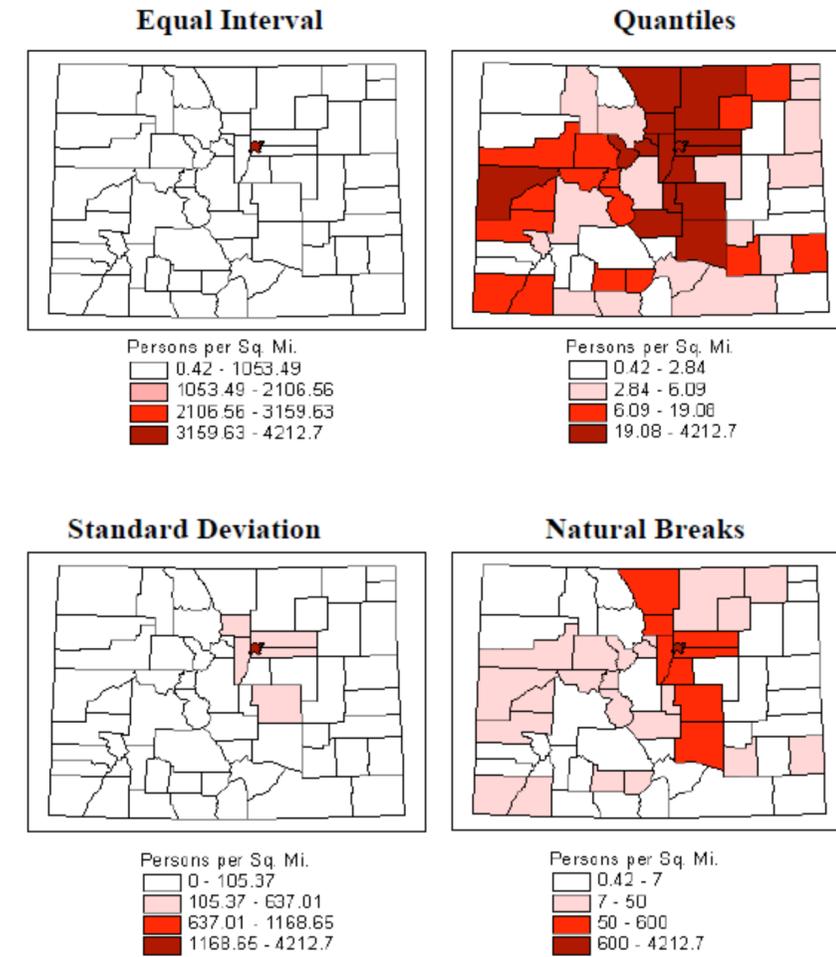
variety of **North Arrows** available in QGIS



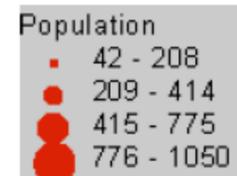


Additional Considerations

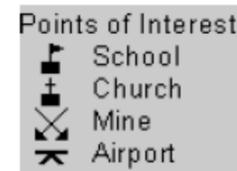
- Map generalizations allow the cartographer to remove unnecessary details in the data and create a simplified view of the data. Generalization is done through many processes
 - Selection and simplification – showing only major cities or national highways
 - Classification – use of a range of colors, intensity, hue, saturation
 - Symbolization – use of different sizes, shapes



Quantitative:
Logical progression from low to high.



Qualitative:
No ranking implied. Differ only in type.

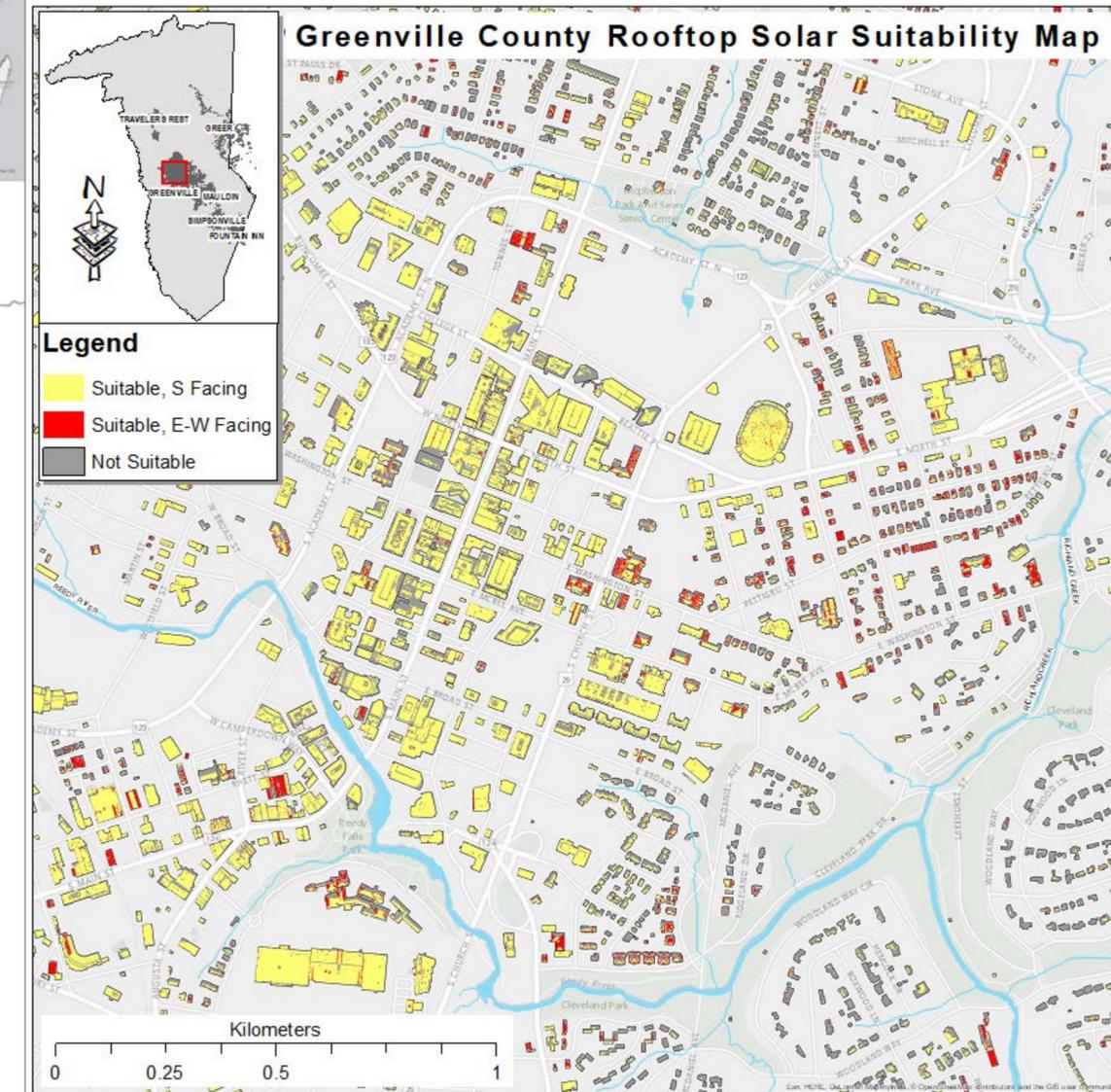
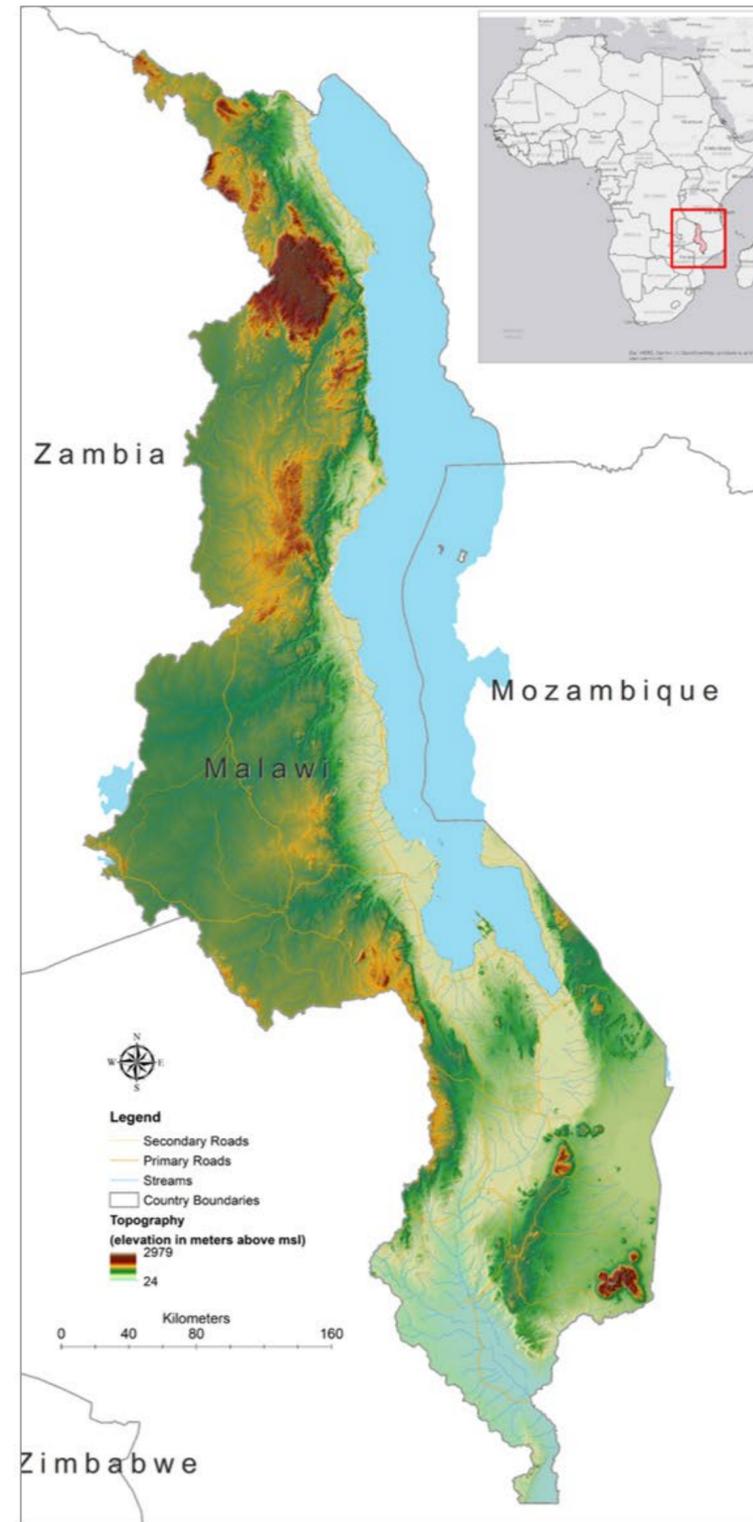


	Size	Shape	Pattern	Hue	Value
Point					
Line					
Area					



Map Composition / Layout

- When creating a map layout, consider the following
 - Select the map template size and shape. Most people stick to the default 8.5x11 inches (A4 or Letter size) but you don't have to
 - Always customize the layout shape and size based on the contents you plan to include, the shape of the study area, and the amount of information that will be displayed
 - Making a map much larger will help declutter the map (try this when you make your map)
 - Create a well-balanced map that avoids too much white space left in different parts of the map; avoid packing too much information on one area and too less in other
 - Consider the aesthetics and professionalism when it comes to selecting colors, symbols, and choice of words to describe or title the map
 - Remember, in most cases, the map is made for your audience, not for yourself.
 - Make sure your map is compatible with the medium for which it will be used (computer screen vs. projector vs. print medium)
 - Don't complicate the map. Keep it simple silly!





End of Session