# **Assignment 1: Population Analysis**

**Objective**

The goal of this assignment is to explore the changing population distribution of China and to gain experience in some elementary descriptive techniques in English. Students will graph two time series (national population and level of urbanization), calculate population density and growth rates for each of the provincial units in China, classify ratio data into categories, and display the spatial patterns in two thematic maps.

It is important to recognize that an assertion is not an argument. To argue successfully you need to include an “appeal to reason” or more commonly, an “appeal to evidence.” Typically we put that evidence in parentheses. It could be a reference or it could be a figure or table. In this assignment we will create four figures and use them as evidence to support the arguments we make about population distribution and dynamics in China.

**Data**

All the data needed for this assignment are available in two files: “China\_Population\_1949-2015-2017” and “China\_population\_2000-2016-area-2017.xls”.

**Instructions**

1. Using the“China\_Population\_1949-2015-2017” Excel file, create a line graph of the population time series for China from 1949 until 2016. Make sure that your graph includes the source of the data and that the axes and numbers are formatted effectively to illustrate the change over time. You may find it useful to toggle between the logarithmic and arithmetic axes when you consider the population growth trend. At the bottom of the graph insert:
	* 1. Figure 1: China population, 1949-2017
		2. Source: China Statistical Yearbook-2018
2. Using the“China\_Population\_1949-2015-2017” Excel file, calculate the level of urbanization in China from 1949 until 2017 (rounded off to one decimal place) and create a bar graph to display the data effectively.

$$Urbanization=\frac{Urban population}{Total population}\*100$$

At the bottom of the graph insert:

* + 1. Figure 2: Urbanization in China, 1949-2017
		2. Source: China Statistical Yearbook-2018
1. Write a paragraph of about 200 words that summarizes national trends in population growth and urbanization.

**4.** Using theChina\_population\_2000-2016-area-2017 Excel file, calculate the population density and growth rate for each province.

1. Open the data table
2. Calculate population density for each province based on the 2010 census using the following formula:

$$Population density=\frac{Total population}{Area}$$

Round-off your results to one decimal place expressed as “persons per square kilometer”.

1. Calculate ***annual average*** intercensal population growth rate for each province between 2010 and 2015 using the following formula:

$$Population growth rate=\frac{P\_{2}-P\_{1}}{P\_{1}}\*100/5$$

$$P\_{1}:population at the beginning of a given time period$$

$$P\_{2}:population at the end of a given time period$$

Express the result as an annual average percentage rounded off to one decimal place.

1. Present the results of your calculations in a table with three columns for the provincial names, density, and average annual population growth rate.
2. At the top of the table insert:
	* 1. “Table 1: Population density, 2010 and average annual growth rate by province, 2010-2015
3. At the bottom of the table insert:
	* 1. Source: National Bureau of Statistics of China”

**5.** Create a choropleth map showing the provincial population density of China

1. Sort the 31 provinces by population density from lowest to highest.
2. Classify the provinces into 5 categories to provide a comprehensive view of the range of population densities.
3. Assign a specific color to each of the categories you generated using a graduated “color ramp” to make your choropleth maps easier to read.
4. Print the outline map of China.
5. Shade the blank map based on your color scheme. How you do this is up to you. You may choose to do this manually or you may use a paint program to do this task digitally**.**
	1. Add a legend to show the density ranges associated with each shade on the map.
	2. At the bottom of the map insert:
		1. “Figure 3: Average annual population growth rate by province, 2015
		2. Source: National Bureau of Statistics of China”
6. After the choropleth map is complete, draw a straight line dividing China into two parts: a densely populated region and a sparsely populated region.
7. Describe the geographical pattern revealed by this map (300 words or less).
8. Using the library or the internet, what can you learn about the Aihui-Tengchong Line (sometimes called the Heihe–Tengchong Line)? Add this line to your map. How does the Aihui-Tengchong line, which dates to 1935, compare to the line you drew based on 2010 data? Discuss your findings (200 words or less).

6. Create a choropleth map showing provincial population growth rates in China.

1. Sort the 31 provinces by population growth rate from lowest to highest.
2. Classify the provinces into 4 categories to provide a comprehensive view of the range of population growth rates. Group all the provinces with declining populations into one category.
3. Assign a specific color to each of the categories you created using a different color scheme from the one you used for density
4. Print another outline map of China.
5. Shade the second map based on the color scheme you just created
6. Add a legend to show the growth rate ranges associated with each shade on the map.
7. At the bottom of the map insert:
	* 1. “Figure 4: Population growth rate by province, 2000-2010
		2. Source: National Bureau of Statistics of China”
8. Based on the map you created, discuss the spatial pattern of China’s population growth in the last decade (300 word maximum).
9. Finally, write a conclusion of 300 words or less that summarizes what you have learned about the spatial distribution of China’s population.

**The assignment is due on 29 March 2019. Be sure to include:**

* + Two graphs
	+ Two choropleth maps
	+ One table
	+ Answers to each of the questions posed above. Refer to your graphs and maps as “Figures 1, 2, 3, or 4” in the text.
	+ Be sure to follow the term paper guidelines on the course blog