Assignment 6: Migration Flow and GDP Per Capita in Indonesia – Amira Qidwai

Overview

This flow map displays internal migration patterns in Indonesia over the span of five years. The data was published in 2010 and includes 34 provinces in Indonesia. This is in contrast to the 38 provinces that Indonesia has today because one of the provinces broke into five parts in 2022. Mapping origin-destination flows in Indonesia is a unique task because the country contains over 18,000 islands, most of which are very small. Additionally, some of the provinces within these islands are small district-like provinces that contain a single city like the Special Region of Yogyakarta and the Special Region of Jakarta. This combination of geographic and administrative boundary challenges means that it is almost impossible to show a relevant number of migration flows for the country while ensuring that choropleth information in smaller provinces is still visible. To resolve this issue, I have created two flow maps, one smaller-scale map that shows the entire country's top 100 flows, and one larger-scale map that shows the top 50 flows in the southwestern portion of the country where migration flows are the densest. The provinces of Yogyakarta and Jakarta are also in southwestern Indonesia, so zooming in on this section of the country gives map readers the opportunity to understand choropleth information in these provinces as well.

The results of this map show that a vast majority of migration in Indonesia takes place in the southwestern portion of the country. It also shows that while GDP per capita might be correlated with increased in-migration in provinces like Jakarta and Riau (dark green province in northwestern Indonesia), this is not the case for all provinces. For example, the only other province with a comparable GDP per capita to Jakarta is Kalimantan Timur (dark green province in central Indonesia) and the migration flows to and from this province are not great enough to be shown in the top 100 flows.

Choropleth Map

Internal migration data is compared with GDP per capita data for each province, which is shown on the choropleth map and listed on the legend in US Dollars. Given that this map will be primarily viewed by US citizens, I chose to list GDP per capita in US Dollars rather than Rupiah, the currency of Indonesia. The choropleth map is shown in shades of green because viewers may associate green with money and the color of US Dollars. I also used a dark gray to outline the provinces, dark enough to emphasize sizable number of small islands, but light and thin enough not to compete with the nodes or flow lines for attention. The choropleth map data is classified using the manual breaks classification method. I tested each of the provided classification methods and natural breaks captured the variation in GDP per capita the best and emphasized the two provinces that have the highest GPD per capita values, but the natural breaks legend was difficult to read. To address this, I used manual breaks data classification to simplify the values.

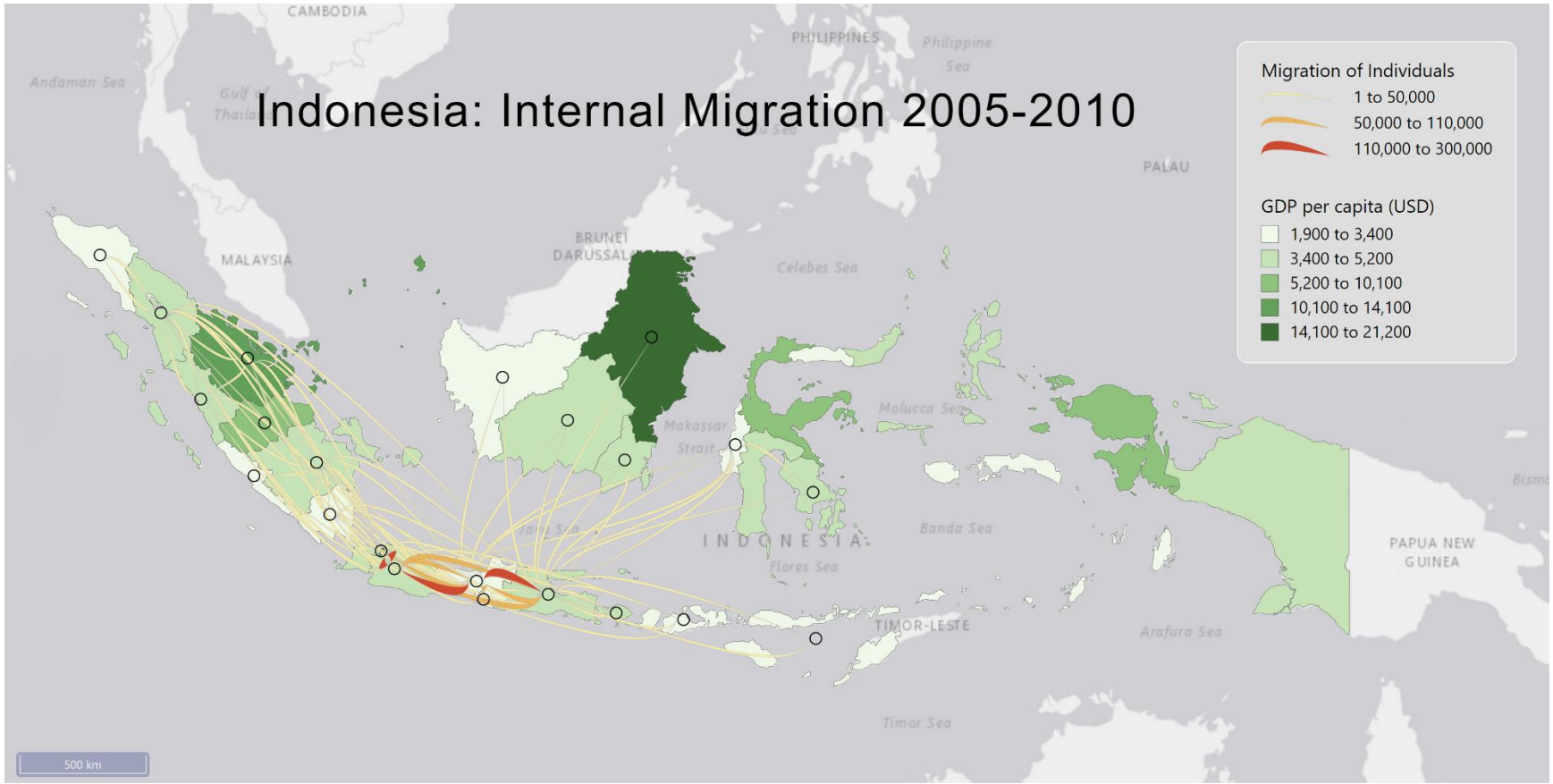
Nodes

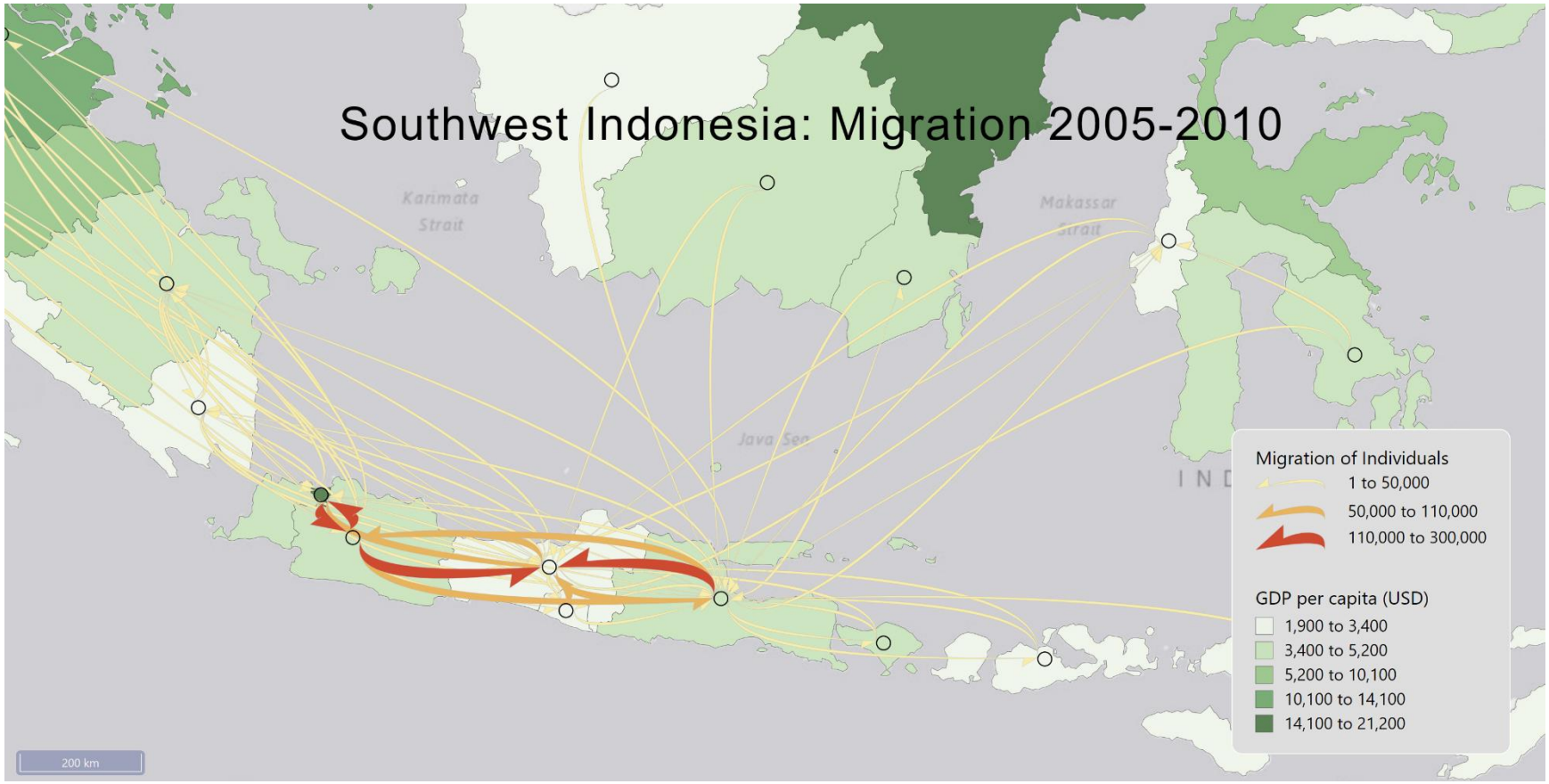
The nodes on this map are centroids for each province. Note that on the map nodes with no flows shown do not show up. Because of this the nodes in more of northeastern Indonesia do not show up. I chose to only include a black outline for each node and make it completely transparent because this helped preserve choropleth information in some of the small provinces. Completely getting rid of nodes, outline and all, is a common practice for mapping region-to-region flows because the centroid of a region is a conceptual point location, meaning visualizing its exact location is not vital. I chose to preserve the outline of each node because it helps map readers visualize which groups of islands are part of the same province.

Flow Lines – Color and Thickness

For mapping flows on the two maps below, I made slightly different choices based on the challenges presented by the scale of each map. On the smaller scale of map of all of Indonesia, I show the top 100 flows because this maximizes information while still ensuring the map is not cluttered enough to make map reading difficult. For the larger scale map of southwestern Indonesia, I only show the top 80 flows to ensure that the choropleth information for Jakarta is visible. For both maps, I made chose curved flow lines instead of straight flow lines because curved flow lines have been shown to strengthen readers ability to understand flow map visualizations. In general, the curved half arrow flow line is the best choice for flow mapping because map readers have been shown to derive the most correct information from the map when curved half arrow flow lines are used. For this reason, I used the curved half arrow flow line on the larger scale map of southwestern Indonesia. Unfortunately, the half arrow on this flow line made small flows more confusing in appearance on the smaller scale map of all of Indonesia. The shortest and largest flows in the country are from Jawa Barat to Jakarta and vice versa and the curved half arrow flow line did not show direction clearly at this short of a distance. Because these two flows are so important, I favored changing the flow line used on the map to the teardrop. The teardrop arrow has been shown to be the second-best flow line in terms of map readability. Although this flow line excels at representing different map reading tasks, it is still preferable to the curved half arrow on this map because it better represents flows over short distances.

On both maps, I used flow line thickness and color to emphasize the volume of each flow. I opted to use manual breaks to classify the flow lines. The classification method that showed the most variation and emphasized the size of the largest flows the best was natural breaks and to adjust the values of the natural breaks classification to be more readable I used manual breaks. I also chose to limit the symbolization of the flow lines to three classes because it was difficult to clearly tell apart five classes and even when I increased the class number to five, the amount of variation was not increasing very much, the major flows in the southwestern portion of the country still dominated the visualization. This told me that the magnitude of these flows was large enough in comparison to the rest of the flows that they were worth emphasizing. A red-orange-yellow color scheme was ideal for these flows because it contrasted well with the green choropleth map.


Indonesia: Internal Migration 2005-2010
Migration of Individuals
1 to 50,000
50,000 to 110,000
110,000 to 300,000
GDP per capita (USD)
1,900 to 3,400
3,400 to 5,200
5,200 to 10,100
10,100 to 14,100
14,100 to 21,200
CAMBODIA
PHILIPPINES
Philippine Sea
Andaman Sea
PALAU
MALAYSIA
BRUNEI DARUSSALAM
Celebes Sea
Molucca Sea
Makassar Strait
INDONESIA
Banda Sea
Flores Sea
PAPUA NEW GUINEA
TIMOR-LESTE
Arafura Sea
Timor Sea
500 km


Southwest Indonesia: Migration 2005-2010
Karimata Strait
Makassar Strait
Java Sea
Migration of Individuals
1 to 50,000
50,000 to 110,000
110,000 to 300,000
GDP per capita (USD)
1,900 to 3,400
3,400 to 5,200
5,200 to 10,100
10,100 to 14,100
14,100 to 21,200
200 km