World City Populations 1950-2030: Proportional Circle Time-Series Map

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Visualising change over time is a common cartographic task, with solutions ranging from mapping change variables to multiple map frames, interactive maps and animations. In this graphic a global time-series of city population data is mapped through a series of overlapping proportional circle layers representing different points in time. This technique allows spatial time series data to be perceived in a single image, communicating both magnitude and growth in city populations (Figure 1). While this is not a new cartographic technique (see for example Burdett et al., 2011), but is not often used and is relevant for visualising global dynamic datasets.

The data used is the United Nations World Urbanization Prospects (UNWUP) 2014 Revision, which estimates individual city populations from 1950 to 2014 from compiling national census data, and includes projections up to 2030 (UN DESA, 2015). There are inevitable limitations with this dataset concerning variable census data quality and inconsistent city boundaries (Satterthwaite, 2010). The basic unit of measurement is metropolitan agglomerations, but there are inconsistencies in urban definitions between countries. Where no metropolitan data is available, population estimates revert to administrative populations (UN DESA, 2014). Cities such as Seoul and Jakarta for example are significantly under-estimated in Figure 1 due to the lack of metropolitan data. Despite these limitations, UNWUP remains a very useful open dataset for exploring global city population trends.

Figure 1 maps city populations in 1950, 1990, 2015 and 2030—coloured from very dark blue (1950) to very light blue (2030)—highlighting the regions in the globe with the largest urban growth, and the general time period when it occurred. Cities in Europe and North-Western USA are dark due to relatively static populations that in many cases are similar to 1950 totals. In contrast, Latin America, Japan, South Korea and Indonesia are dominated by growth from 1950 to 1990. The rapid growth of cities in India, China and South/South-East Asia is more recent, focussed mainly between 1990 to 2015. Further growth is projected in many Asian cities by 2030, though it is sub-Saharan Africa where the greatest proportional growth is predicted for the next 15 years, and subsequently many African cities appear in very light blue in the map.

As well as identifying regional patterns, the map can be used to investigate dynamics for individual cities. There is considerable variation at the city scale in the USA for example (e.g. Sunbelt vs. Rustbelt cities), and in the evolving urban hierarchy of India (e.g. Delhi out-growing Kolkata and Mumbai) or the emerging megacities of Africa (the new megacities of Lagos and Kinshasa will be joined by Luanda and Dar es Salaam by 2030). An interactive version of the map is available online at http://luminocity3d.org/WorldCity where the full population time-series for individual cities can be queried.

The circle areas on the map have been calculated using the Flannery compensation method (Flannery, 1971). There are some map legibility issues where large cities are in close proximity, particularly for polycentric regions such as the Pearl River Delta. Additionally the map symbology focusses on growth and stasis, but does not highlight city decline. These issues are addressed in the interactive version of this map, but are not straightforward to solve in the static version without sacrificing map clarity.

References

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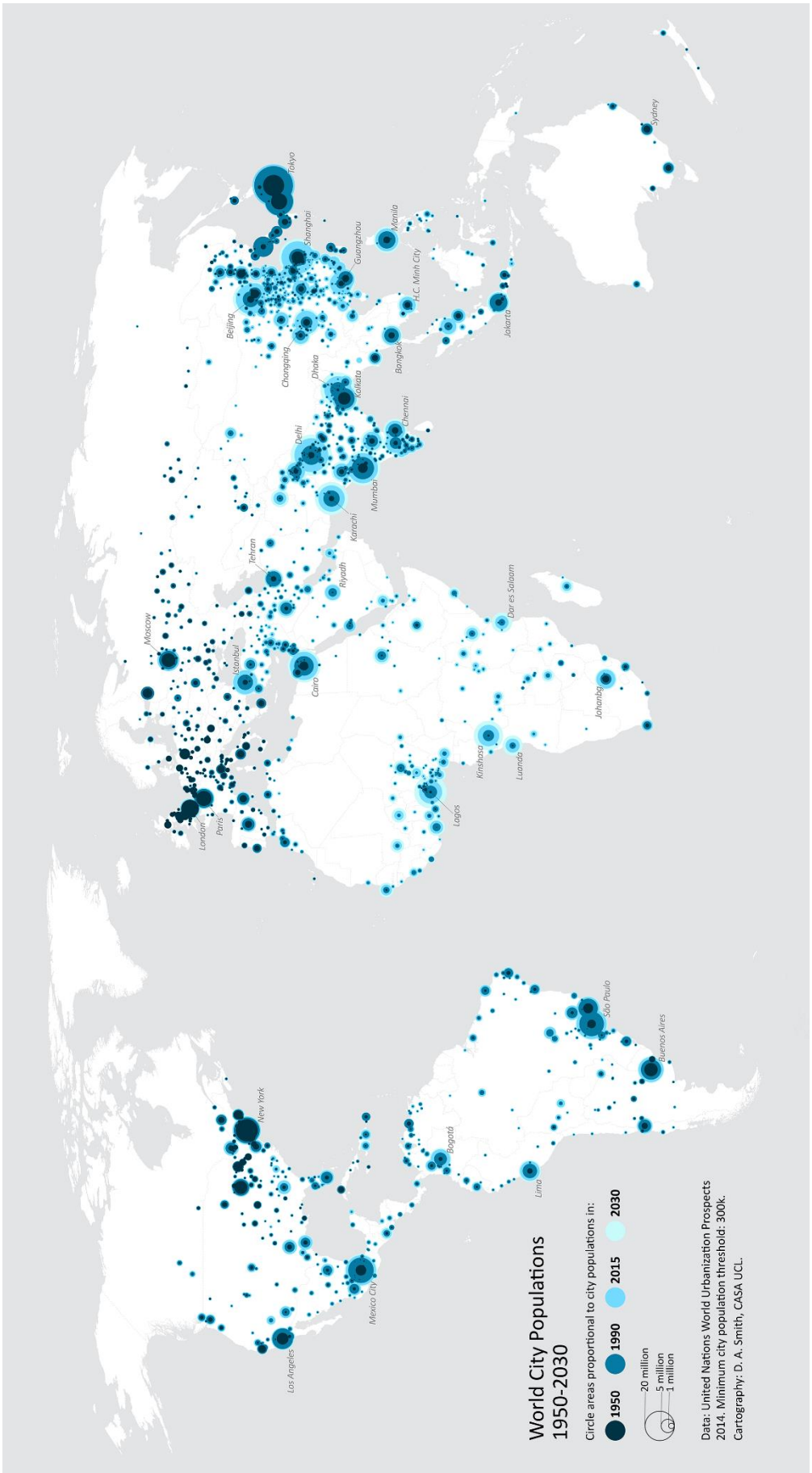

Figure 1. World city populations 1950-2030. Data from UN World Urbanization Prospects 2014