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QNI Quality of Nationality Index

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EXPERT COMMENTARY

A Human Cartographic Approach to Mapping the Quality of Nationality Index

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A Human Cartographic Approach to Mapping the Quality of Nationality Index

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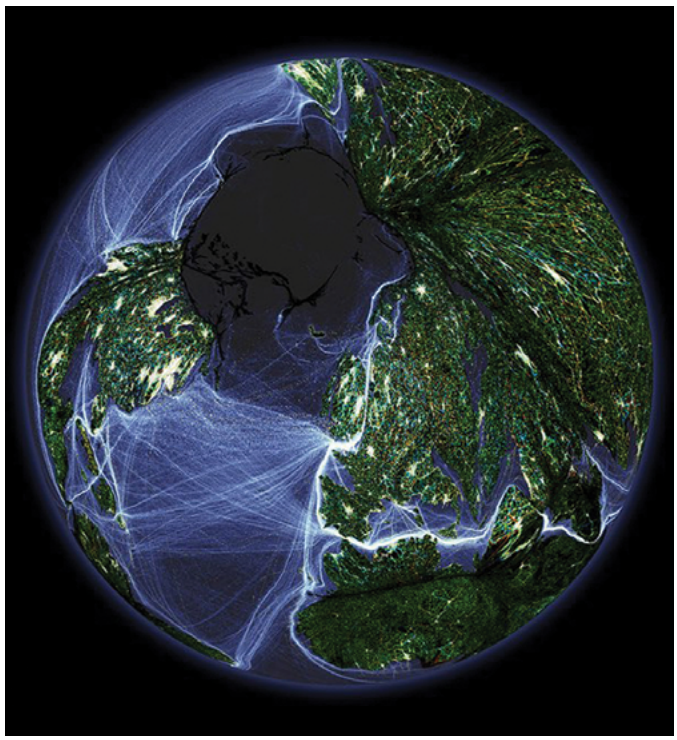
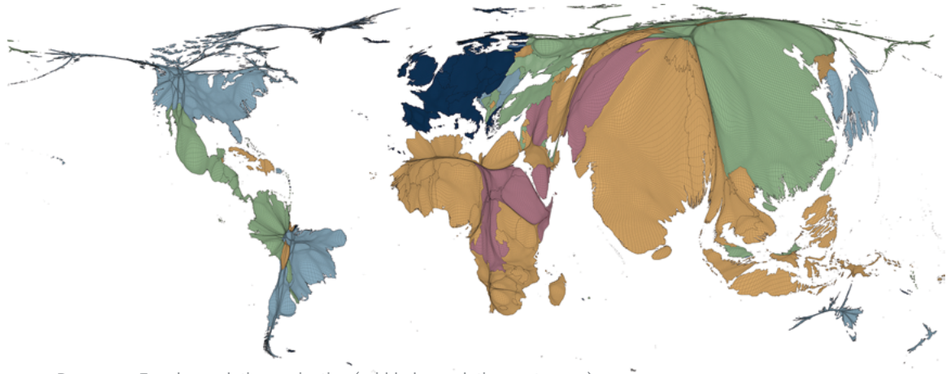


The map of the QNI presented on pages 16–17 is based on a conventional approach to visualizing data about countries. Although most people are used to such conventional maps of their countries, which approximate countries' size and shape to how they appear from space or in the most popular map projections to which we have become accustomed, we would strongly argue that this is not always the best way to visualize human geographical data such as the QNI and its underlying domains. The conventional maps of the QNI show how much land is associated with states that have different qualities of nationality in their territories, but they fail to highlight how many people live in these countries and therefore give a misleading representation of the respective phenomenon and its spatial distribution across humanity. In addition, within countries there is a visual bias in favor of sparsely populated areas: urban areas with large populations but a small area are virtually invisible to the map reader.

The maps of the QNI shown here were created using state-of-the-art geographical information systems and new cartography techniques, to offer an alternative and more fluid way of visualizing the world and its people. In particular, these maps were created by redrawing geographical regions on the basis that the area of each region should be proportional to the number of people who live in each small neighborhood rather than on each land mass. This kind of visualization differs from traditional maps in that it places emphasis on treating all people as equally important, rather than highlighting what occurs in the most sparsely populated rural regions.

The maps shown here were created using the gridded-population cartogram approach[1] developed by Benjamin Hennig (one of the authors of this article). Its creation builds on the earlier, groundbreaking work of two physicists, Michael Gastner and Mark Newman.[2] This approach has given rise to a wide range of thematic applications, including the ongoing Worldmapper project[3] and the recently published *Human Atlas of Europe*.[4] The technique involves dividing the whole territory to be mapped into a grid of cells of equal (physical) size and estimating and interpolating the population distribution across this raster. The next step is to apply a mathematical technique to resize each cell in a way that is proportional to the number of people living within each grid cell area. This process results in a contiguous, gridded-population cartogram that could also be seen as an equal-population projection, meaning that each new grid cell has an area proportional to the number of people who live there, but still touches only its original eight neighboring cells and therefore preserves the physical topology of the 'real' world.

QNI Quality Tiers on a Map of the World Scaled by Population



Base map: Equal-population projection (gridded-population cartogram)

The demographic picture depicted in the resulting cartogram can be further enriched with more information — for example, by shading the gridded-population cartograms according to a theme of interest, such as the QNI. In the population cartogram shown below, we have colored the resized grid cells on the basis of the QNI values. In particular, the shading shows the spatial pattern of the QNI, following the same approach used to create the map presented on pages 16–17, but distorted using the method described above to highlight where people live in different areas, rather than how much land there is in each country.

By following this approach, we can illustrate that the extent of inequality in the quality of nationalities in the QNI is much starker than a conventional map of the QNI would show. In particular, the map highlights that the total number of people who are fortunate enough to reside in countries with Extremely High Quality and Very High Quality nationalities is very small, with this population mostly found in the rich — but relatively less densely populated — continents of North America

1 Hennig, B. D. (2013). *Rediscovering the World: Map Transformations of Human and Physical Space.* Springer: Heidelberg/New York/Dordrecht/London.

2 Gastner, M. T. & Newman, M. E. J. (2004). Diffusion-based Method for Producing Density Equalizing Maps. *Proc. Natl. Acad. Sci. USA* 101(20): 7499–7504.

3 See http://www.worldmapper.org/.

4 Ballas, D., Dorling, D., & Hennig, B. (2017). *The Human Atlas of Europe: A Continent United in Diversity.* Policy Press: Bristol.

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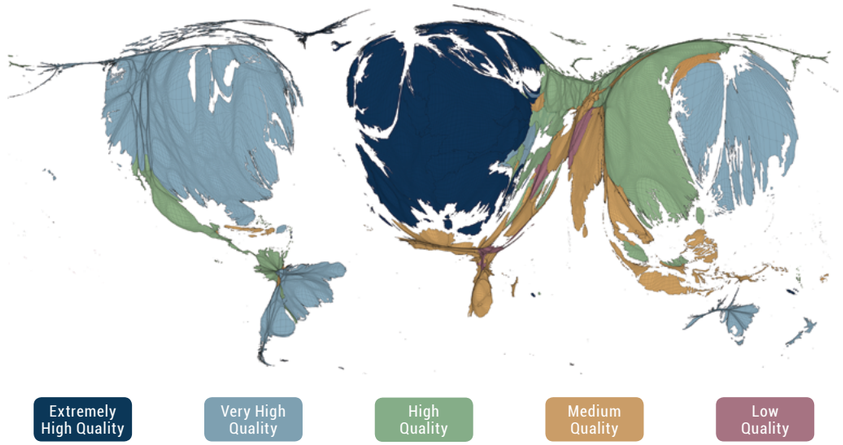
and Europe, while vast swathes of the world's population live in countries with Medium Quality to Low Quality nationalities. When compared to conventional maps, such a cartogram is much more effective in highlighting the extent of global inequality in terms of opportunity, freedom, citizenship value, quality of nationality, and, ultimately, quality of life. It puts a particular focus on what matters most in this index: the people who are affected by the quality of the nationalities they possess.

The cartographic method that was used to create these maps can, in principle, be applied to any variable with values that add up to a meaningful total for all the countries or territories being mapped, such as the total population, which was the basis for the map presented above. This means that the values of the QNI, or of any of its sub-elements, could not be used to create a cartogram, since they only represent relative — or even qualitative — data, which is not suitable for distorting and visualizing quantitative distributions.

QNI Quality Tiers on a Map Scaled According to the World's GDP



Base map: Equal-population projection (gridded cartogram of GDP productivity)

The main challenge of using quantitative variables for a gridded cartogram approach is the ability to estimate their distribution on a high-resolution grid, which provides the basis for the map transformation. There are suitable variables that relate to the QNI, such as the total economic output of each country (adding up to the total economic output of the world, which is a meaningful total). The map shown above is a gridded cartogram in which the land area of each country has been resized to reflect economic output. North America and Western Europe bulge to dominate this world map, while the entire continent of Africa virtually disappears. As Economic Strength is one of the key sub-elements of the QNI, in this map we can see that countries with the highest QNI levels are also the countries that dominate the map. The possibility of using this 'equal-wealth projection' for other indicators of the QNI provides an interesting perspective that could be further explored as a novel approach to analyzing the spatial patterns of the QNI, similar to the approach taken using a population perspective in this article.

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