

A Map A Day, For Every Day of the Year

A New View of the World

Have you ever found the way the world looks on your computer screen a little boring? Ever wondered what the point was of drawing that extra map; doing that additional overlay; buffer – or whatever is ‘in’ in geoinformatics at the moment? Fancy having a look at something a bit different – maps that have even featured in Esquire magazine?!

By Anna Barford and Danny Dorling



Figure 1. This map shows every territory with an equal area. Russia has the same space on the map as Nepal, as Canada, as Gambia.

Worldmapper

Don't worry – we're not going to get you sacked – but type this into your web browser: www.worldmapper.org.

Now, before you get carried away let us explain a little about this project and what is available, especially what a more technically minded audience might appreciate about this work. What the website does, which might not be apparent at first glance, is provide you with 366 different 'free' views of the world (or more, depending on when you are reading this). Each view highlights one aspect of life that someone thought was important enough to collect data for most territories in the world on it.

The website:

- Shows you the distribution of that data in a cartogram – a map-like pie chart.
- Provides you with access to the raw data from which the maps are drawn.
- Explains in laborious detail exactly what we did to get these numbers.

- Gives top and bottom ten rankings for all 366 variables that are mapped, which are not useful only in winning pub quiz games etc., but also often quite enlightening.
- Provides regional graphing and a unique world distribution graph for each variable.
- Presents a colourful and detailed PDF format poster for every map, designed to be printed and pinned to a wall. The maps need not be confined to the Internet.
- Gives a succinct example of the importance of what is being showing using a quote and further information on where it was sourced. The quote shows an individual's understanding whilst the map shows the worldwide distribution.
- Provides a reference land area map that is labelled. Cross-reference between this map and others can help identification of particularly distorted territories.
- Series of articles giving more information about elements of the worldmapper project. So far articles have been written in Italian, Spanish, Finnish, Japanese, English, Dutch, German and Swedish.

- Provides all data cleaned and in identical format for comparisons.

At first glance, it is not that obvious that all of this is available, so we thought we'd point it out. Now for a little more about the project and who has been involved, then some example maps to try to further encourage you to visit our website www.worldmapper.org. We are over two thirds of the way to 1 million unique viewers, so please tell your friends too...

How The Algorithm Works?

Mark Newman explains: "If we want to make a map in which the sizes of countries vary with, say, population, then we want to make countries larger – spread them out more – if they have larger populations. We do this by making use of an analogy to the physical process of diffusion. This is where the physics comes in.

Imagine dumping a bottle of ink into a swimming pool. Initially, the ink will be concentrated in a small area while the rest of the water will be clear. As time goes by, however, the ink will spread out, and if we wait long enough it will end up uniformly distributed throughout the pool, with all the water being just slightly inky. This is the diffusion process. In our work we mimic the same process on a computer using the population density. We let population spread out away from the places where it is highest – the cities and greater metropolitan areas – until it is uniform everywhere. And as it spreads we allow it to carry the features of the map along with it, such as country borders and coastlines, so that the countries with big populations expand while those with small populations remain small."

Some Examples

What does the world look like if every territory is equal? The map (see Figure 1) shows just how distorted the world can look if territories are all drawn with equal area and are not drawn in proportion to their land area (see paragraph above for an explanation of map making). The term 'territories' rather than 'countries' allows for the inclusion of areas that are not recognised states in and of themselves. The term 'territory' also allows some political neutrality when mapping disputed areas such as the Western Sahara (see Table 1). This map, is effectively how power in the world would be distributed were the United Nations to operate a 'one country, one vote' system if all territories were United Nations mem-

The Worldmapper Team (the brains and soul of the project)

The worldmapper project is a collaborative work between the following people:



Danny Dorling, *University of Sheffield*

Danny has done much work in the development of cartograms and human cartography, and was responsible for devising this project, and the huge task of gathering all of the required data together. The idea came to him whilst relaxing on the beach in New Zealand. He is vaguely responsible for the Social and Spatial Inequalities research group, in the Geography Department at the University of Sheffield.



Mark Newman, *University of Michigan*

Mark is Associate Professor of Physics and Complex Systems at the University of Michigan, and a member of the University of Michigan Center for the Study of Complex Systems. Together with his PhD student Michael Gastner, Mark developed the algorithm that is used in transforming the normal world map into this series of cartograms. Mark also wrote the computer software for making the cartograms (see paragraph 'How the algorithm works?') and produces the figures themselves using the data gathered by Danny. More information on Mark's research can be found on his website (www-personal.umich.edu/~mejn/).



Graham Allsopp, *University of Sheffield*

Graham is Chief Cartographer in Cartographic Services, a support unit of the Geography Department at the University of Sheffield. His expertise in all things relating to maps and design have been utilised in many aspects of this project, particularly in the design of the posters.



Ben Wheeler, *University of Sheffield*

Ben is a research fellow working with the Social and Spatial Inequalities Research Group. Ben has been invaluable in his role in this project, giving advice and checking for accuracy and quality of the information presented here.



John Pritchard, *University of Sheffield*

John provides technical and research support for the Social and Spatial Inequalities Research Group. He works on many aspects of the project, particularly the development of the website. John adds quality to the data files and has a higher standard of what is acceptable than Danny – if ever you think we are being extremely pedantic that is probably John's fault!



Anna Barford, *University of Sheffield*

Anna writes the informative text that accompanies each map, sources the quotes used, and produces the posters. She also helps to oversee the project. It's Anna who is likely to answer your emails if you have any queries. She deals with anyone ranging from school children to journalists, scientists to politicians. Anna is more responsible for the spin put on the text of the maps than any of the rest of us.

ber states and if the United Nations had that much power. It doesn't and it doesn't. The equal area map (see Figure 1) highlights physically smaller territories which have expanded to the same area that physically larger have shrunk to become. This shows no single territory as dominant, this map is the only map in the worldmapper series that shows such internationally equal distributions. Obviously, this map is not drawn using collected data, it remains hypothetical. What if every person was equal? The population

map below (see Figure 2) would be the result. Here each person alive in 2002 is given an equal amount of space on this map. Territorial boundaries shrink and expand to incorporate the proportion of the world population that lives there. This provides an ideal base for looking at other things such as clustering – or whether Ikea stores are equally spread across the world's population. Population is often a far more meaningful variable to study than land area, so why does our preoccupation with land area maps persist?

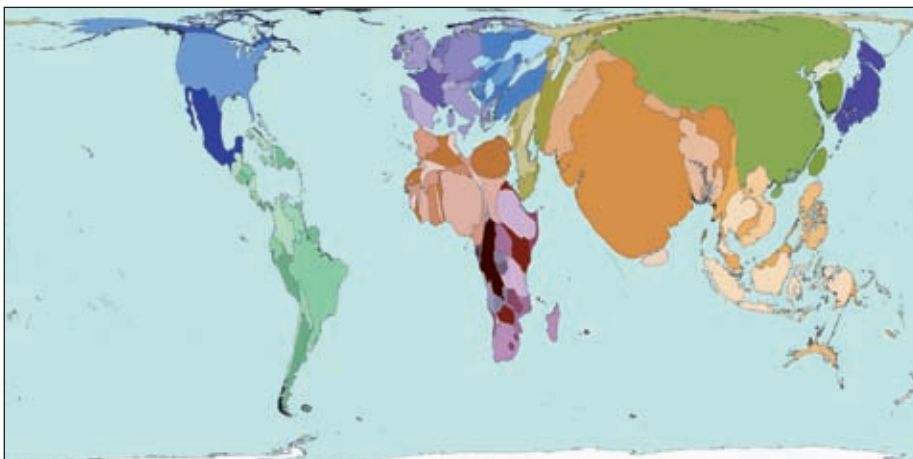


Figure 2. Population in 2002 - each person alive in 2002 is given an equal amount of space on this map.

IMF

The International Monetary Fund (IMF) has 184 member countries (our maps show 200 territories). The organisation was "established to promote international monetary cooperation ... to foster economic growth and high levels of employment; and to provide temporary financial assistance to countries to help ease balance of payments adjustments" (See IMF website www.imf.org/external/about.htm). Figure 3 shows how votes within this organisation are distributed – the territory with the most area and therefore the most votes is the United States, followed by Western European territories, Japan and Saudi Arabia. IMF vote distribution is closer to the distribution of wealth than of people. Malawi's finance minister in 2004, Goodall Gindwe, argues that a "good deal of the operations of the fund and the bank are in Africa ... If the fund and bank are going to be effective, they need to hear an African point of view." (See BBC News Africa fails in IMF vote demand, 4th Oct 2004 - <http://news.bbc.co.uk/1/hi/business/3712718.stm>) Malawi is barely visible on this votes map.

Regions	Territories
Central Africa	Angola, Burundi, Central African Republic, Congo, Democratic Republic of Congo, Equatorial Guinea, Gabon, Rwanda, Sao Tome & Principe, and Zambia
South Eastern Africa	Botswana, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, Somalia, South Africa, Swaziland, Uganda, United Republic of Tanzania, and Zimbabwe
Northern Africa	Algeria, Benin, Burkina Faso, Cameroon, Cape Verde, Chad, Cote d'Ivoire, Egypt, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Libyan Arab Jamahiriya, Mali, Mauritania, Morocco, Niger, Nigeria, Senegal, Sierra Leone, Sudan, Togo, Tunisia, and Western Sahara
South Asia	Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka
Asia Pacific	Australia, Brunei Darussalam, Cambodia, Cook Islands, Federated States of Micronesia, Fiji, Indonesia, Kiribati, Lao People's Democratic Republic, Malaysia, Marshall Islands, Myanmar, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Philippines, Samoa, Singapore, Solomon Islands, Thailand, Timor-Leste, Tonga, Tuvalu, Vanuatu, and Viet Nam
Middle East	Afghanistan, Armenia, Azerbaijan, Bahrain, Gaza Strip & West Bank, Georgia, Iraq, Islamic Republic of Iran, Israel, Jordan, Kazakhstan, Kuwait, Kyrgyzstan, Lebanon, Oman, Qatar, Russian Federation, Saudi Arabia, Syrian Arab Republic, Tajikistan, Turkmenistan, United Arab Emirates, Uzbekistan, and Yemen
East Asia	China, Democratic People's Republic of Korea, Hong Kong (China), Mongolia, Republic of Korea, and Taiwan
South America	Antigua & Barbuda, Argentina, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Saint Kitts & Nevis, Saint Lucia, Saint Vincent & The Grenadines, Suriname, Trinidad & Tobago, Uruguay, and Venezuela
North America	Bahamas, Canada, Greenland, Mexico, and United States
Eastern Europe	Albania, Belarus, Bosnia Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Republic of Moldova, Romania, Serbia & Montenegro, Slovakia, Slovenia, TFYR Macedonia, Turkey, and Ukraine
Western Europe	Andorra, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Holy See, Iceland, Ireland, Italy, Liechtenstein, Luxembourg, Malta, Monaco, Netherlands, Norway, Portugal, San Marino, Spain, Sweden, Switzerland, and United Kingdom
Japan	Japan

Table 1. The following territories are shown in Worldmapper maps (Why we don't call them countries? Because they aren't all - although most are):

Wrapping up

Above are just three of the 366 maps that we have made during 2006. Most of these are already available, with accompanying notes, data and posters at www.worldmapper.org. We

have briefly considered the significance of these maps and how they are related. Other topics mapped include more on population, some about movement, transport, food, goods, manufacturers, services, resources, fuel, production,

work, income, wealth, poverty, housing, education, health, disease, death, destruction, violence, pollution, depletion, communication, exploitation and action (for a detailed list see A-Z Index at www.sasi.group.shef.ac.uk/worldmapper/atozindex.html). With such a range of maps there's bound to be something of interest to you! And something of relevance to you, because it is often you and the other 6 billion people in the world that are represented by the tiny specks of colour that fill territories, push boundaries and thus change the shape of these world maps.

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Figure 3. Votes in the International Monetary Fund, in 2006 prior to voting reforms.