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The unequal distribution of population and wealth in the world

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Demographic and economic statistics are usually published for each country separately; this practice, however, restricts their significance. Of course, there is nothing untrue in stating that the world's five most populated countries contain half the world's population, or that the five wealthiest countries account for about 60% of the world's GNP (see table 1). Yet, if countries were replaced by continental expanses or economic unions such as the European Union (EU), the North American Free Trade Association (NAFTA), etc., the resulting picture would be quite different. Thus, in 1997, the EU's global GNP (1) exceeded that of the United States (8,598 and 7,924 billion dollars, respectively).

◆ Maps without borders

Given the present context of globalization, it makes sense to examine the distribution of population and wealth in the world without referring to political borders between states. Indeed, such an approach enables us to determine the quantity of population or wealth located in the vicinity of various points of the Earth's surface. This "borderless" approach is based on the hypothesis that if, in the 21st century, goods and persons will be circulating with increasing freedom, regardless of international borders, then new analytical tools are needed to determine which parts of the world attract wealth and population. This renewed approach seems all the more necessary as we study the impact of human activity such as carbon dioxide

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Table 1 - The world's most populated and wealthy countries (in %)

(a) The world's most populated countries in 1999

Country	Share of the world's population	Cumulated share
China	21	21
India	16	37
United States	5	42
Indonesia	4	46
Brazil	3	48

(b) The world's wealthiest countries in 1997

Country	Share of global GNP	Cumulated share
United States	27	27
Japan	16	43
Germany	8	50
France	5	56
United Kingdom	4	60

Source: Michel-Louis Lévy [1]

emissions or energy consumption on the Earth's ecosystem [2].

There are many ways of measuring the population or wealth potential of a precise area or point on the planet. The method chosen here consists in calculating the number of inhabitants or the quantity of wealth

(1) It must be noted that the indicator chosen to measure wealth is not devoid of significance. Thus, the wealth of China corresponds to 13.7% of the world total (2nd rank), instead of 3.5% (7th rank) if one replaces the GNP in dollars by the GDP expressed in terms of purchasing power.

found within a radius of 1,000 km of any point on the globe; the computation system confers greater importance to places nearer to this point than to those that are farther (cf. box p.4).

◆ In which areas of the world are population and wealth most concentrated?

As shown in map 1, population is most densely concentrated in two main regions: South Asia and Southeast Asia (respectively 10% and 15% of the world's population lives in the vicinity of Wu Han, near Shanghai, and Nagpur, near Calcutta), followed by the Euro-Mediterranean area, though with little more than 6% of the world's population concentrated within a radius of 1,000 km. The four following "peak areas", representing 2 to 3% of the world's population, are located in North America, South America and in Africa (in Nigeria and in the Great Lakes region), and two smaller centres in the Pacific zone — in Hawaii and southeastern Australia.

Although some of these very dense areas do match the territorial limits of the most populated states (India, China, United States, Brazil, Nigeria), others result from the combination of neighbouring groups of densely populated, but small states (Europe, the Great Lakes region in Africa). These demographic "peaks" are in fact the centres of densely populated expanses which can reach out quite far: for instance North America into Mexico, China into Japan and Southeast Asia, Europe into North Africa, the Near-East and Russia.

As concerns wealth, measured here in terms of GNP in US dollars in 1995 (see map 2), the peaks of concentration are distributed in a simpler fashion, roughly a large northern triad (United States and Canada, Europe and Near-East, East Asia), and a small southern triad (Brazil-Argentina, South Africa, Australia-New Zealand). Minor concentrations of wealth can be observed in Nigeria and in isolated peaks in the Pacific (Hawaii, French Polynesia). In terms of spatial concentration of wealth, Europe (24% of the world's wealth within a 1,000 km radius) is way ahead of East-Asia (18%) and especially North America (13%), which is fragmented in several centres situated several thousand km away from one another. Amusingly, the spot concentrating the most wealth within a radius of 1,000 km appears to be located in France, near the city of Metz... (2)

A comparison between the distribution of population and wealth in the world shows the following:

in some parts of the world, wealth is much more concentrated than population;

(2) But the uncertainty of data and computation makes the results rather approximate (to within several hundred km).

population and wealth peaks are not located in the same areas, in any case their respective proportions often do not correspond;

when state borders are ignored, a new map of population and wealth concentration appears, which is quite different from that based on traditional territorial divisions.

Removing borders sheds new light on inequality in the world. However, this new point of view also raises a host of theoretical and methodological problems. Thus, a change in the choice of radius (250, 500, 2,000 km) would modify the location and relative importance of the main hubs of population and wealth, as suggested in the CD-Rom "6 billion people... and me" [3]. For this reason, it is important to complement the analysis of population or wealth potential with an analysis of accessibility which does not imply the choice of a specific radius [4].

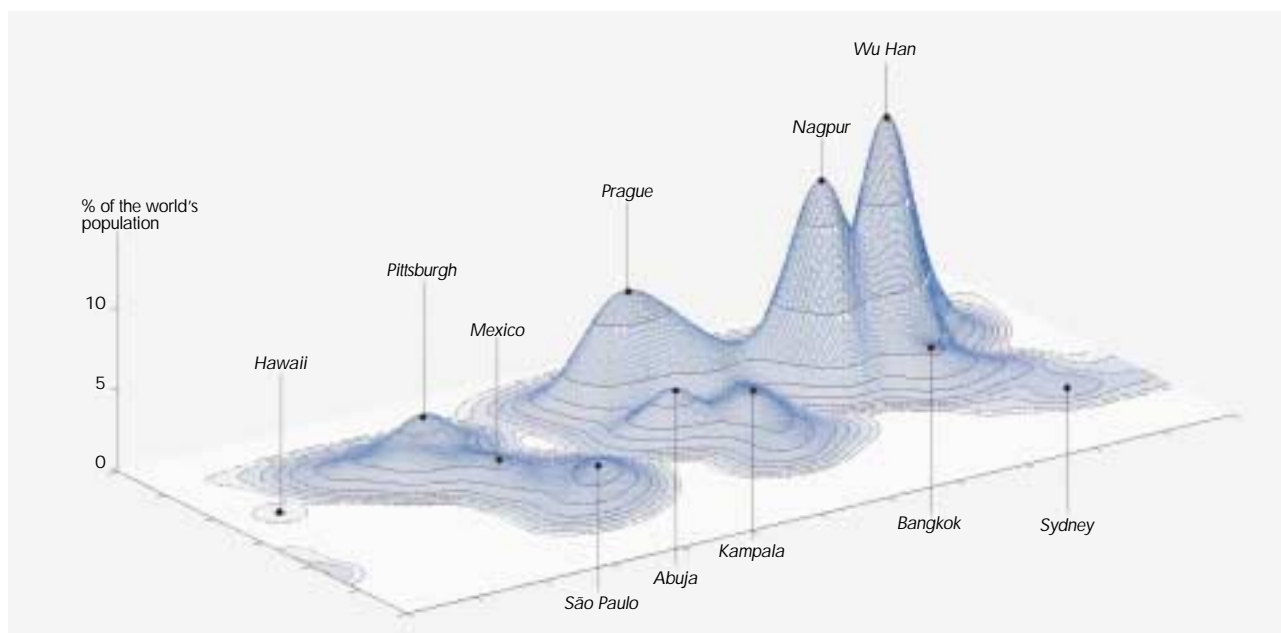
◆ Population and wealth accessibility

The accessibility of a point on the surface of the Earth is the average distance between that point and the grid cells of the Earth's surface, weighted by the number of inhabitants (demographic accessibility) or the amount of wealth (economic accessibility) located in those cells. The shorter the average distance between that point and the world's population or wealth, the more that point is considered accessible for the value (population or wealth) under consideration.

As concerns the main demographic centres (map 3A), it seems logical that the most demographically accessible points (less than 6,000 km distance from the global population) are located in Central and Southern Asia. Europe, the rest of Asia, Indonesia and north-eastern Africa also have a good accessibility rate to the world's population (between 6,000 and 8,000 km). However, the Americas, the rest of Africa and the South Sea Islands are on the average much more distant from global humanity (from 8,000 to 14,000 km), due to their relatively small populations and the size of the oceans surrounding them: one more confirmation of the age-old opposition between the "Old World" and the "New World".

Since Europe, Japan and the United States are located at about the same distance from one another and at approximately the same latitude, one might have expected the area of maximum economic accessibility to have been situated around the North Pole. In fact, since Europe's importance as an economic centre is relatively higher than that of Japan and the United States, the maximum economic accessibility zone (under 6,000 km) is closer to Europe and the Northern Atlantic (see map 3B). The economic accessibility of

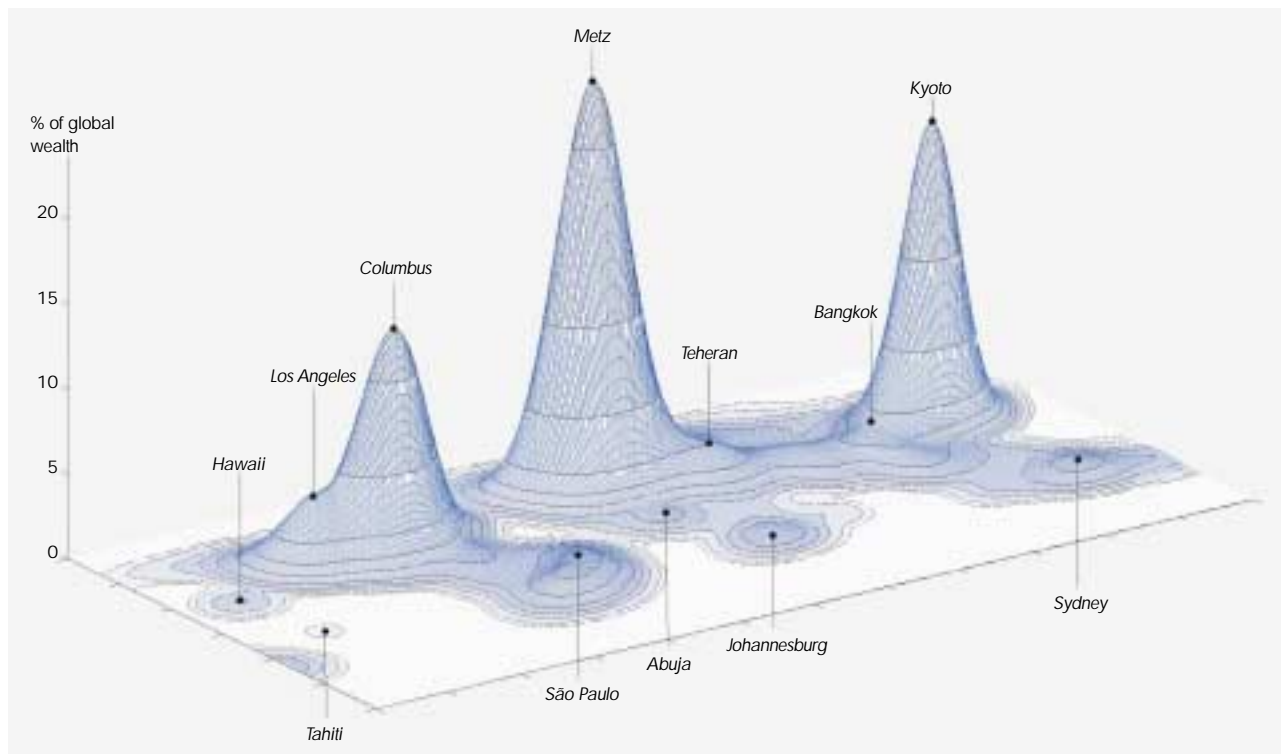
Map 1. Distribution of world population towards 1990: concentration within a 1,000 km radius



Note: The share of the global population situated in the vicinity of the main peaks is the following: Wu Han (China): 15%; Nagpur (India): 12%; Prague (Czech Republic): 7%; Abuja (Nigeria): 3%; Pittsburgh (United States): 3%; Kampala (Uganda): 2%; São Paulo (Brazil): 2%; Sydney (Australia): 0.2%. • Source: UNEP-GRID, World Bank.

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Map 2 – Distribution of global wealth towards 1995: concentration within a 1,000 km radius



Note: The share of GNP situated in the vicinity of the main peaks is the following: Metz (France):24%; Kyoto (Japan): 18%; Columbus (United States): 13%; São Paulo (Brazil): 1%; Sydney (Australia): 1%; Johannesburg (South Africa): 0.4%; Abuja (Nigeria):0.3%; Hawaii (United States):0.1%. • Source: UNEP-GRID, World Bank.

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Map 3 – World demographic and economic accessibility**A: Average distance from the total world population towards 1990****B: Average distance from the total world wealth (GNP) towards 1995**

Source: UNEP-GRID, World Bank.
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each area then decreases in parallel strips, as one moves towards the southern hemisphere, underscoring the North-South opposition as an accurate reflection of global economic inequality.

Economic accessibility is a global measure which has nothing to do with the local situation of the points from where it is measured. Thus, although northern Russia has a good level of global economic accessibility, in no way can it be considered in itself a centre of accumulation of wealth. Conversely, Australia and New Zealand have a very low level of global economic accessibility, though they themselves are important centres of prosperity in the southern hemisphere.

The measurement of accessibility of any point of the Earth's surface raises a very symbolic question: which is the most accessible point on Earth, the "centre of the world", as it were? For a demographer, the centre of the world would be at the crossroads between China, India, Pakistan and Tajikistan, since that is where one is on average closest to all of mankind (5,200 km). For an economist, the centre of the world would be in southern Scandinavia, the closest point to the world's entire wealth measured in GNP (5,600 km).

The distance between these two points — several thousand kilometres — is a clear indicator of the

Drawing maps without borders

The making of the CD-Rom "6 billion people... and me" [3] provided an opportunity to apply several new mapping methods to the study of the distribution of the world's population and wealth. This project was made possible thanks to the data base of the United Nations Environment Program which shows the distribution of the world's population, in 1990, according to a 1-degree latitude/longitude grid, and ignoring state borders (UNEP-GRID). On the basis of this grid, we estimated the distribution of world wealth by allocating each country's GNP in proportion to its population located within each cell of the grid. However, this method does not account for regional variations of the per capita GNP, and as a result the location of wealth remains to a certain extent approximate.

Two approaches were chosen to carry out the "borderless" analysis of the distribution of population and wealth. The "potential"-based approach consists in evaluating the quantity of population (or wealth) located in the vicinity of a specific point in the world, on the basis of certain hypotheses suggesting a weakening of the link with growing distance (1). This method makes it possible to determine the main points of concentration of population or wealth.

The "accessibility" approach makes it possible to evaluate the average distance between a given point on the Earth's surface and the entire world population or wealth. Each point of the globe can be measured in terms of demographic or economic accessibility, and one can determine the most accessible point of the world, in demographic or economic terms.

(1) The calculation of potential is weighted by a Gaussian function of a value of 0.5 for a distance of 1,000 km. In concrete terms, this means that a population mass of 5 million people will contribute 100% (5 million) to the potential of the place where it is located, only 50% (2.5 million) to the potential of a place located 1,000 km away and less than 5% (250,000) to the potential of a place 2,000 km away.

unequal distribution of population and wealth in the world, and especially of the unequal distribution of wealth among the human beings that people the Earth.

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