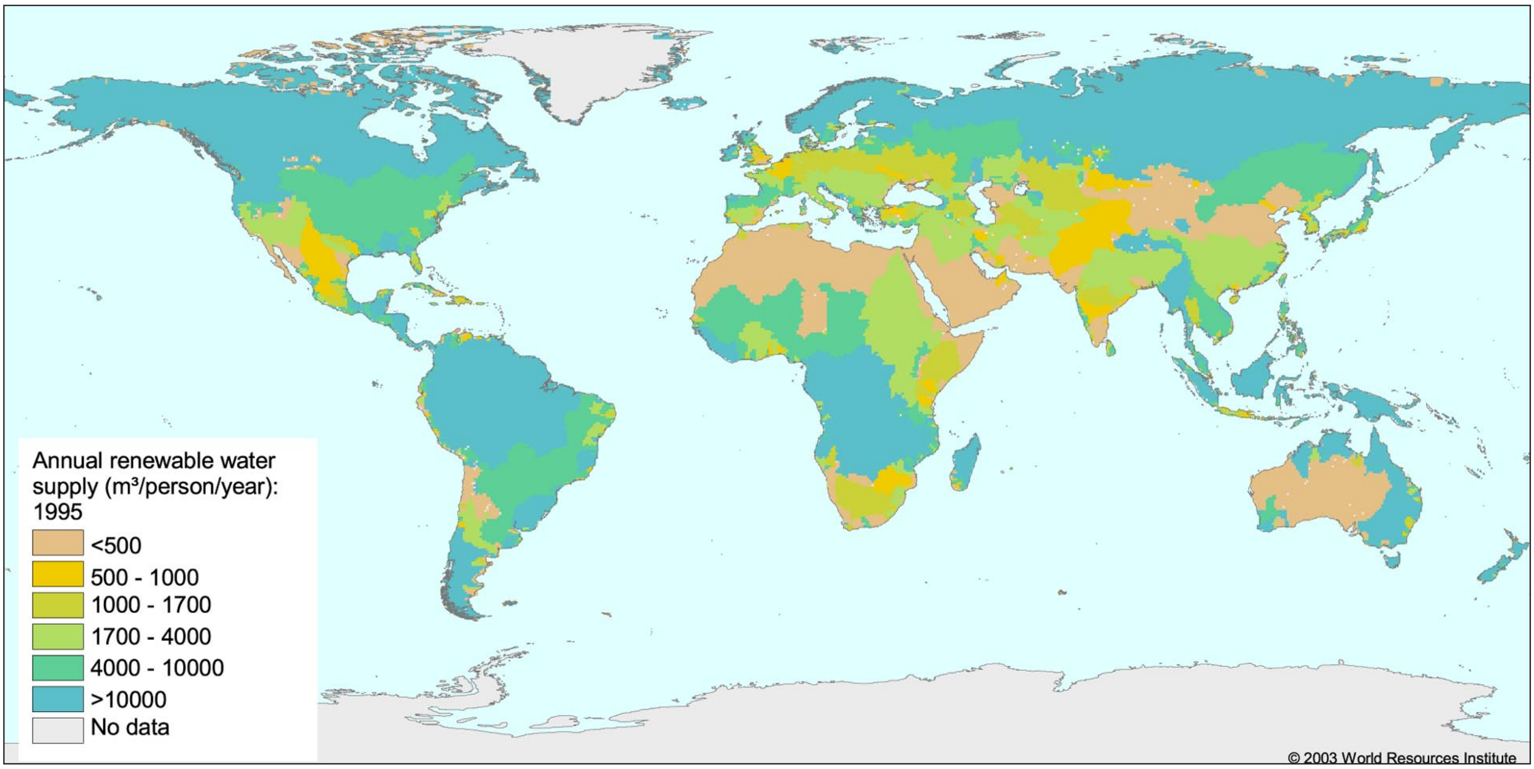
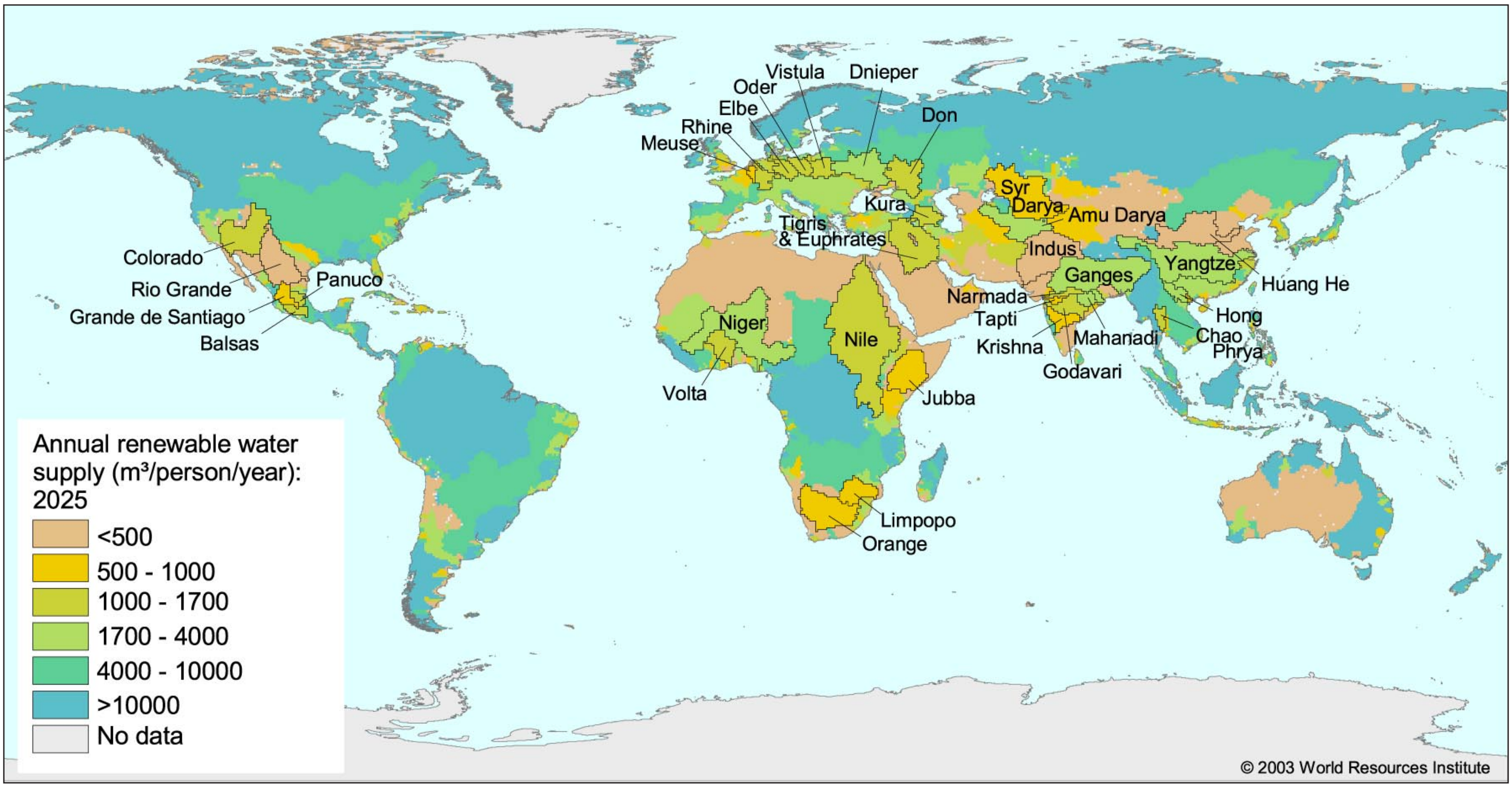
Water Resources eAtlas

15. Annual Renewable Water Supply Per Person by Basin for 1995 and Projections for 2025





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Map Description

Water, used by households, agriculture, and industry, is clearly the most important good provided by freshwater systems. Humans now withdraw about one fifth of the world's rivers' base flow (the dry-weather flow or the amount of available water in rivers most of the time), but in river basins in arid or populous regions the proportion can be much higher. This has implications for the species living in or dependent on these systems, as well as for human water supplies. Between 1900 and 1995, withdrawals increased by a factor of more than six, which is greater than twice the rate of population growth (WMO 1997).

Water supplies are distributed unevenly around the world, with some areas containing abundant water and others a much more limited supply. In water basins with high water demand relative to the available runoff, water scarcity is a growing problem. Many experts, governments, and international organizations are predicting that water availability will be one of the major challenges facing human society in the 21st century and that the lack of water will be one of the key factors limiting development (WMO 1997).

These maps show water supply per person for individual river basins as of 1995 and projections for 2025. Water experts define areas where per capita water supply drops below 1,700 m^3/year as experiencing "water stress"—a situation in which disruptive water shortages can frequently occur. In areas where annual water supplies drop below 1,000 m^3 per person per year, the consequences can be more severe and lead to problems with food production and economic development unless the region is wealthy enough to apply new technologies for water use, conservation, or reuse. This map is based on the analysis carried out by WRI for the *Pilot Analysis of Global Ecosystems: Freshwater Systems (PAGE)*. The first map shows that as of 1995, some 41 percent of the world's population, or 2.3 billion people, live in river basins under water stress, with per capita water supply below 1,700 m^3/year. Of these, some 1.7 billion people reside in highly stressed river basins where water supply falls below 1,000 m^3/year.

In the second map we see water scarcity projections for 2025. The analysis shows that by 2025, assuming current consumption patterns continue, at least 3.5 billion people— or 48 percent of the world's projected population —will live in water-stressed river basins. Of these, 2.4 billion will live under high water stress conditions. This per capita water supply calculation, however, does not take into account the coping capabilities of different countries to deal with water shortages. For example, high-income countries that are water scarce may be able to cope to some degree with water shortages by investing in desalination or reclaimed wastewater. The study also discounts the use of fossil water sources because such use is unsustainable in the long term.

In the second map, a selected number of basins have been outlined. These watersheds represent basins that are in or approaching water scarcity and where the projected population for 2025 is expected to be higher than 10 million. Six of these basins including, the Volta, Nile, Tigris and Euphrates, Narmada, and the Colorado River basin in the United States, will go from having more than 1,700 m^3 to less than 1,700 m^3 of water per capita per year. Another 29 basins will descend further into scarcity by 2025, including the Jubba, Godavari, Indus, Tapti, Syr Darya, Orange, Limpopo, Huang He, Seine, Balsas, and the Rio Grande.

Mapping Details

These maps were developed by combining a global population database for 1995 that uses census data for over 120,000 administrative units (CIESIN et al. 2000) and a global runoff database developed by the University of New Hampshire and the WMO/Global Runoff Data Centre (Fekete et al. 1999). The runoff database combines observed discharge data from monitoring stations with a water balance model driven by climate variables such as temperature and precipitation combined with variables on land cover, and soil information. For those regions where discharged data were available, the modeled runoff was adjusted to match the observed values; for regions with no observed data, the modeled estimates of runoff were used. The 2025 estimates are considered conservative because they are based on the United Nations' low-range projections for population growth, which has population peaking at 7.2 billion in 2025. In addition, a slight mismatch between the water runoff and population data sets leaves 4 percent of the global population unaccounted for in this analysis.

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Map Projection

Geographic

Sources

Revenga, C., J. Brunner, N. Henninger, K. Kassem, and R. Payne. 2000. *Pilot Analysis of Global Ecosystems: Freshwater Systems*. Washington DC: World Resources Institute. Based on CIESIN (Center for International Earth Science Information Network), International Food Policy Research Institute, and World Resources Institute. 2000. Gridded Population of the World, Version 2. Palisades, New York: CIESIN and Columbia University, and Fekete, B., C. J. Vörösmarty, and W. Grabs. 1999. Global, Composite Runoff Fields Based on Observed River Discharge and Simulated Water Balance. World Meteorological Organization Global Runoff Data Center Report No. 22. Koblenz, Germany: WMO-GRDC.

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