

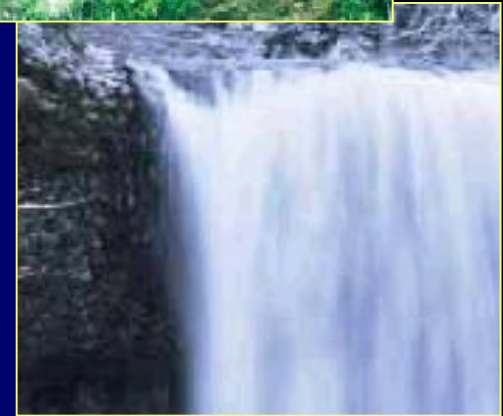
Corso di Laurea Specialistica in
Ingegneria delle Acque e della Difesa del Suolo



Corso di

GESTIONE delle RISORSE IDRICHE

a.a. 2003-2004

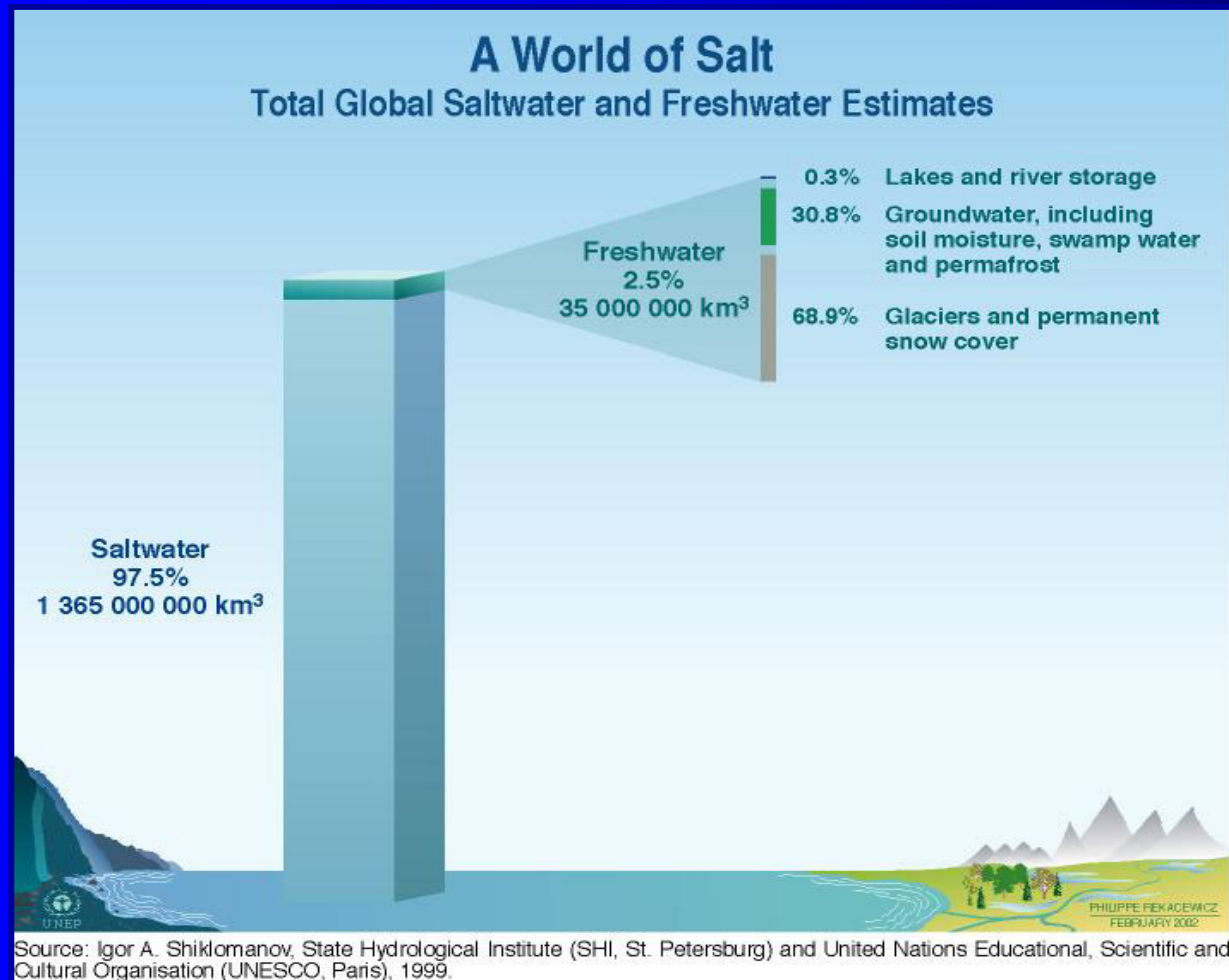


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Dipartimento di Ingegneria Ambientale - DIAM

LA DISTRIBUZIONE DELLE RISORSE IDRICHE

Fonte: United Nations World Development Report (<http://www.unesco.org/water/wwap/index.html>)



...AD USO ANTROPICO

- Risorse naturali di acqua dolce quali laghi, fiumi e acquiferi
- I bacini artificiali forniscono 8000 km³ di risorsa idrica
- La PRECIPITAZIONE è la fonte principale di risorsa idrica

SFRUTTAMENTO RISORSE IDRICHE



8% del totale annuo di risorse rinnovabile di acqua dolce

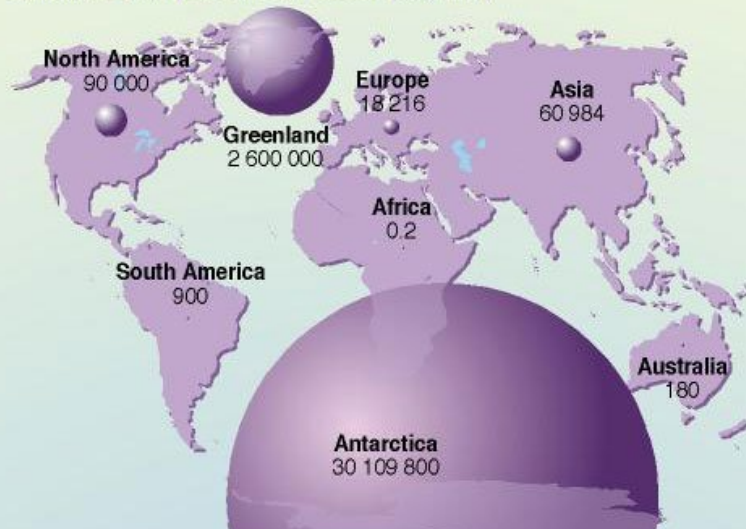
54% del totale annuo di acqua di scorrimento superficiale

24% dell' evapo-traspirazione annua totale

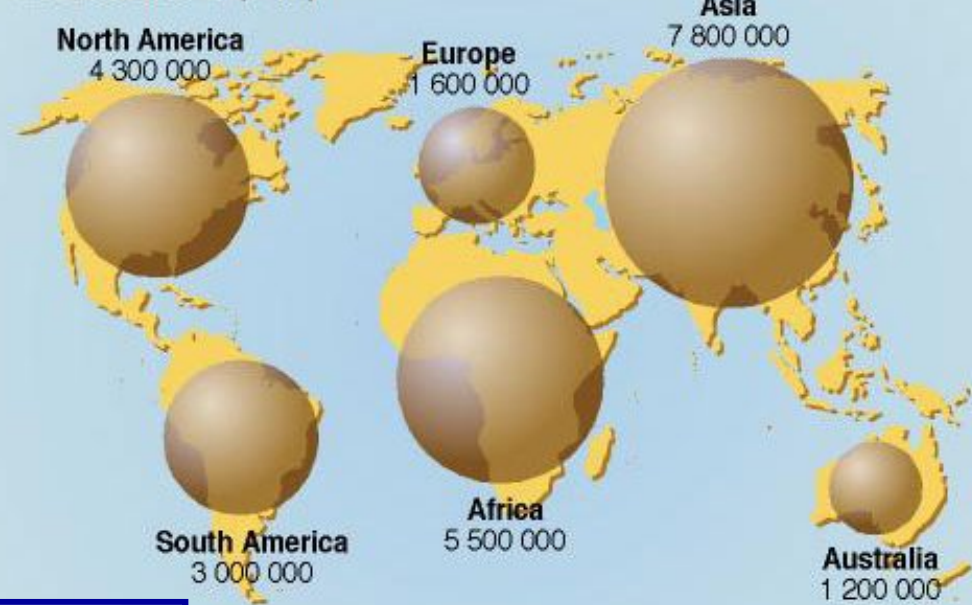
Global Freshwater Resources

Quantity and Distribution by Region

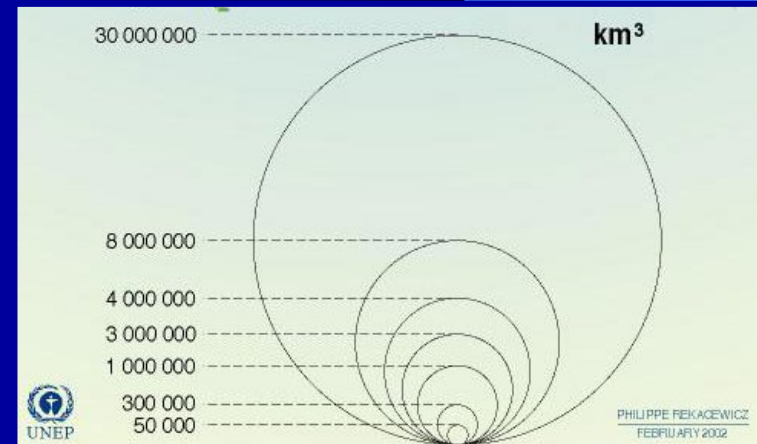
Glaciers and permanent ice caps (km³)



Groundwater (km³)



Wetlands, large lakes, reservoirs and rivers (km³)

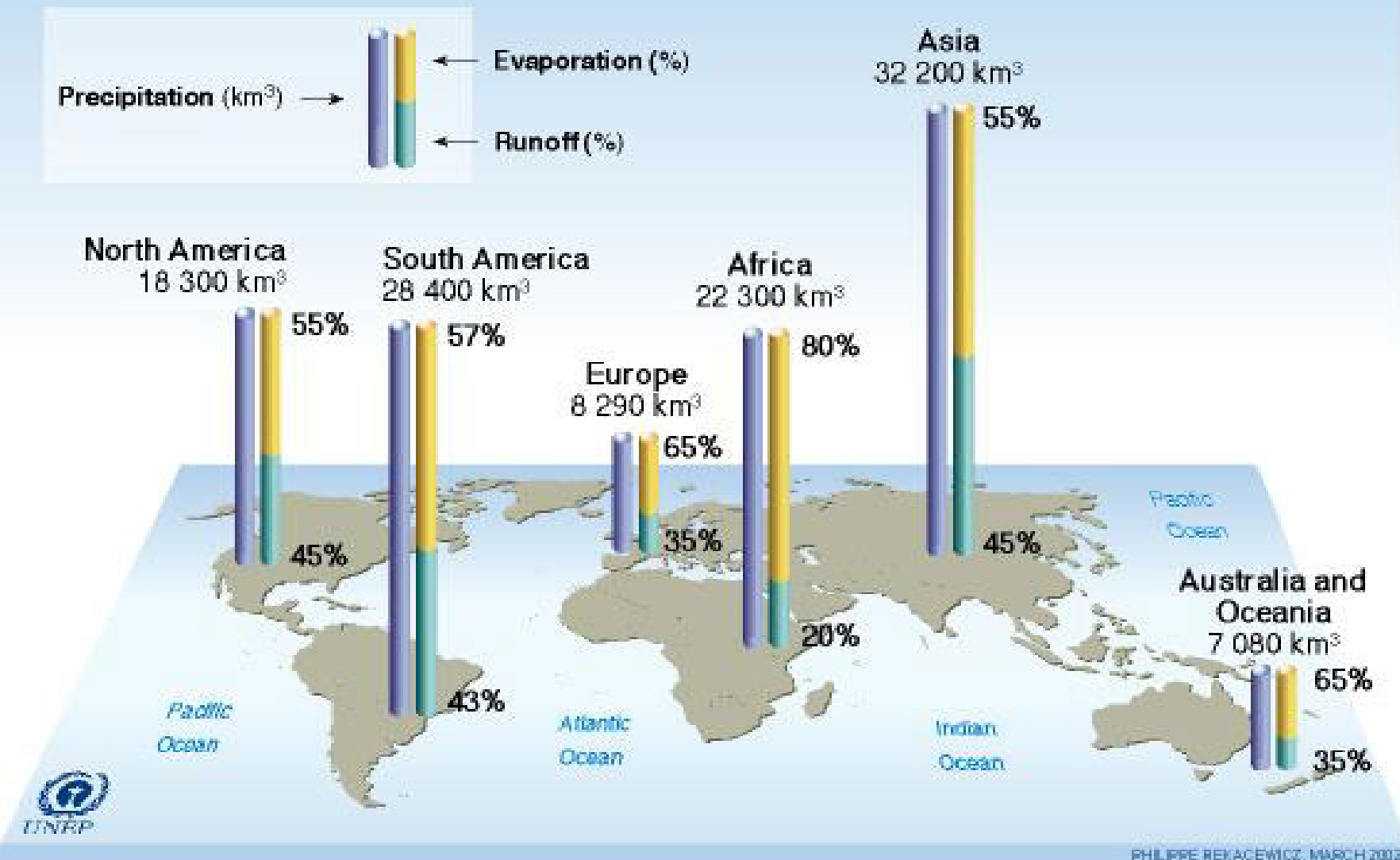


Note: Estimates refer to standing volumes of freshwater.

Source: Igor A. Shiklomanov, State Hydrological Institute (SHI, St. Petersburg) and United Nations Educational, Scientific and Cultural Organisation (UNESCO, Paris), 1999; World Meteorological Organisation (WMO); International Council of Scientific Unions (ICSU); World Glacier Monitoring Service (WGMS); United States Geological Survey (USGS).

The World's Surface Water

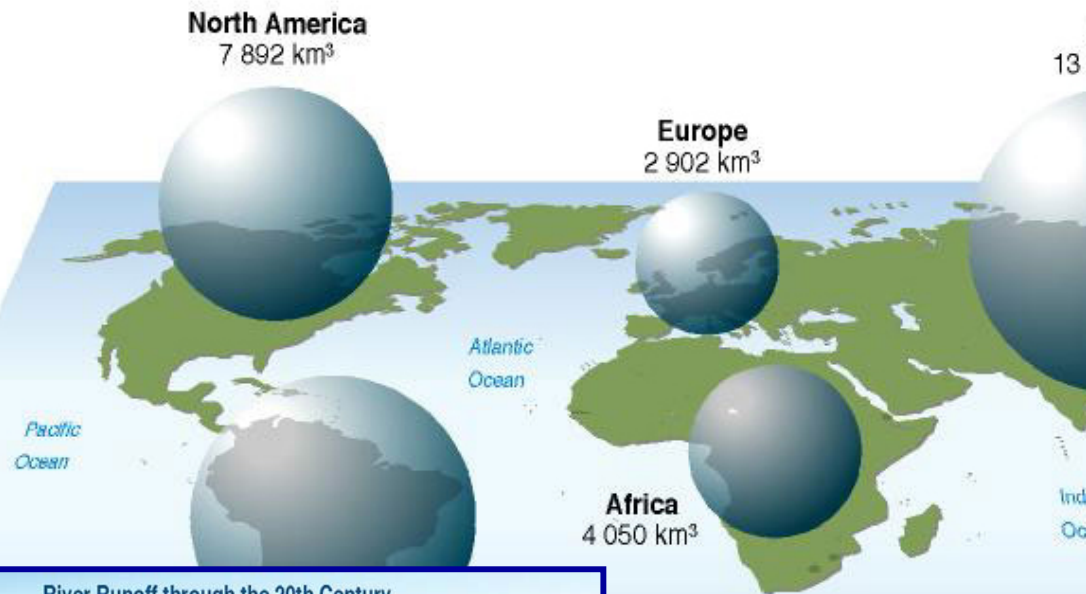
Precipitation, Evaporation and Runoff by Region



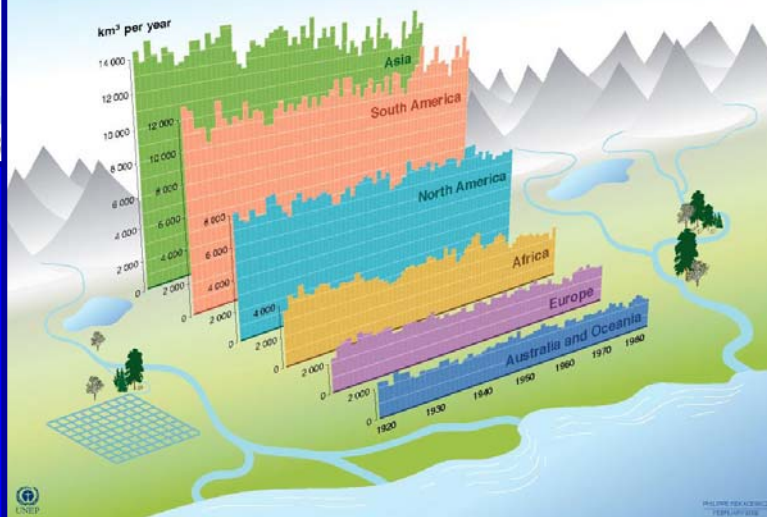
Source: Peter H. Gleick, *Water in Crisis*, New York Oxford University Press, 1993.

River Runoff through the 20th Century

Average Annual Volume by Continent, 1921-1985



River Runoff through the 20th Century
Average Annual Volumes by Continent, 1921-1985

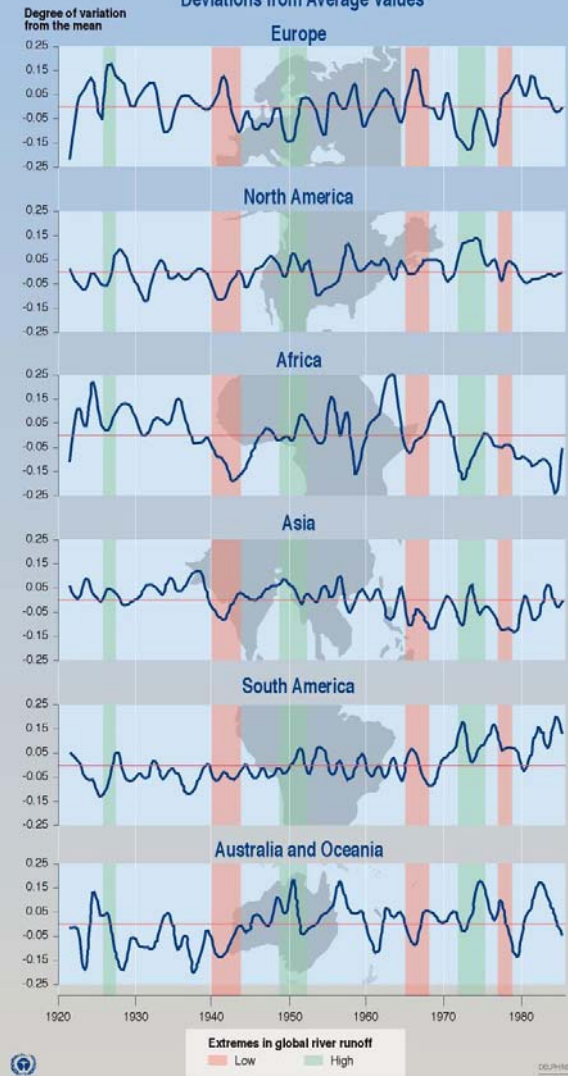


Spheres are proportional to
the volume of water by continent

(St. Petersburg) and United Nations Educational, Scientific and Cultural Organisation (UNESCO, Paris), 1999

Variations in River Runoff by Continent through most of the 20th Century

Deviations from Average Values



Source: Igor A. Shiklomanov, State Hydrological Institute (SHI, St. Petersburg) and United Nations Educational, Scientific and Cultural Organisation (UNESCO, Paris), 1999

LA DISTRIBUZIONE DELLE RISORSE IDRICHE



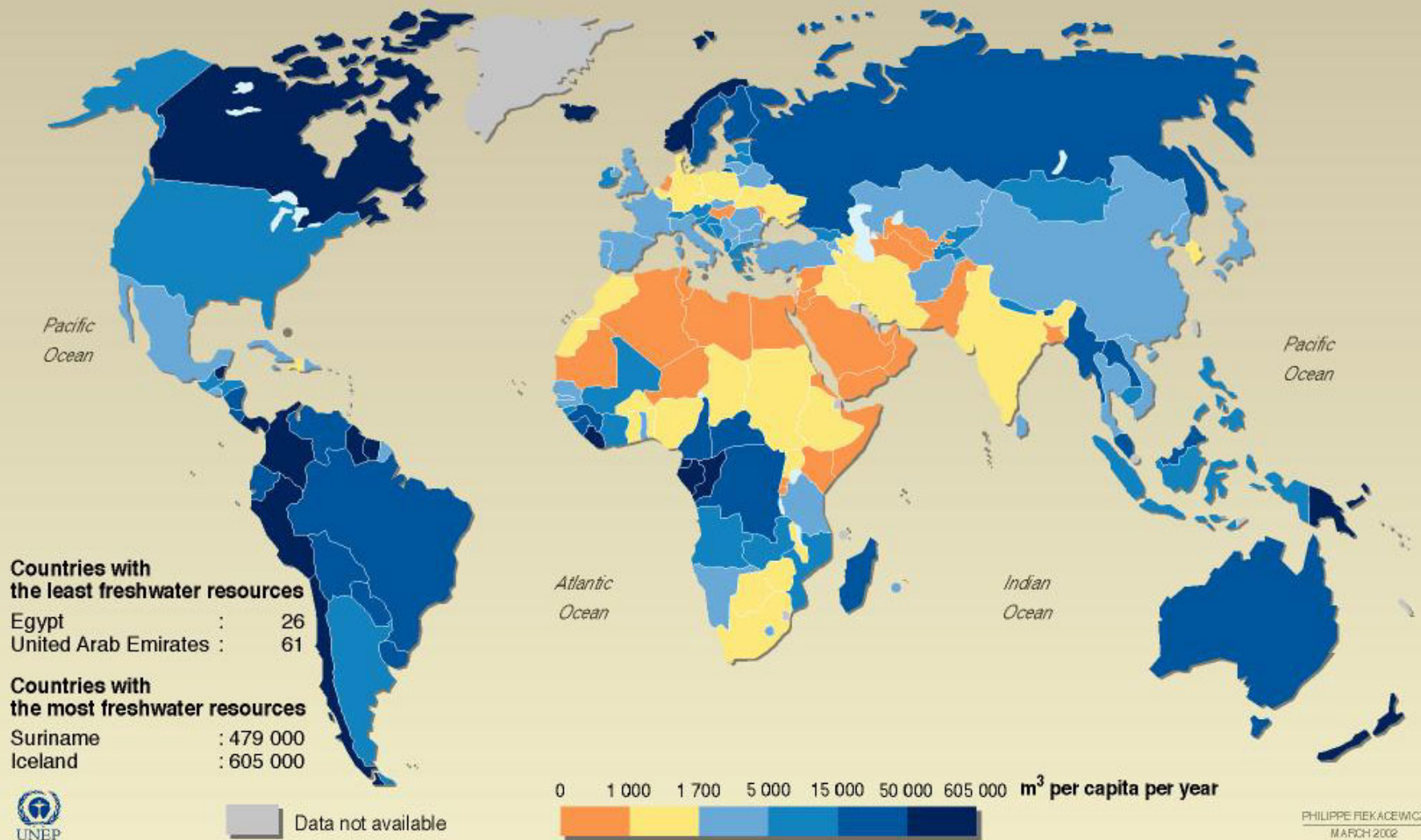
DISTRIBUZIONE DELLE RISORSE IDRICHE RISPETTO ALLA POPOLAZIONE MONDIALE



*Evidente disuniformità nella distribuzione delle risorse in particolare in ASIA:
>50% della popolazione mondiale
solo il 36% di risorse idriche disponibili!!*

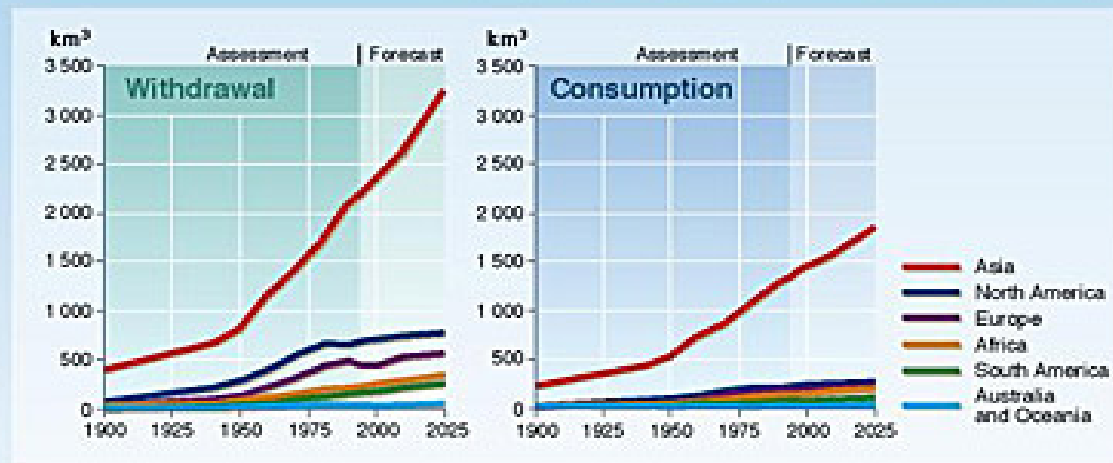
Availability of Freshwater in 2000

Average River Flows and Groundwater Recharge

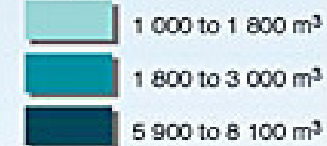


Source: World Resources 2000-2001, People and Ecosystems: The Fraying Web of Life, World Resources Institute (WRI), Washington DC, 2000.

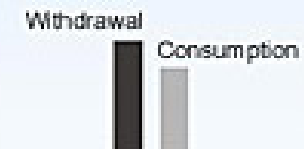
Global Water Withdrawal and Consumption



Top 20 water consumers per capita

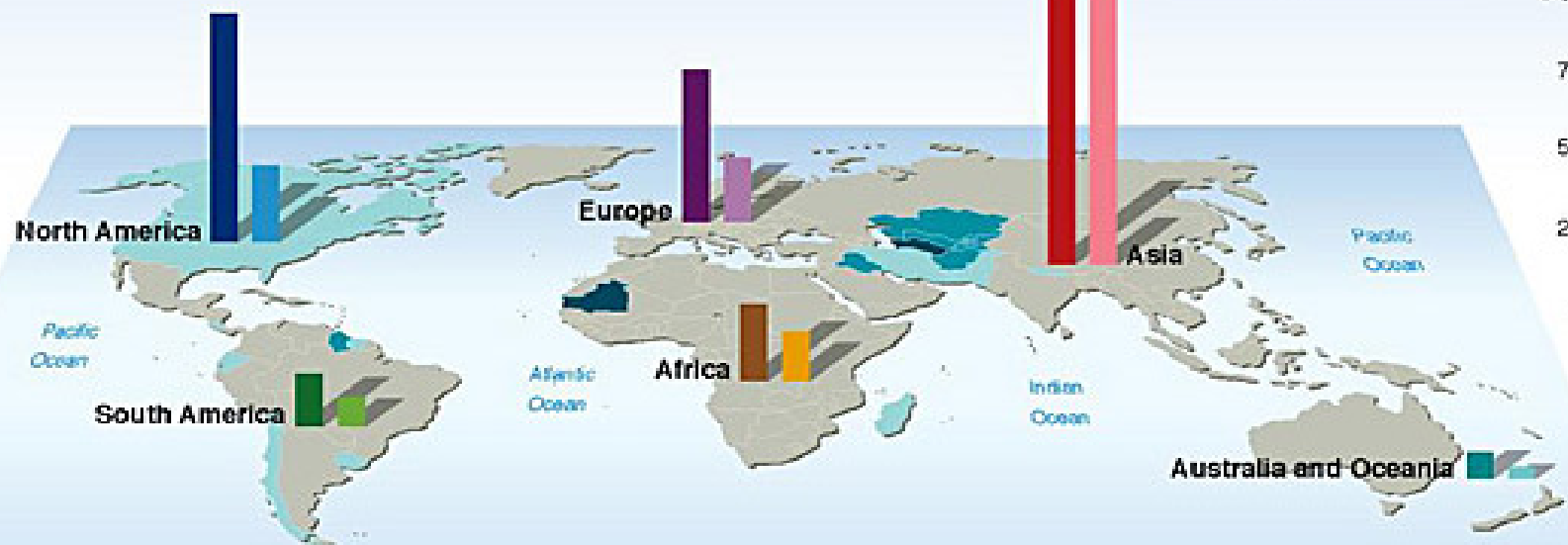


Water use at the end of the 1990s



km³ per year

2 500
2 250
2 000
1 750
1 500
1 250
1 000
750
500
250
0



PHILIPPE REJAUMEZ, MARCH 2002

Source: Igor A. Shiklomanov, State Hydrological Institute (SHI, St. Petersburg) and United Nations Educational, Scientific and Cultural Organisation (UNESCO, Paris), 1999; World Resources 2000-2001, People and Ecosystems: The Fraying Web of Life, World Resources Institute (WRI), Washington DC, 2000; Paul Harrison and Fred Pearce, AAAS Atlas of Population 2001, American Association for the Advancement of Science, University of California Press, Berkeley.