

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



Corso di

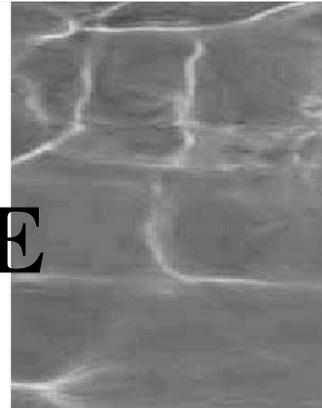
**GESTIONE delle
RISORSE IDRICHE**

a.a. 2003-2004

Lezione 1

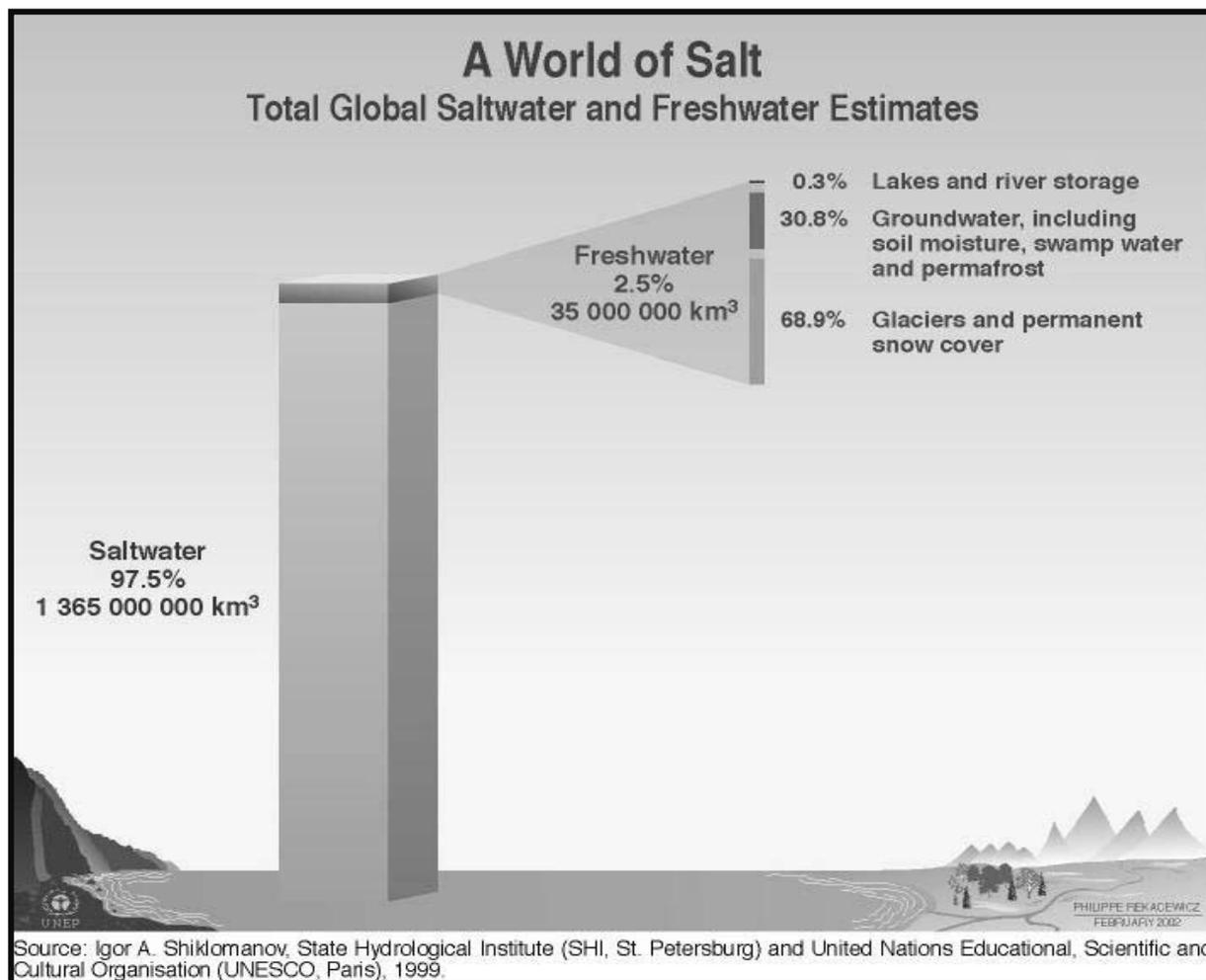
Prof. Luca G. Lanza

Dipartimento di Ingegneria Ambientale - DIAM



LA DISTRIBUZIONE DELLE RISORSE IDRICHE

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



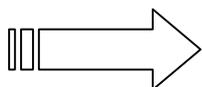
...AD USO ANTROPICO

➤ *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**

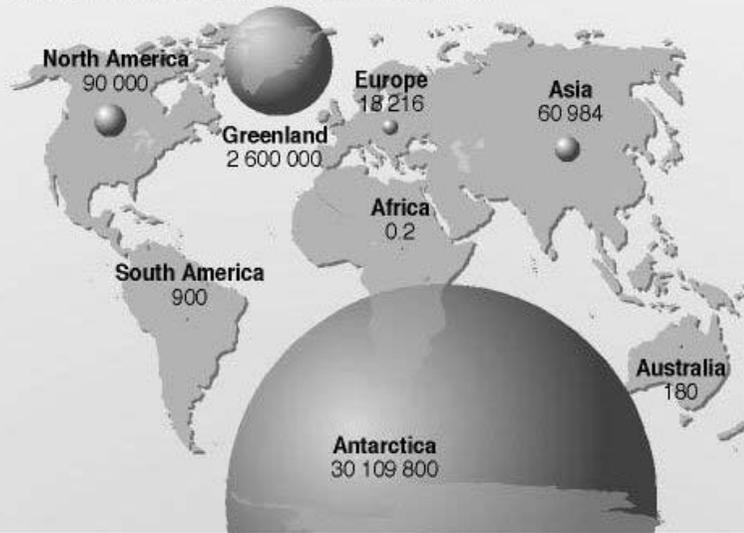


8% del totale annuo di risorse rinnovabile di acqua dolce
54% del totale annuo di acqua di scorrimento superficiale
24% dell' evapo-traspirazione annua totale

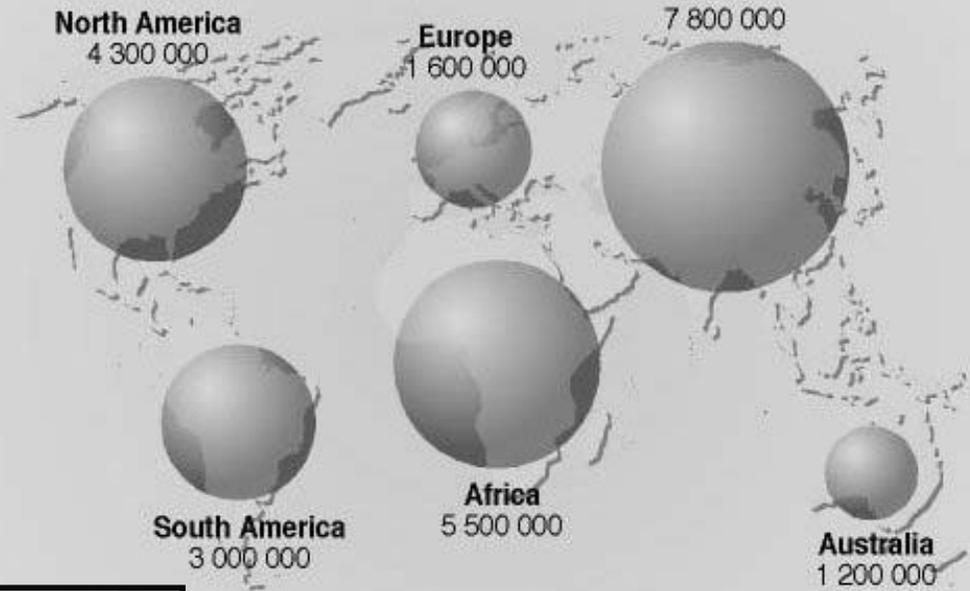
Global Freshwater Resources

Quantity and Distribution by Region

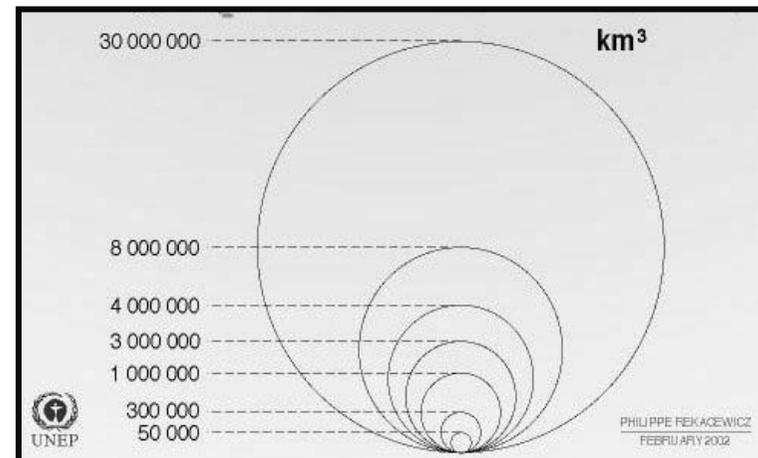
Glaciers and permanent ice caps (km³)



Groundwater (km³)



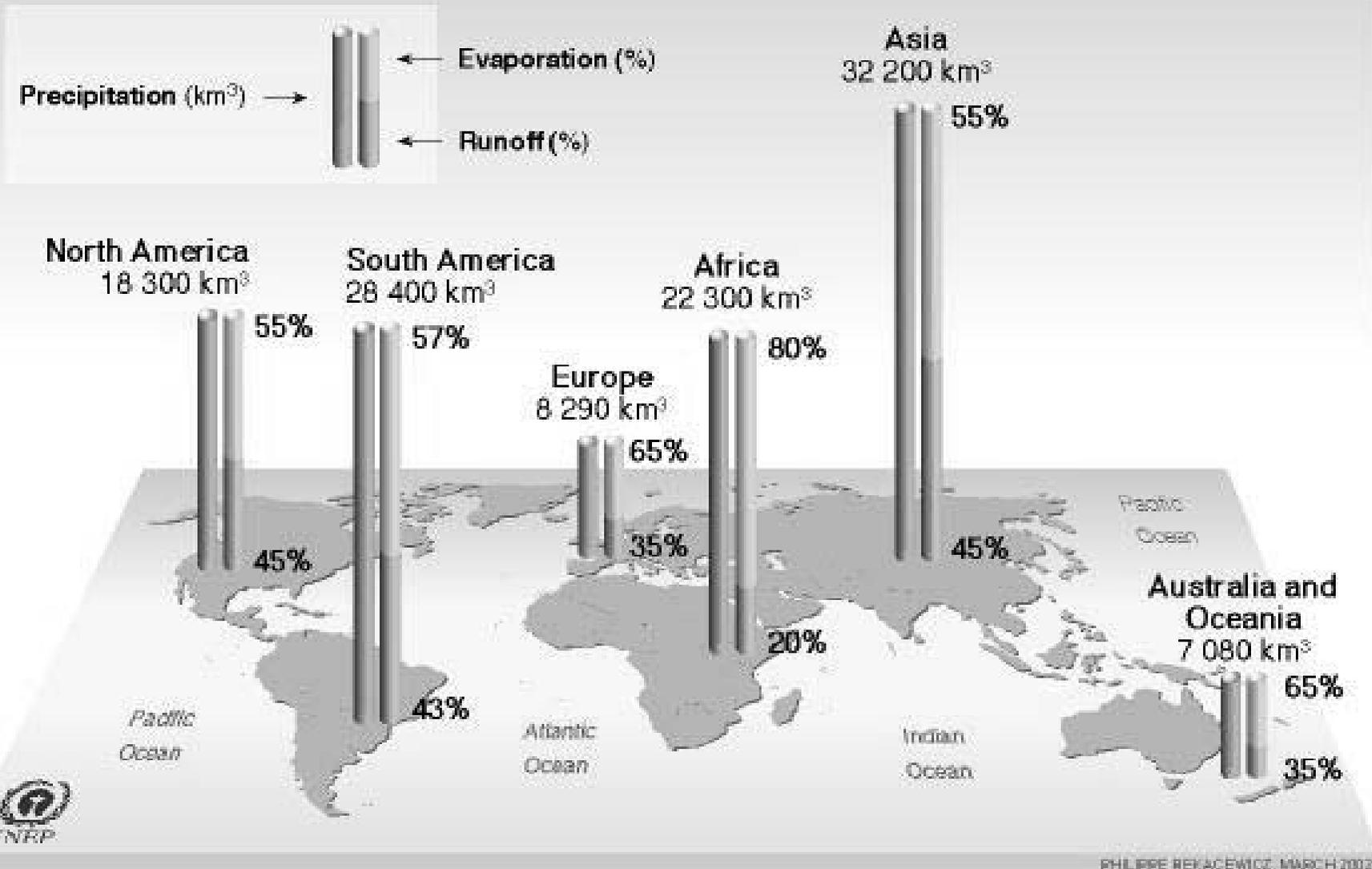
Wetlands, large lakes, reservoirs and rivers (km³)



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

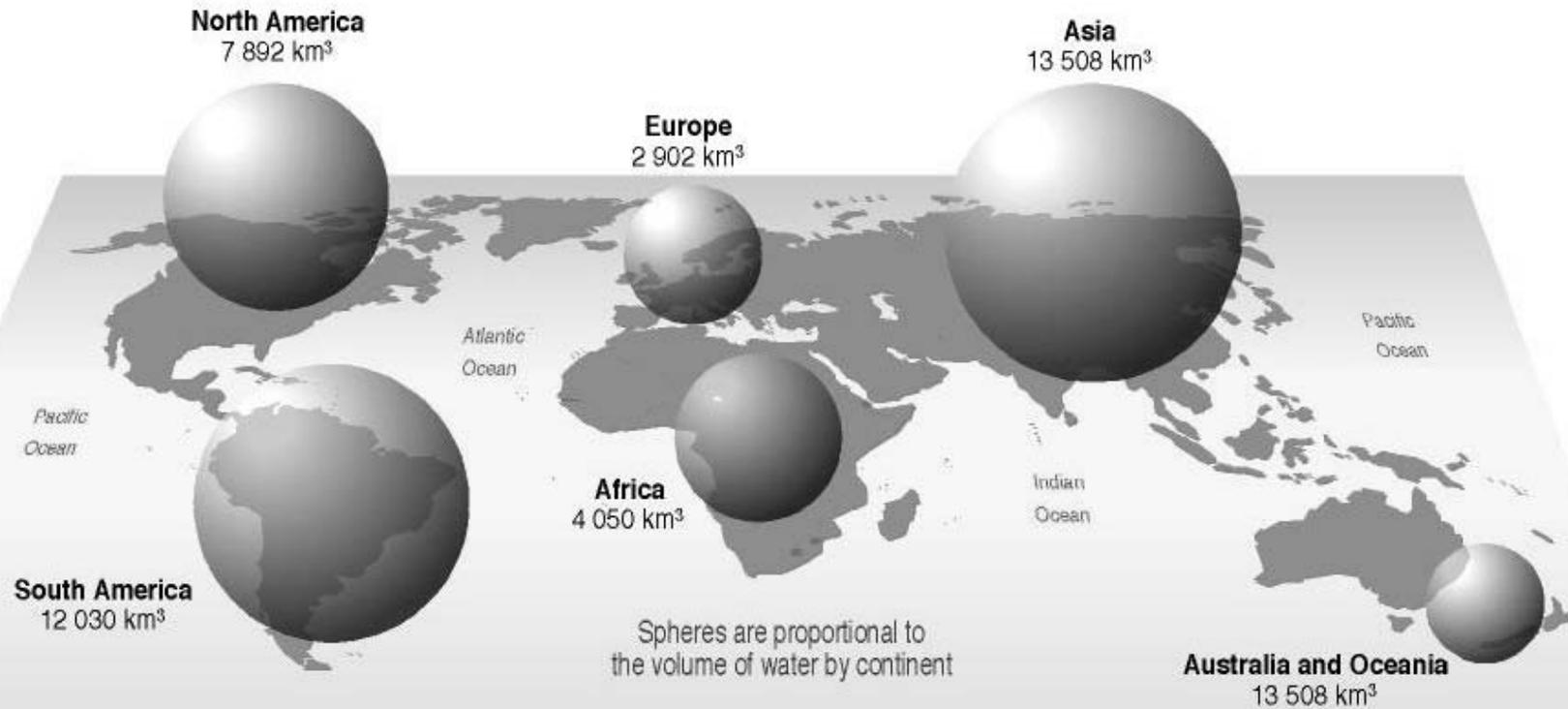


Source: Peter H. Gleick, *Water in Crisis*, New York Oxford University Press, 1993.

PHILIPPE REKACEWICZ, MARCH 2002

River Runoff through the 20th Century

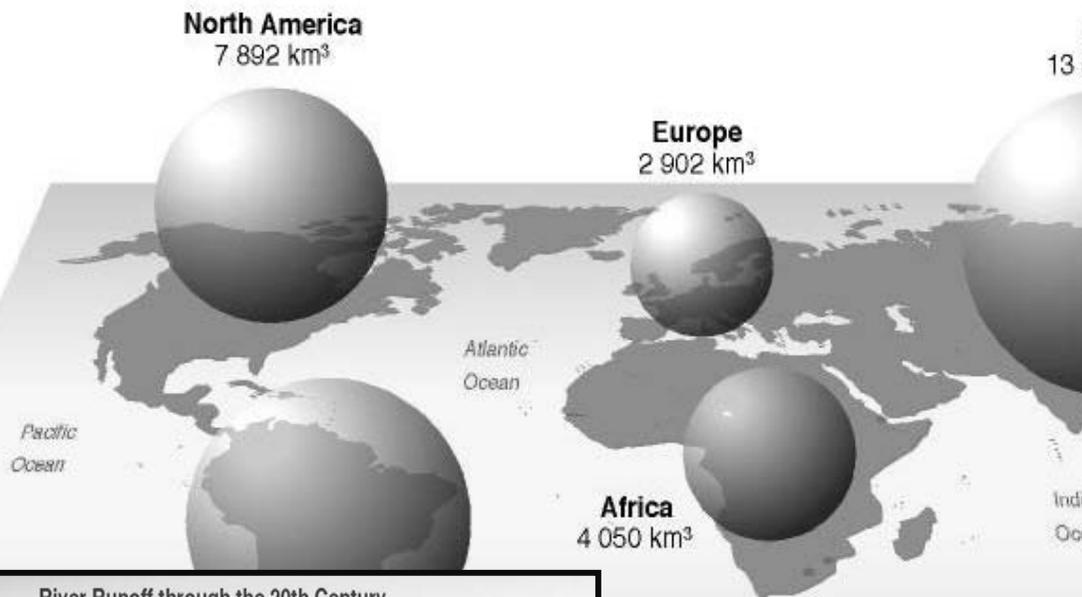
Average Annual Volume by Continent, 1921-1985



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

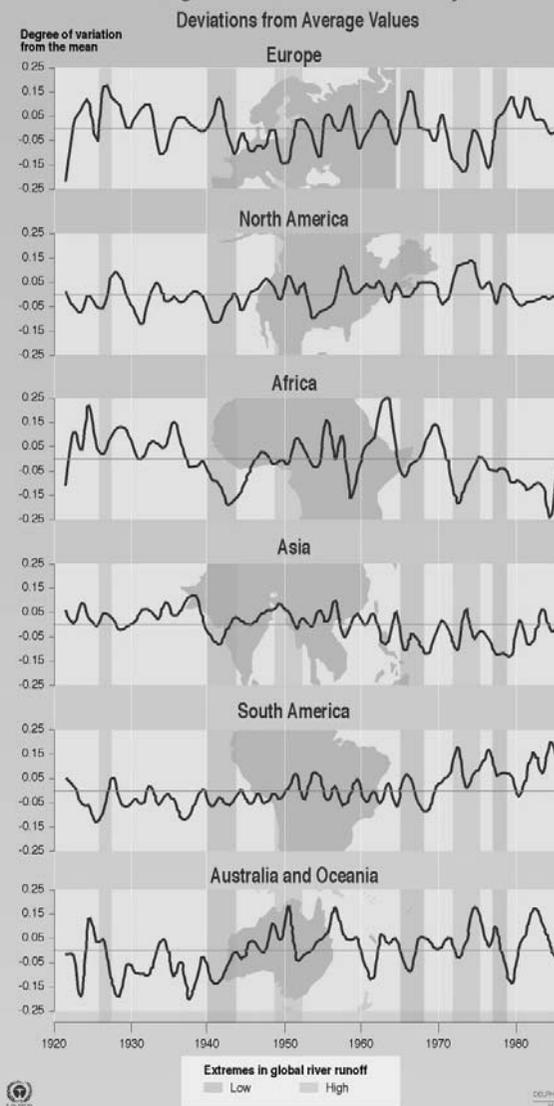
River Runoff through the 20th Century

Average Annual Volume by Continent, 1921-1985



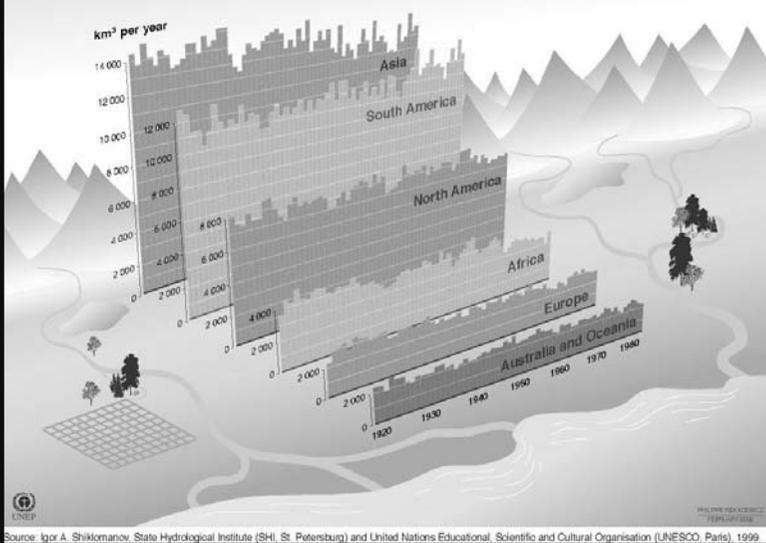
Spheres are proportional to the volume of water by continent

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



River Runoff through the 20th Century

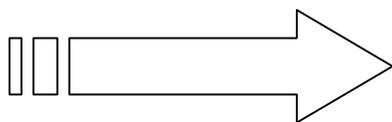
Average Annual Volumes by Continent, 1921-1985



LA DISTRIBUZIONE DELLE RISORSE IDRICHE



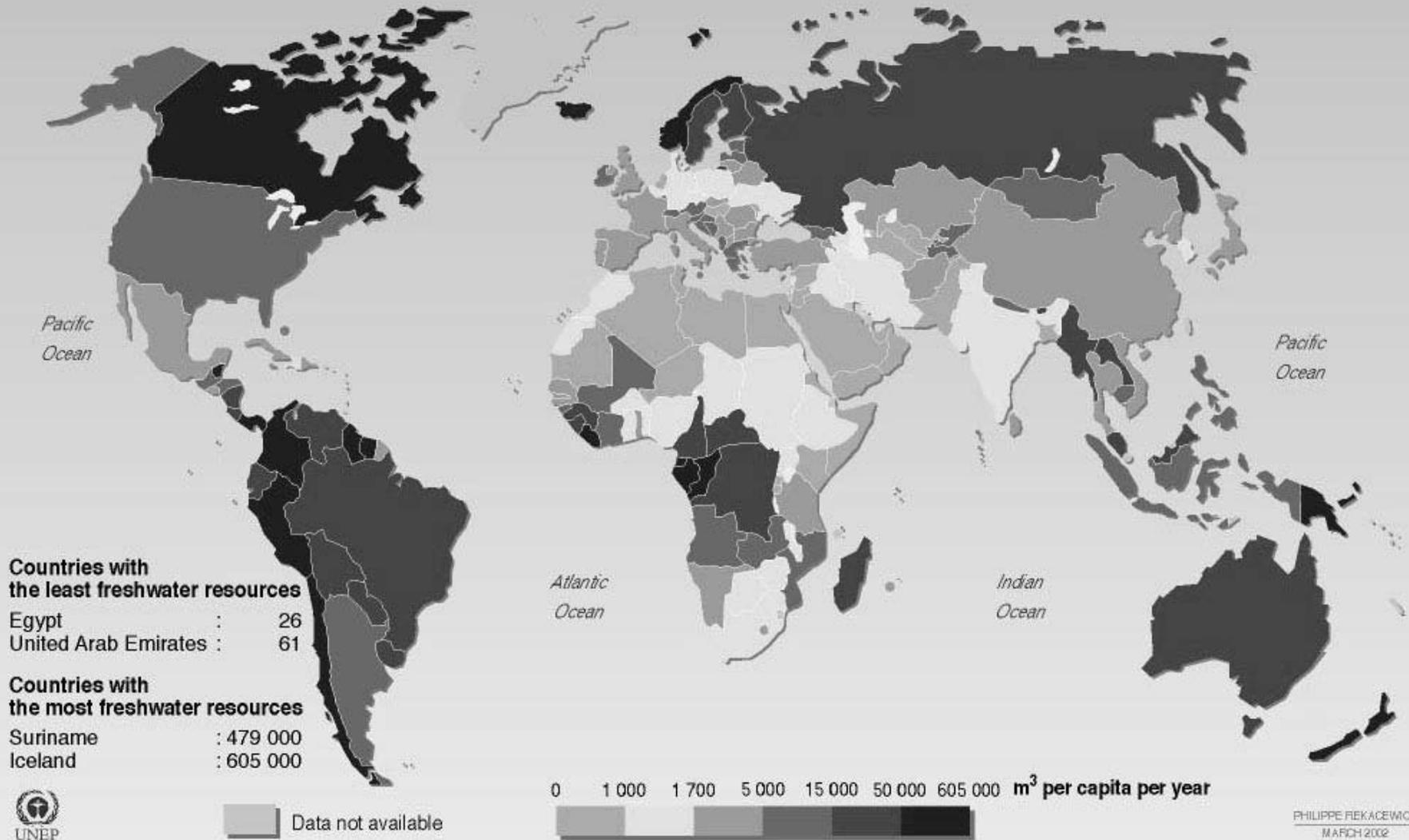
DISTRIBUZIONE DELLE RISORSE IDRICHE RISPETTO ALLA POPOLAZIONE MONDIALE



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.