

Advances in Hydro-Environment Research
Water–Energy–Food–Environment
EXPANDING THE NEXUS



Prof Arthur E Mynett

UNESCO-IHE
Institute for Water Education



UNESCO & WATER

UNESCO is the largest body within the United Nations system dealing with the most comprehensive range of water activities.

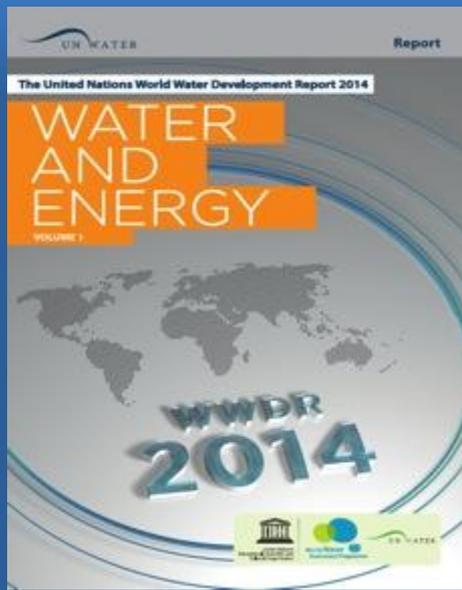
UNESCO's water activities:



UNESCO-IHE
Institute for Water Education



1. International Hydrological Programme (research)
2. UNESCO-IHE Institute for Water Education (capacity development)
3. Secretariat of the World Water Assessment Programme (data)



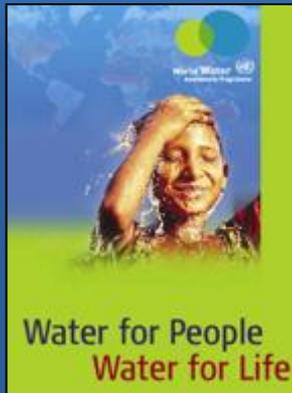
UN WATER



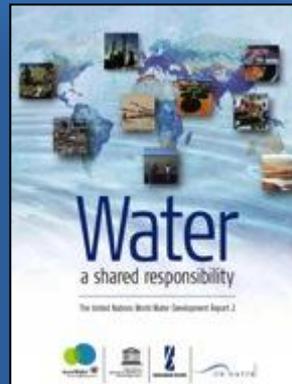
UN HABITAT
FOR A BETTER URBAN FUTURE



UNECA, UNECE,
UNECLAC, UNESCAP,
UNESCWA



2003



2006



2009



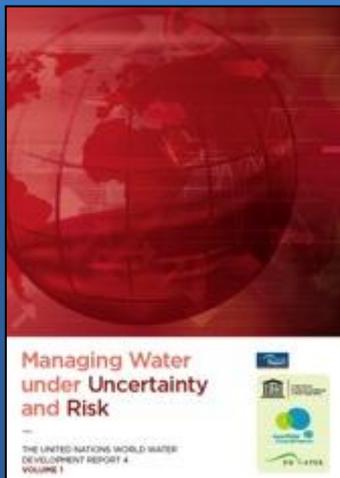
UN WATER



UN HABITAT
FOR A BETTER URBAN FUTURE



UNECA, UNECE,
UNECLAC, UNESCAP,
UNESCWA



2012



UN WATER



UN HABITAT
FOR A BETTER URBAN FUTURE



UNECA, UNECE,
UNECLAC, UNESCAP,
UNESCWA



**36th IAHR
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28 June – 3 July, 2015

Delft – The Hague, the Netherlands

**DELTA OF
THE FUTURE**
and what happens
upstream
> JOIN IAHR



Prof Arthur E Mynett

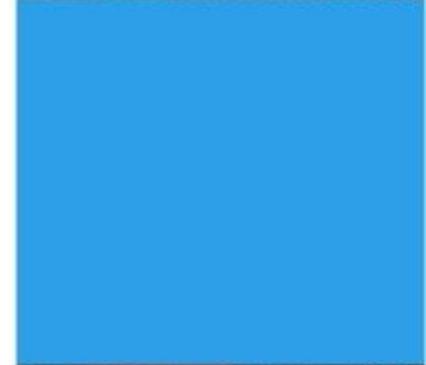
Vice President IAHR

CHAIR LOC IAHR-2015



**36th IAHR
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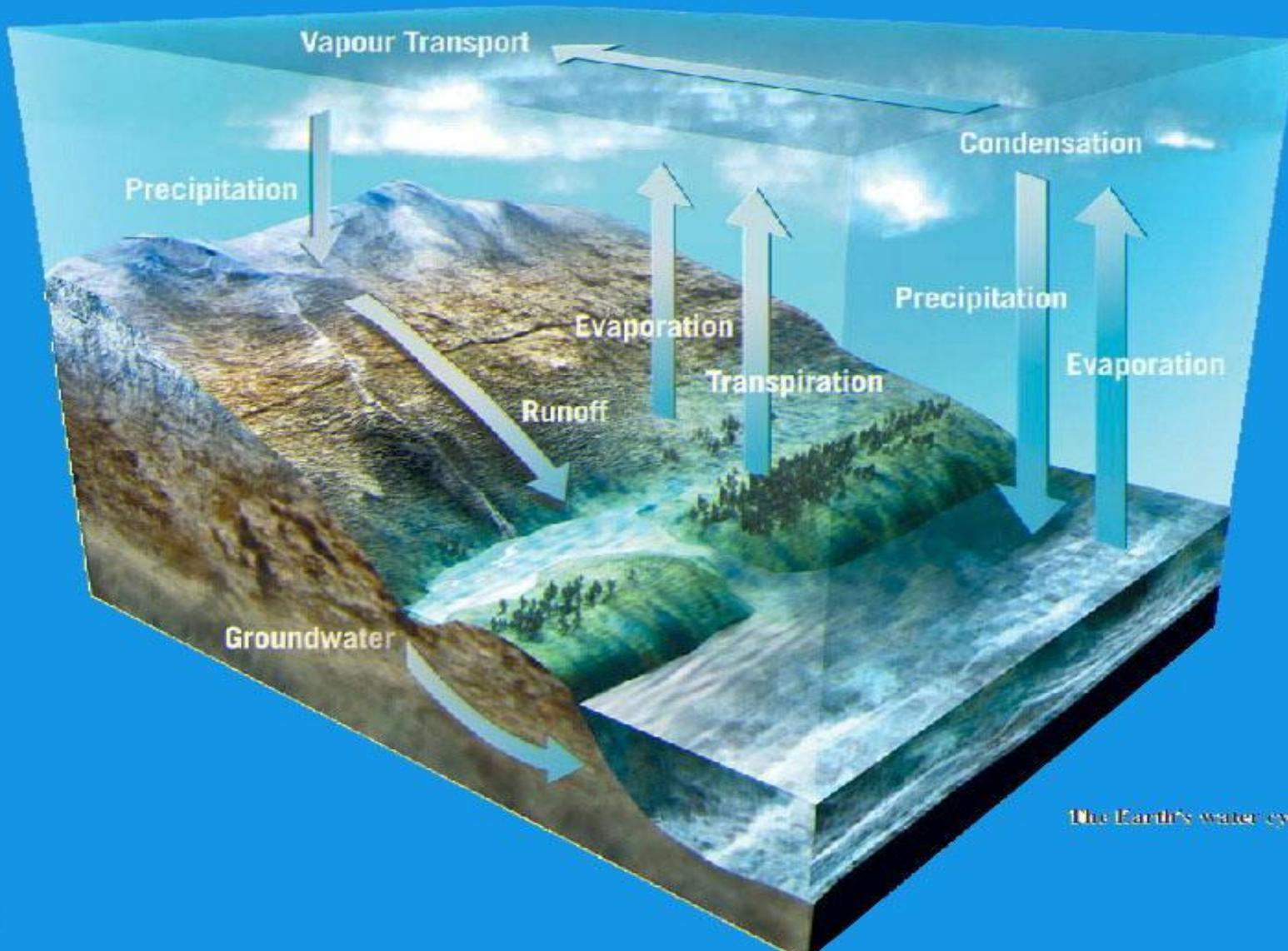
WELCOME !!
28 June – 3 July, 2015



FLOODS ON THE RISE ...



DOES THE HYDROLOGICAL CYCLE ACCELERATE ...?

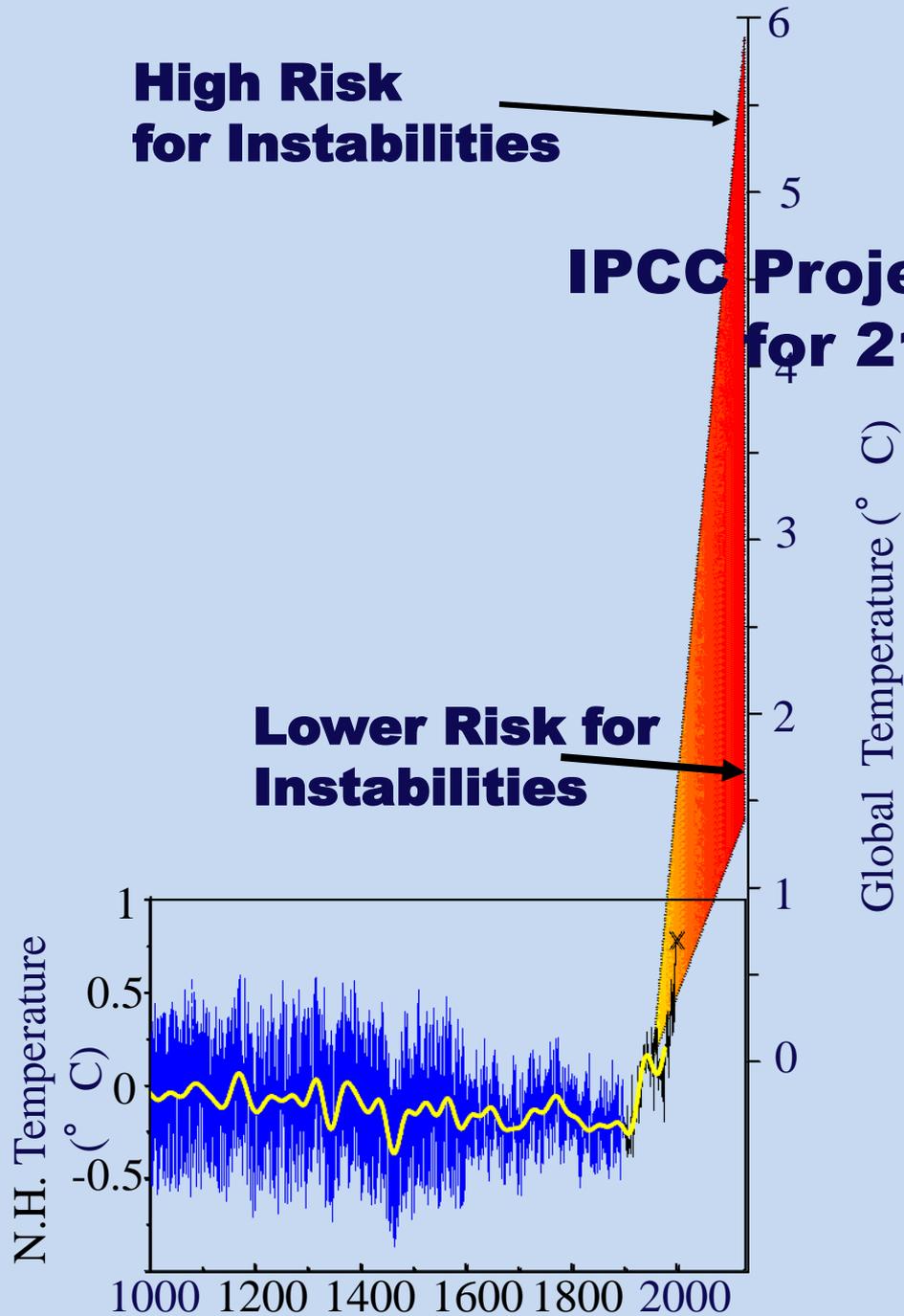


The Earth's water cycle

**High Risk
for Instabilities**

**IPCC Projections
for 2100**

**Lower Risk for
Instabilities**





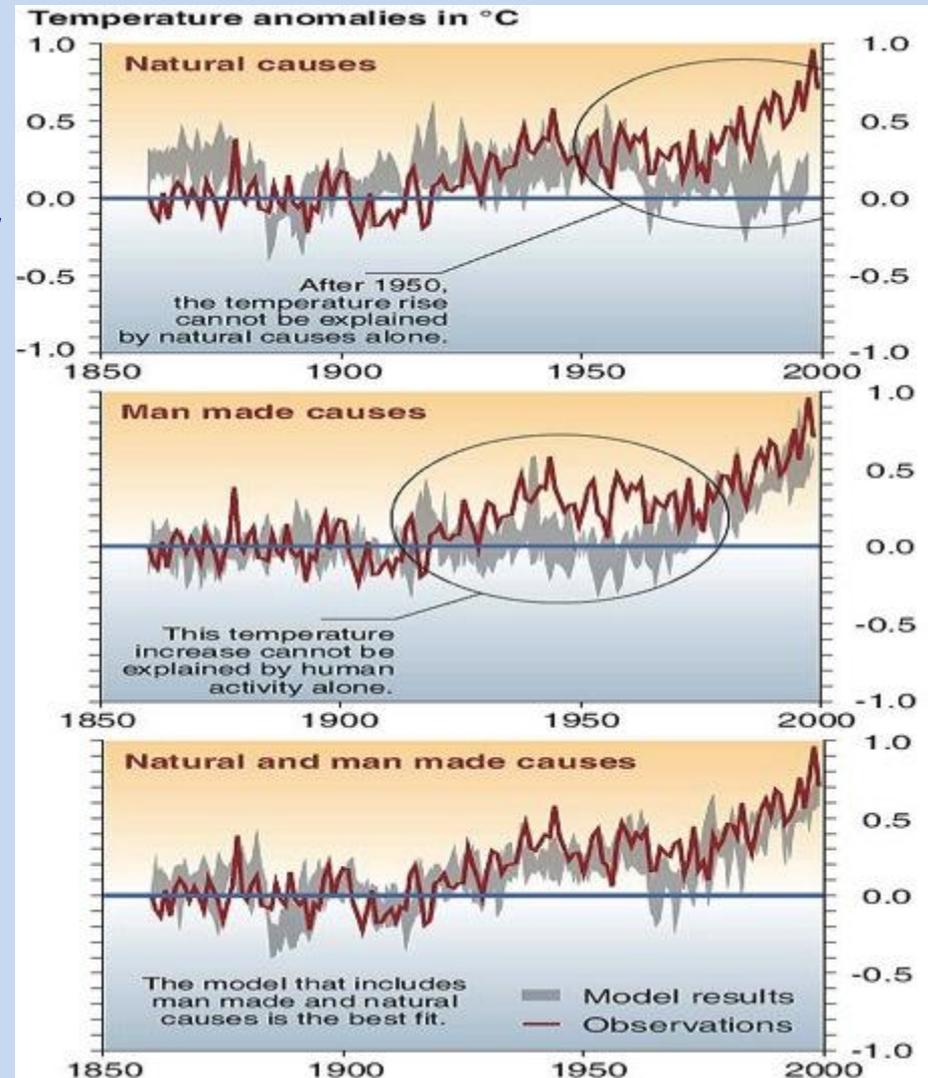
I DON'T BELIEVE IN
GLOBAL WARMING

Climate Change: What do we know?

***Global Mean Temperature
has increased***

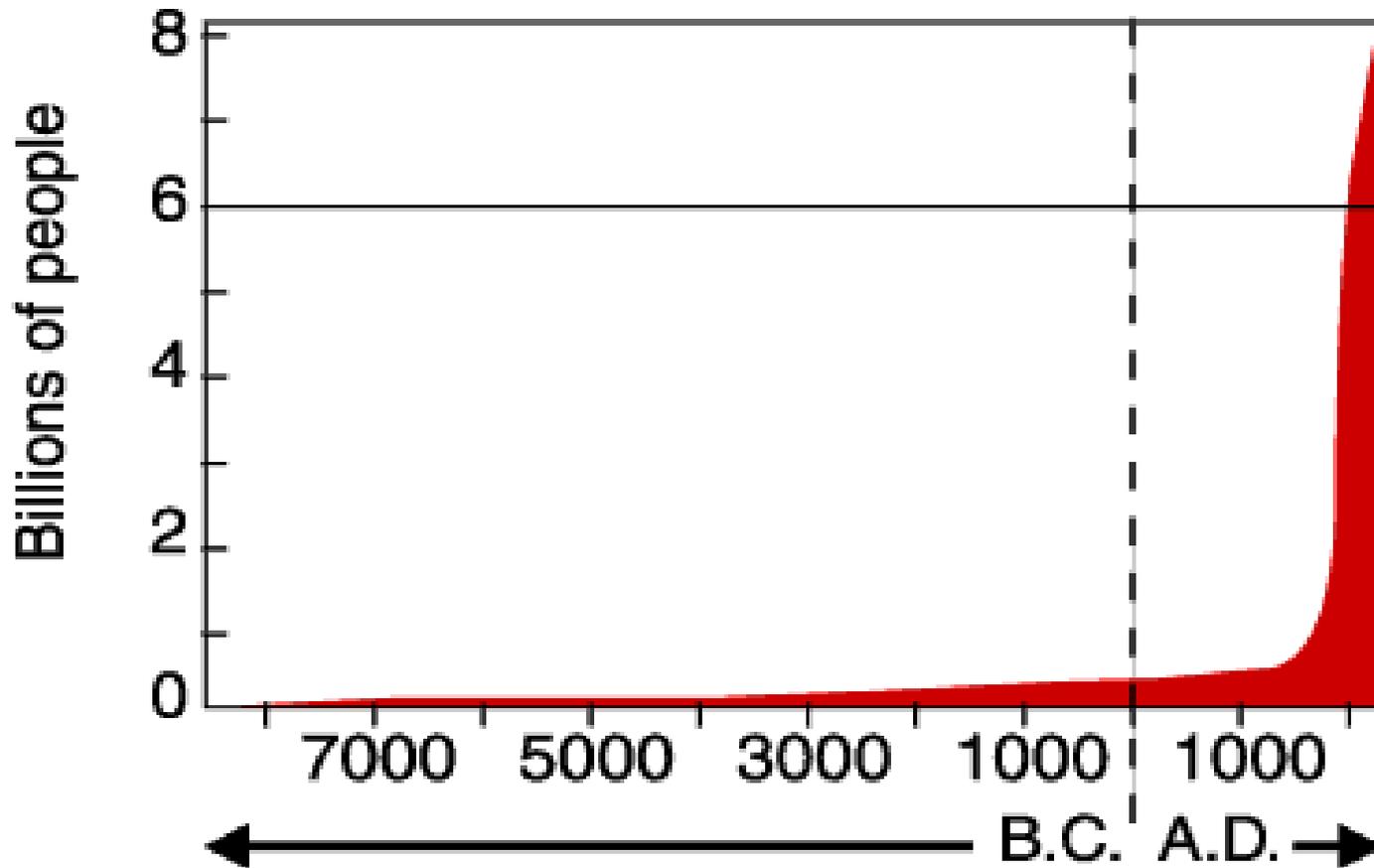
***Greenhouse Gases
do play a role***

***Reducing Emissions alone
will not avoid impacts***



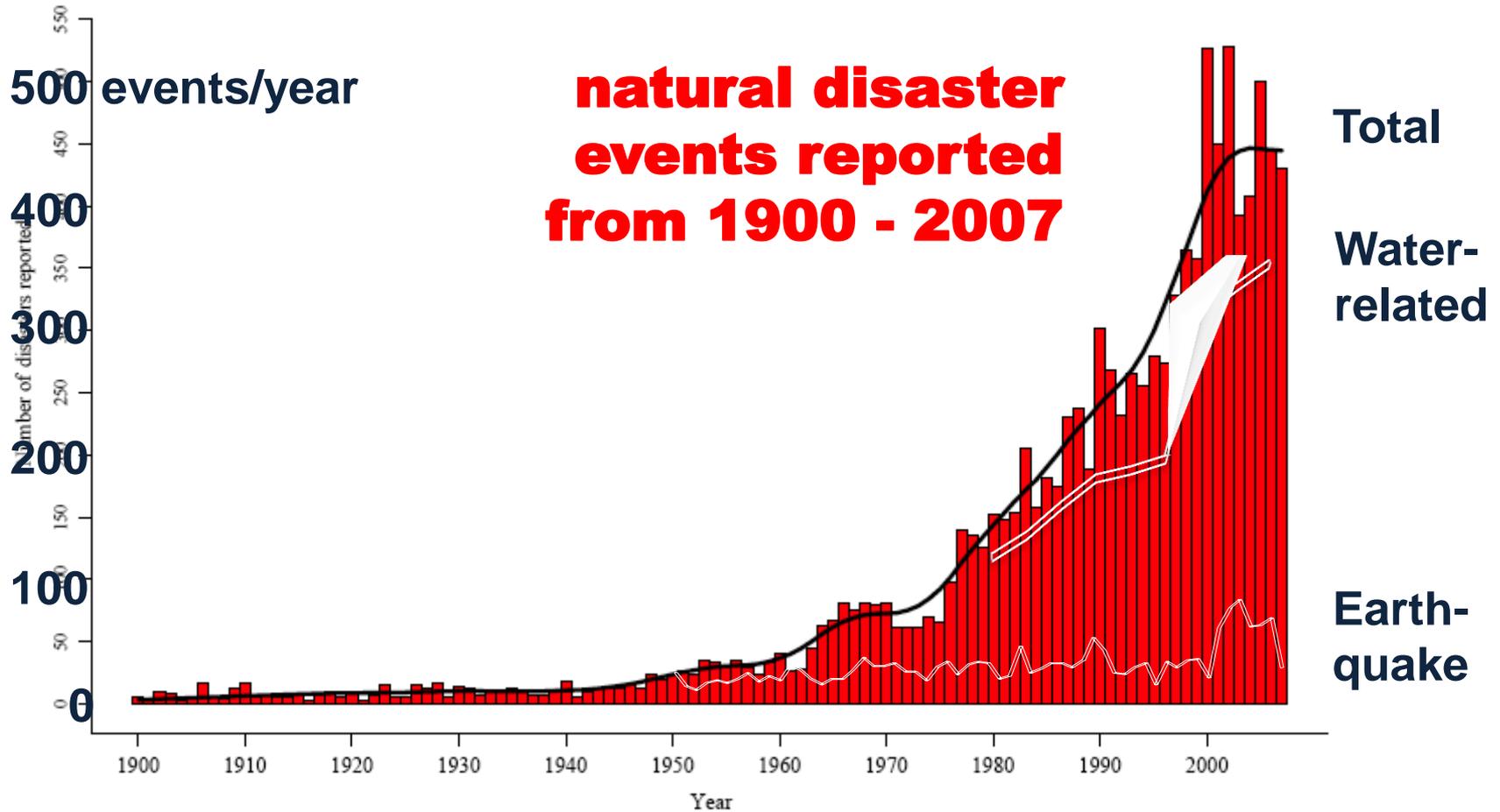
the GLOBAL CHANGE DRIVER ...

Human Population



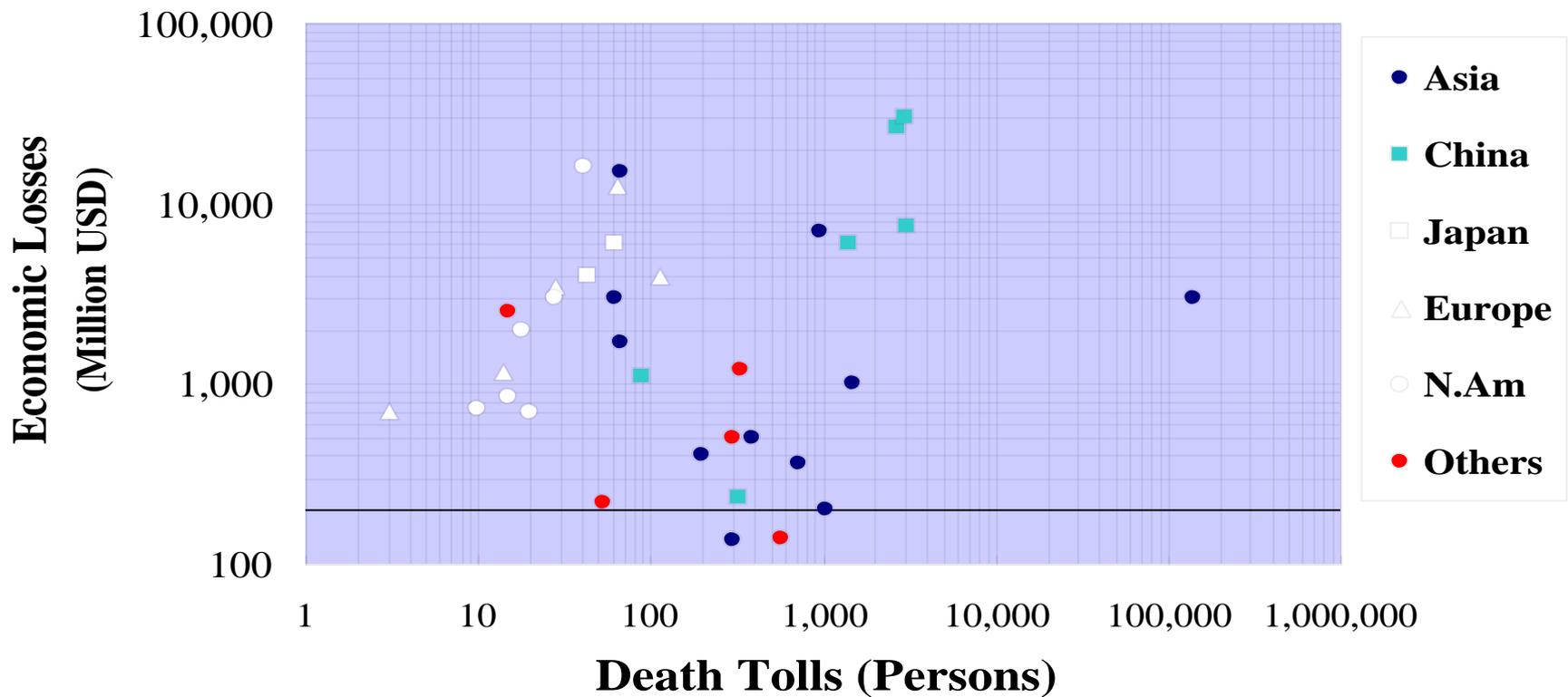
U.S. Bureau of the Census

INCREASE IN WATER HAZARDS



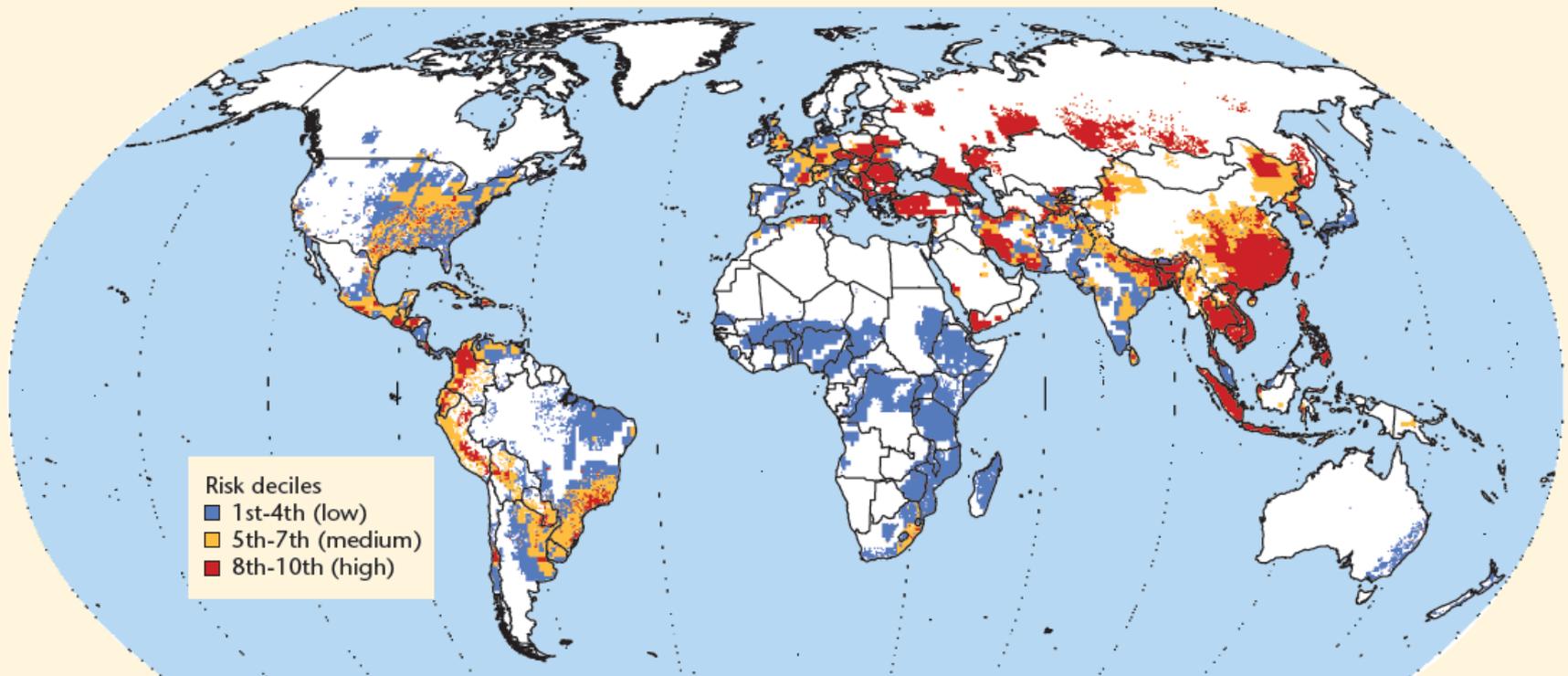
INCREASE IN FLOOD DAMAGES

Damages of Floods in 1990's



IMPACT OF FLOOD LOSSES in % GDP

Map 10.3 Impact of flood losses (comparative losses based on national GDP)

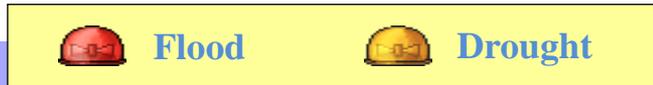


Note: Deciles refer to the level of risk, normalized for comparing 10 categories.
Source: Based on Dilley et al. 2005.

4% ~ 10%

CO-OCCURRENCE OF FLOODS + DROUGHTS

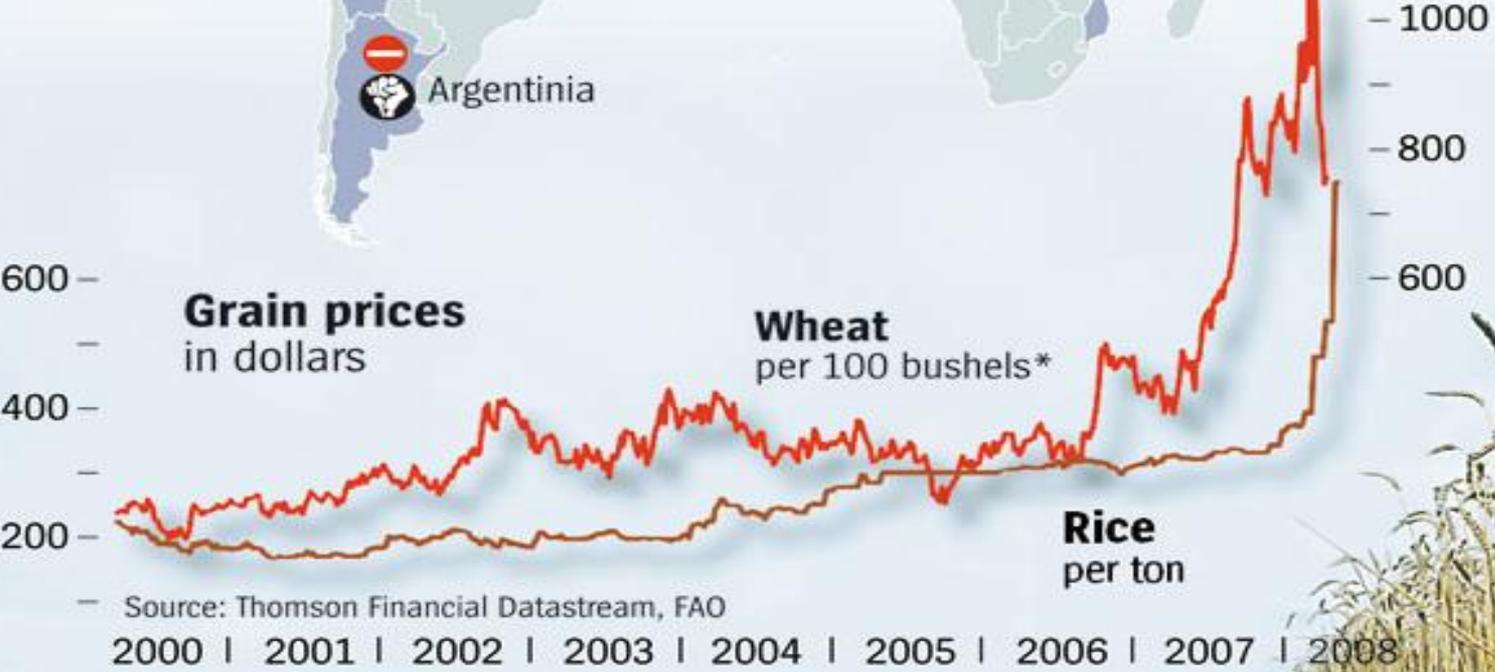
(eg 2002)



Going Hungry

Consequences of the food crisis

-  Unrest/protests
-  Export ban/restrictions



*one bushel of wheat weighs around 27 kg

Source: Thomson Financial Datastream, FAO
2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008





UNESCO-IHE & UNIV NEBRASKA

WE WILL NEED MORE

STORAGE

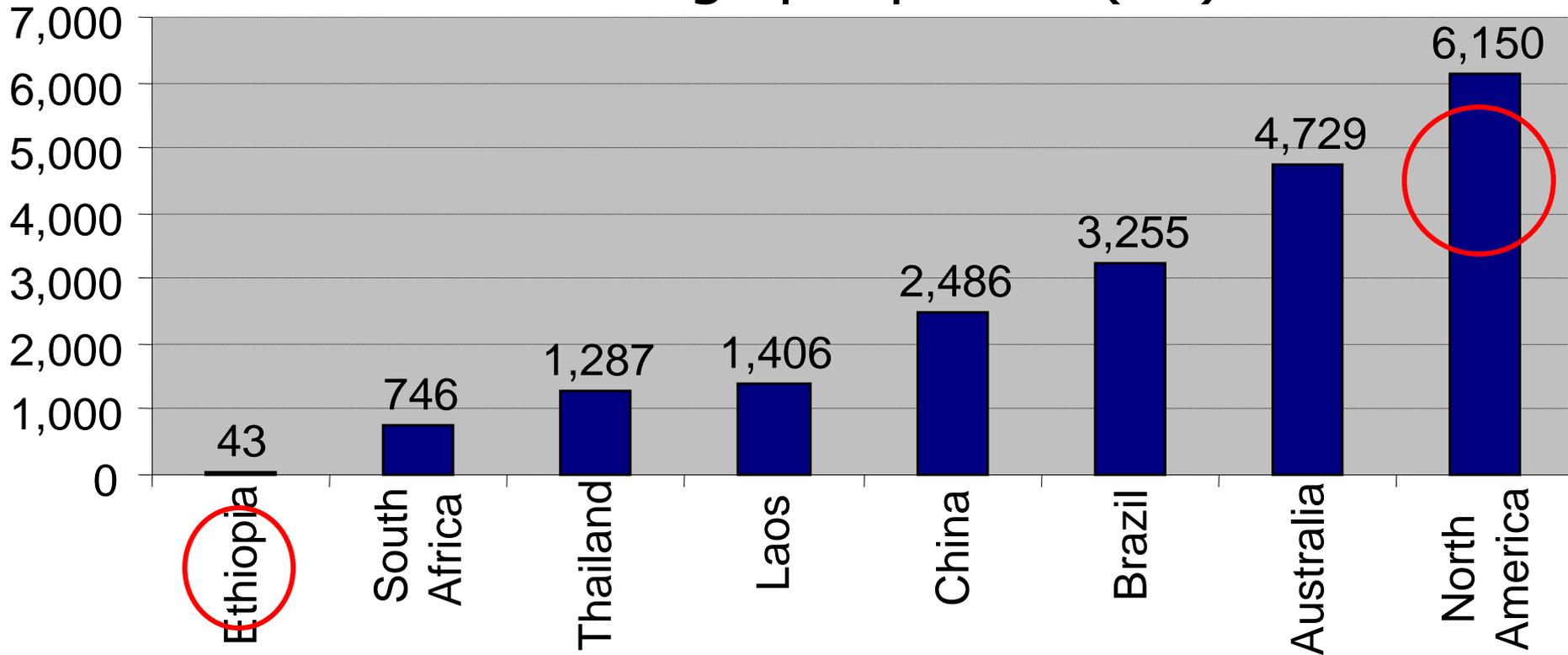
STORAGE

IS THE NEXUS BETWEEN

WATER – FOOD – ENERGY

Infrastructure gap: Water storage [m³/person]

water storage per person (m³)



History of US Dam & Reservoir Construction



1800



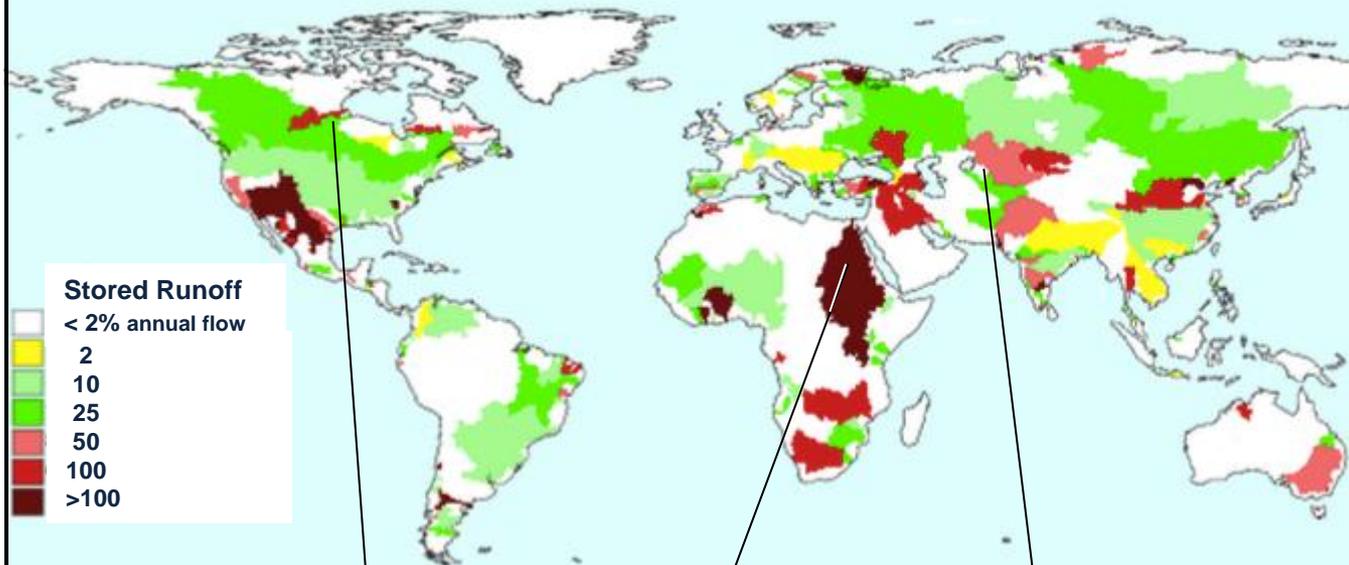
1900



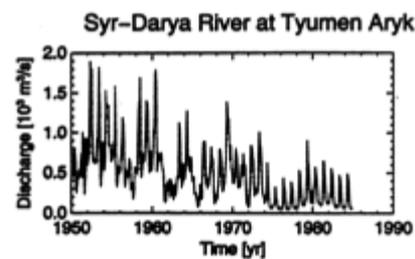
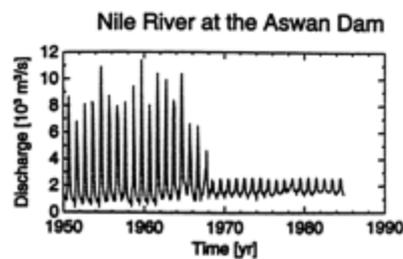
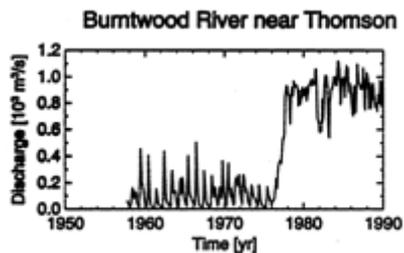
1950



2000



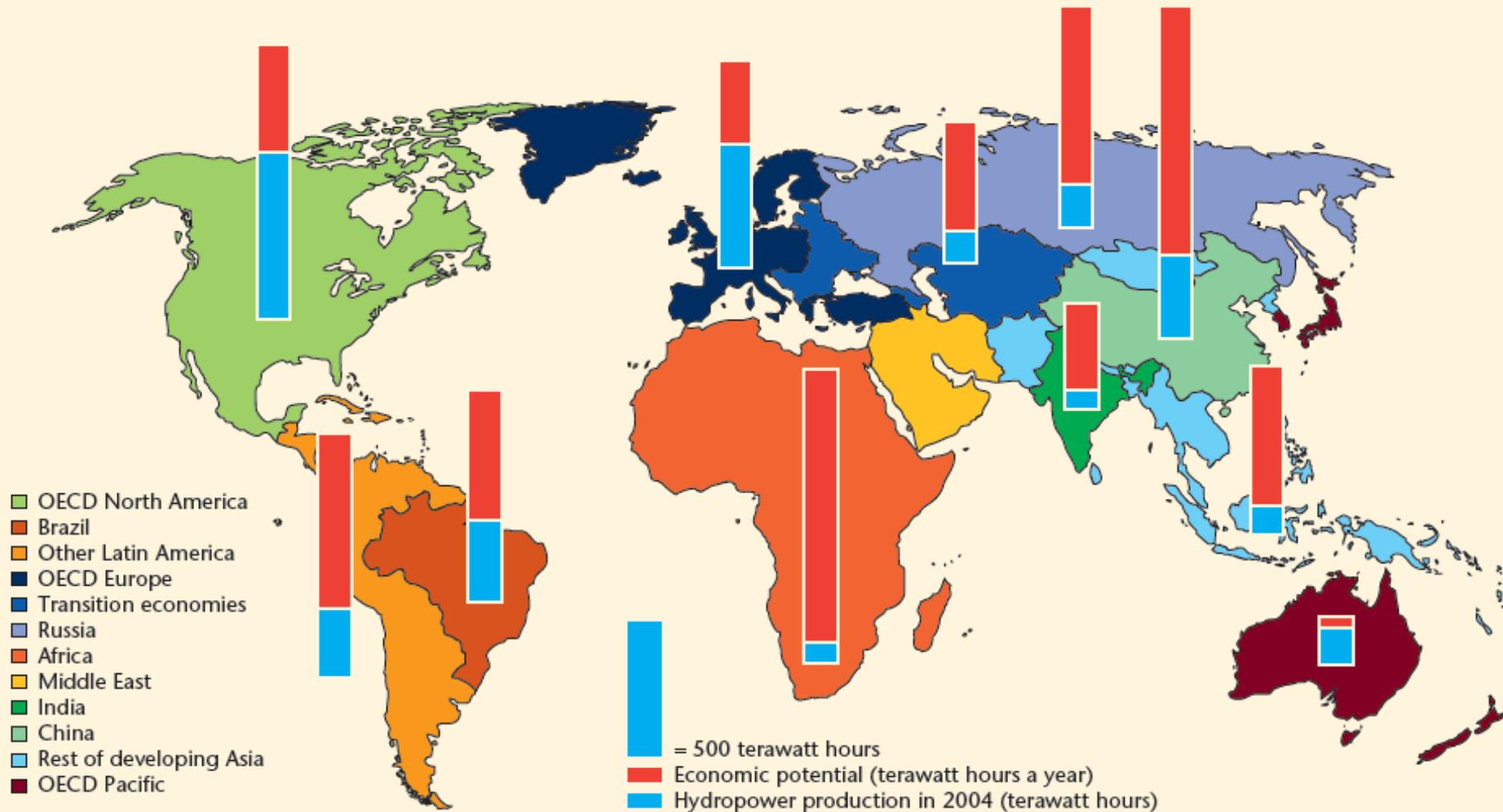
- 700% increase in water held by river systems
- Several years of residence time change in many basins
- Tripling of river runoff travel times globally (from 20 up to 60 days)
- Substantial impact on aquatic biodiversity
- Interception of 30% of continental TSS flux



THE GLOBAL HYDROPOWER POTENTIAL

Map 7.6

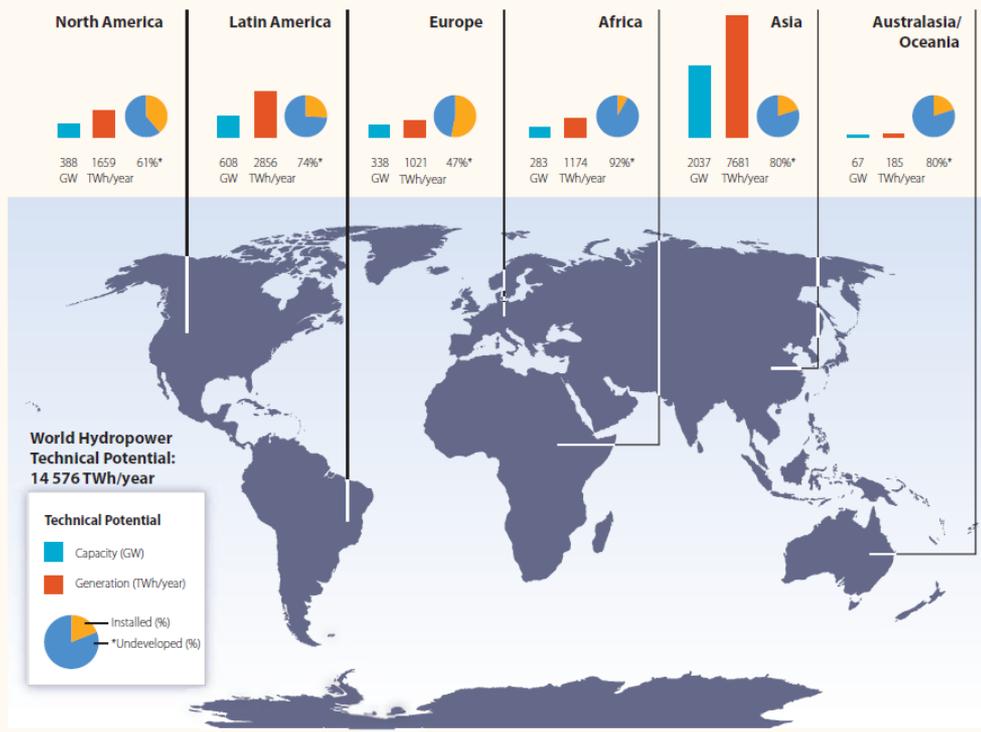
World potential and current hydropower production, 2004



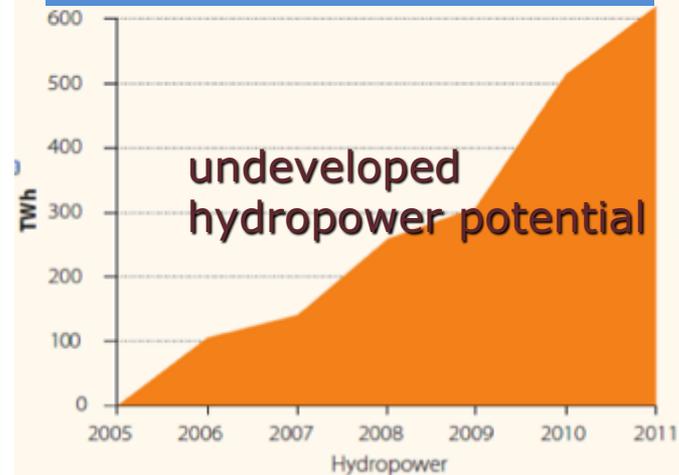


90% of expected increase 2010-2035 in non OECD Countries

Regional hydropower technical potential in terms of annual generation and installed capacity, and percentage of undeveloped technical potential in 2009



HYDROPOWER



Africa 92%

Asia 80%

Australia/Oceania 80%

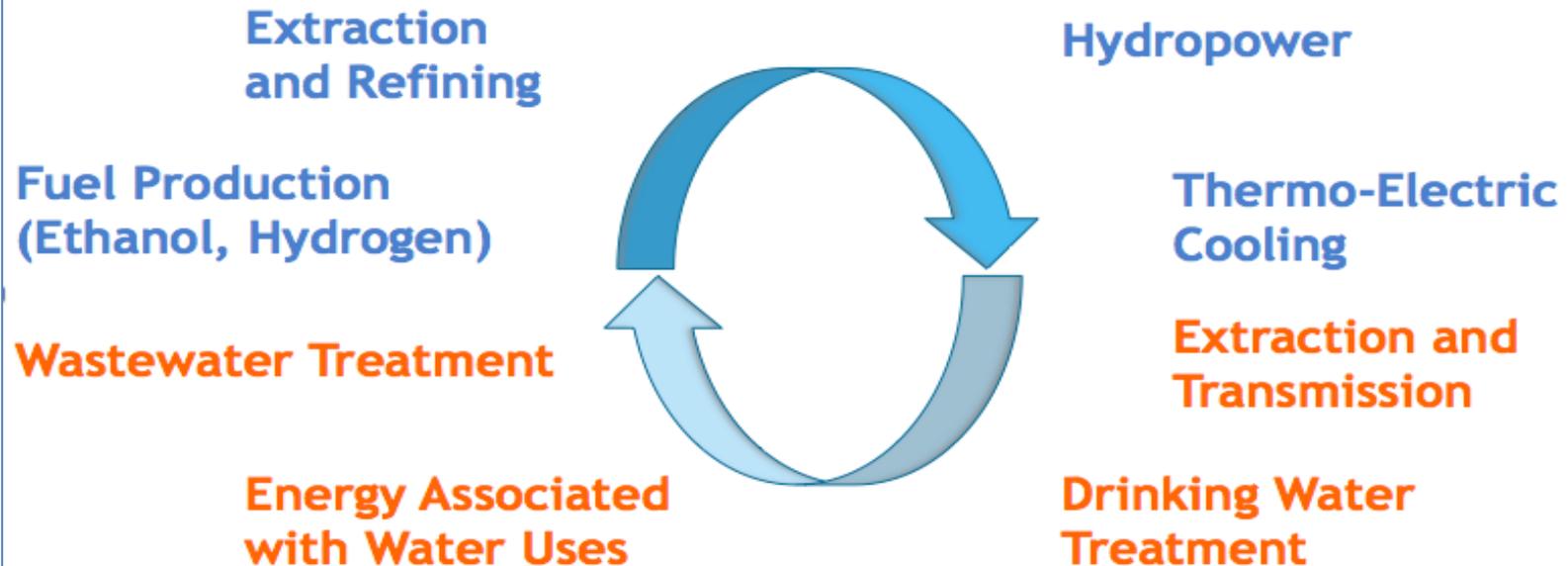
Latin America 74%



**SEVERE SOCIO-ENVIRONMENTAL
IMPLICATIONS ...**



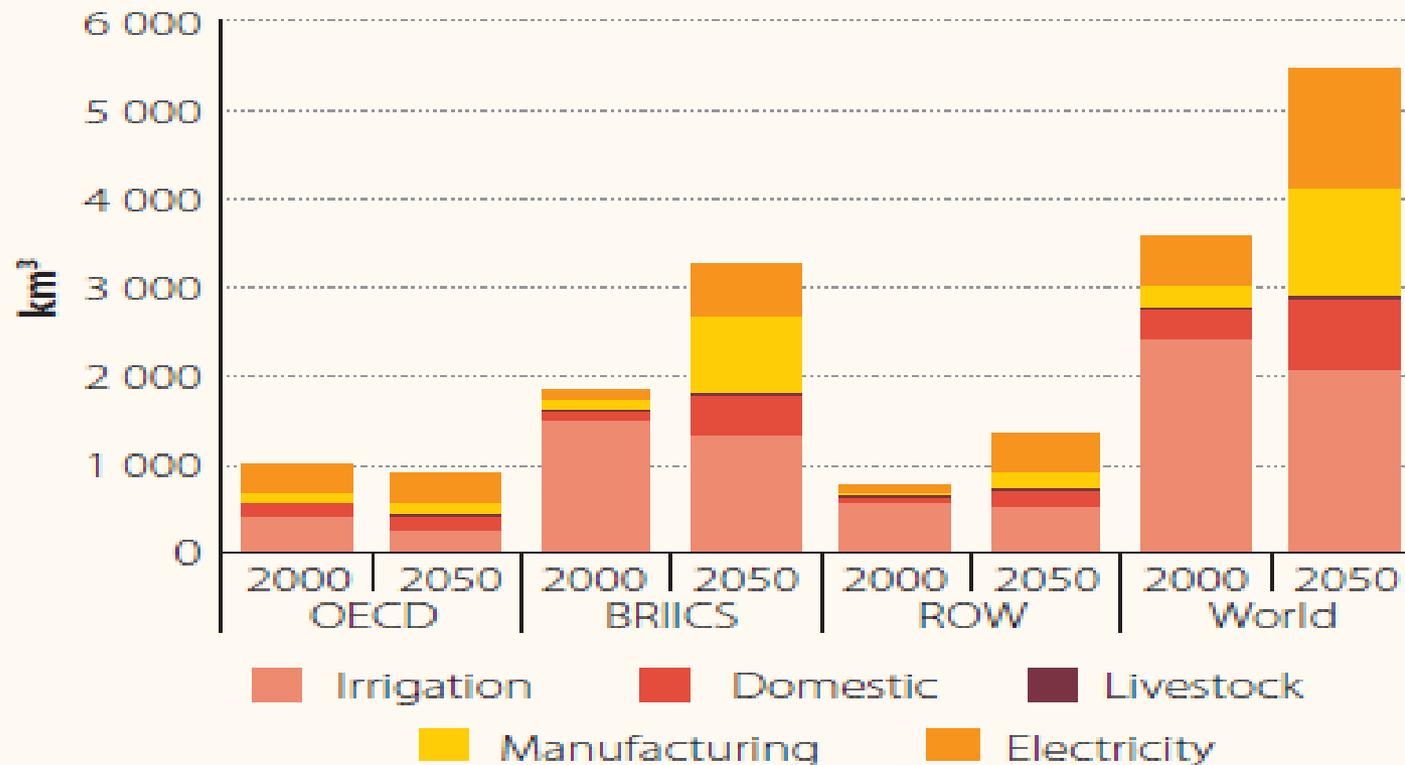
WATER FOR ENERGY



ENERGY FOR WATER



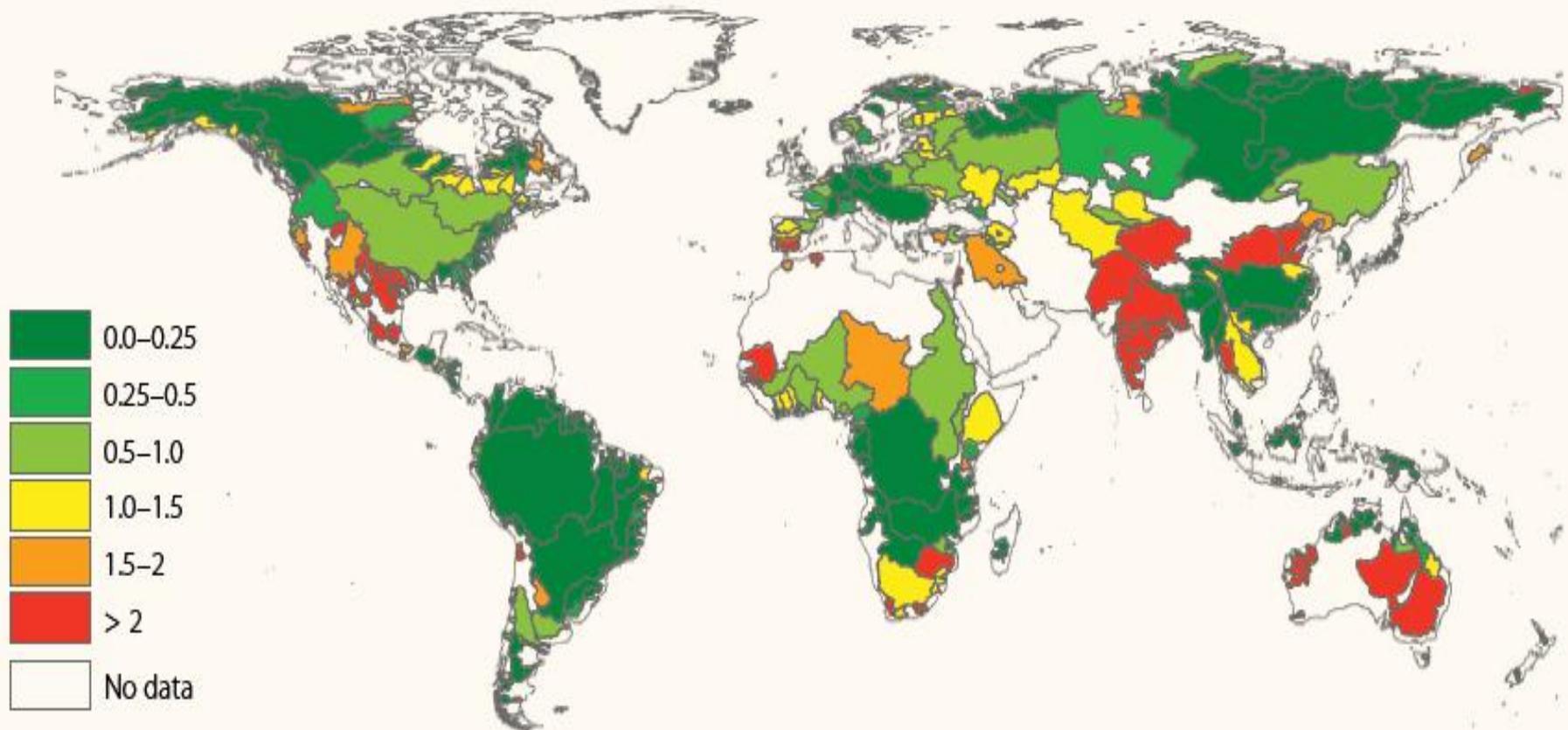
Global water demand (freshwater withdrawals): Baseline Scenario, 2000 and 2050





BLUE WATER AVAILABILITY APPROACHING **CRITICAL** LIMITS

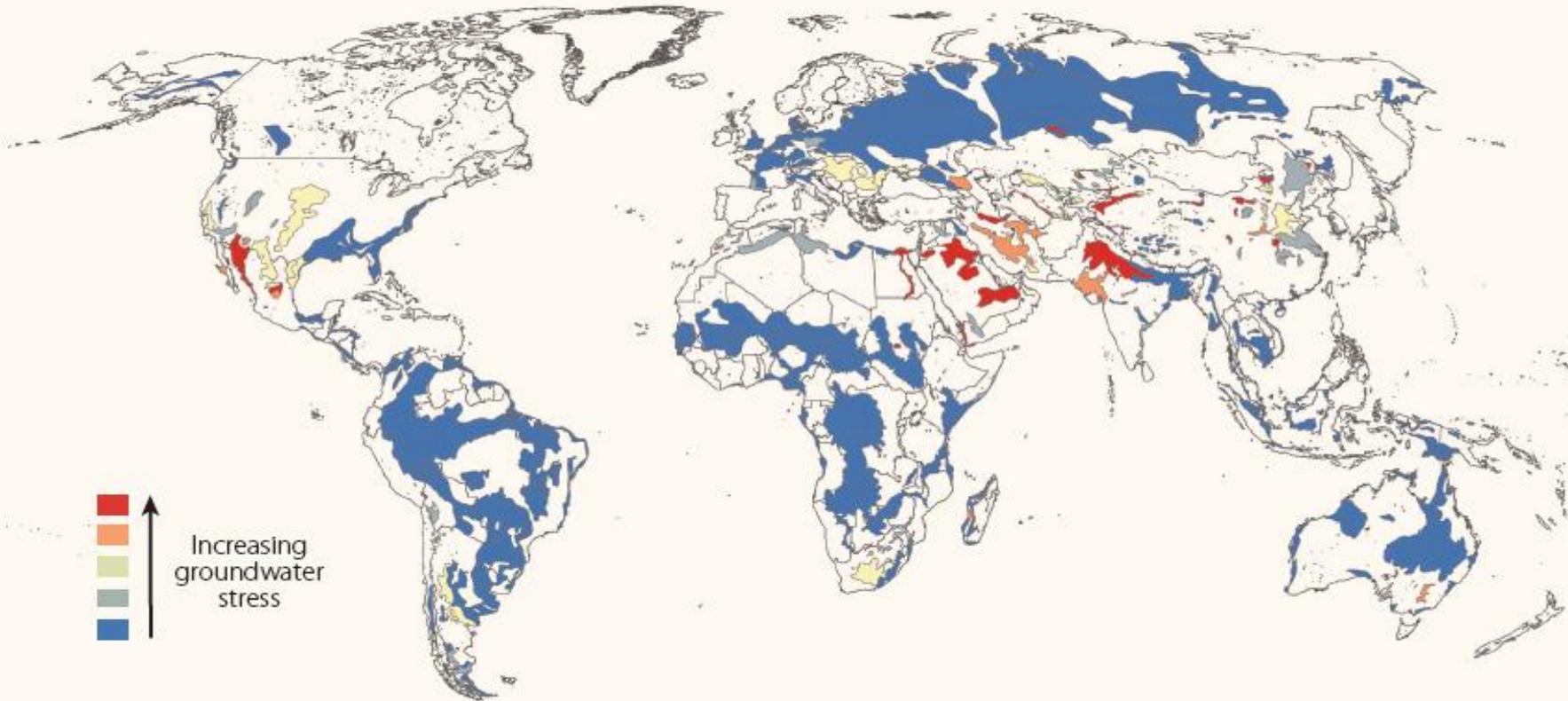
Annual average monthly blue water scarcity in the world's major river basins (1996–2005)





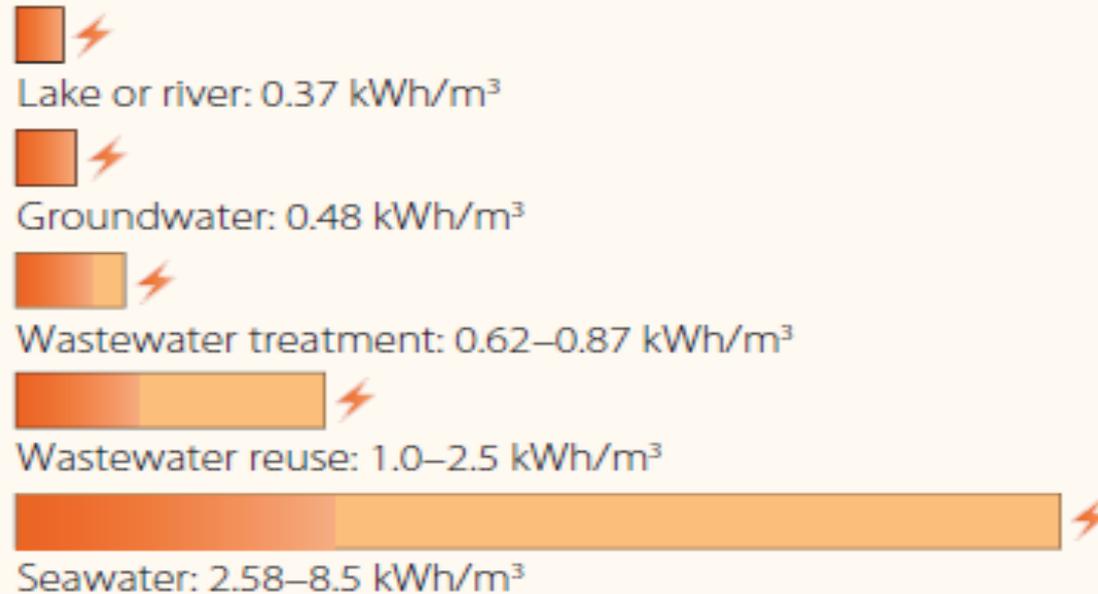
GROUNDWATER AVAILABILITY APPROACHING **CRITICAL** LIMITS

Water stress of aquifers important for farming



THE OTHER SIDE OF THE NEXUS: ENERGY *FOR* WATER

Amount of energy required to provide 1 m³ water safe for human consumption from various water sources





MEETING THE CHALLENGE

- Energy smart and water efficient AGRICULTURE
- Innovative CITIES
- An enhanced role for INDUSTRY
- Prioritizing ECOSYSTEM SERVICES
- SMART power generation



‘Living with Water’

new concepts in spatial planning



‘Living with Water’

new concepts in urban development



the WATER–ENERGY–FOOD–ENVIRONMENT nexus: at the heart of Hydro-Environment research





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Netherlands**



www.iahr2015.info





KEY DATES

November 4, 2014

Submission of ABSTRACTS

December 1, 2014

Notification of ACCEPTANCE

February 1, 2015

FULL PAPER / EXT ABSTRACT

EARLY BIRD registration deadline

April 1, 2015

FINAL NOTIFICATION

June 21–27, 2015

short courses / master class, Delft

June 28–3 July, 2015

IAHR World Congress, The Hague





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