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UBC Design Challenge: Water
October 2, 2015

Key Questions

- **Is water Scarce? Are we facing a water crisis?**
- **How important is an appreciation of social and spatial inequality for understanding differentiated water use and access?**
- **What are key challenges with respect to overcoming the uneven geographies of access and to extend water to the most impoverished?**
- **Key concerns: non stationarity; uncertainty; Water-Energy-Food Nexus**
- **What are important governance trends to consider (e.g. privatization, devolution)**

Key Questions

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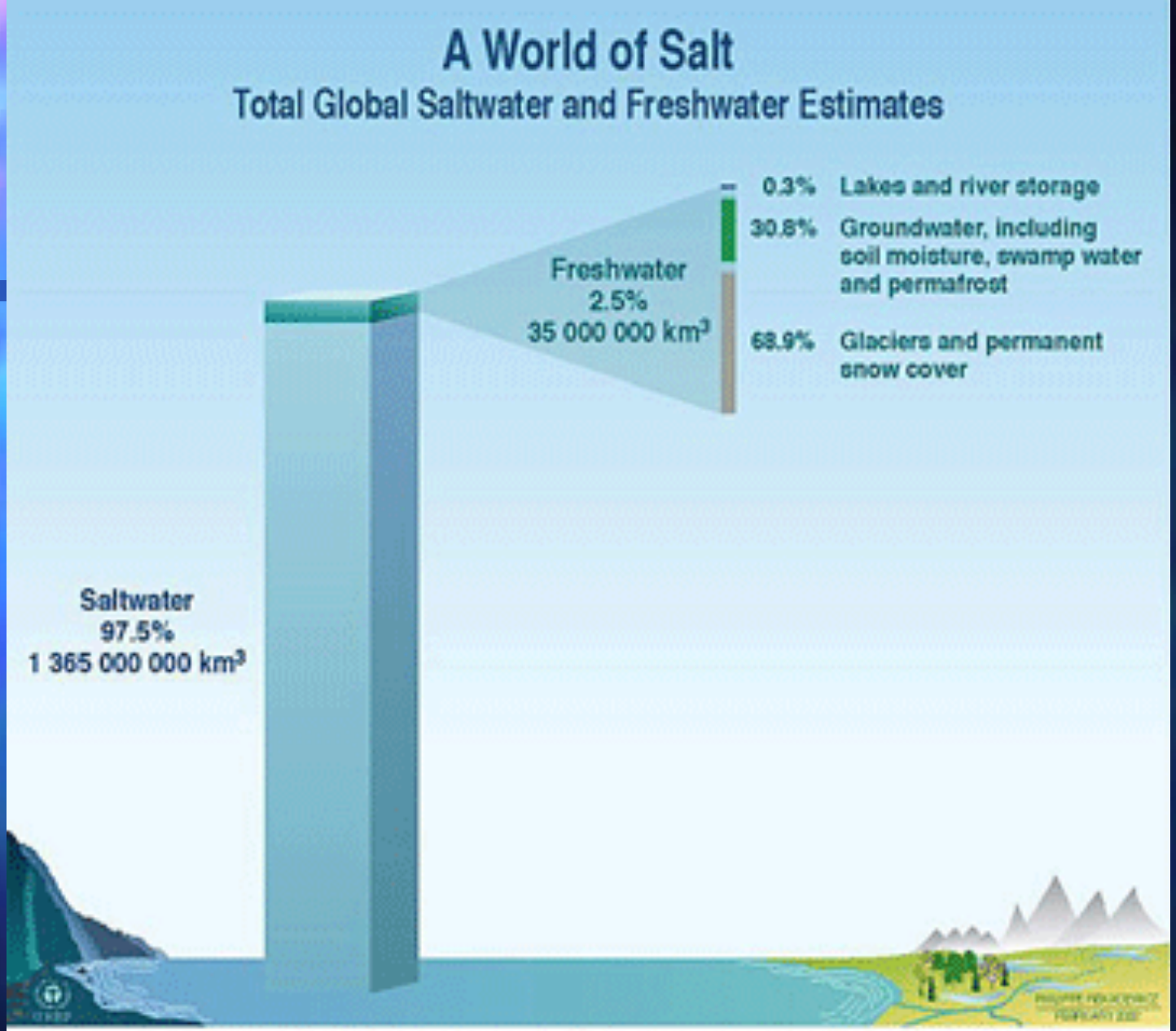
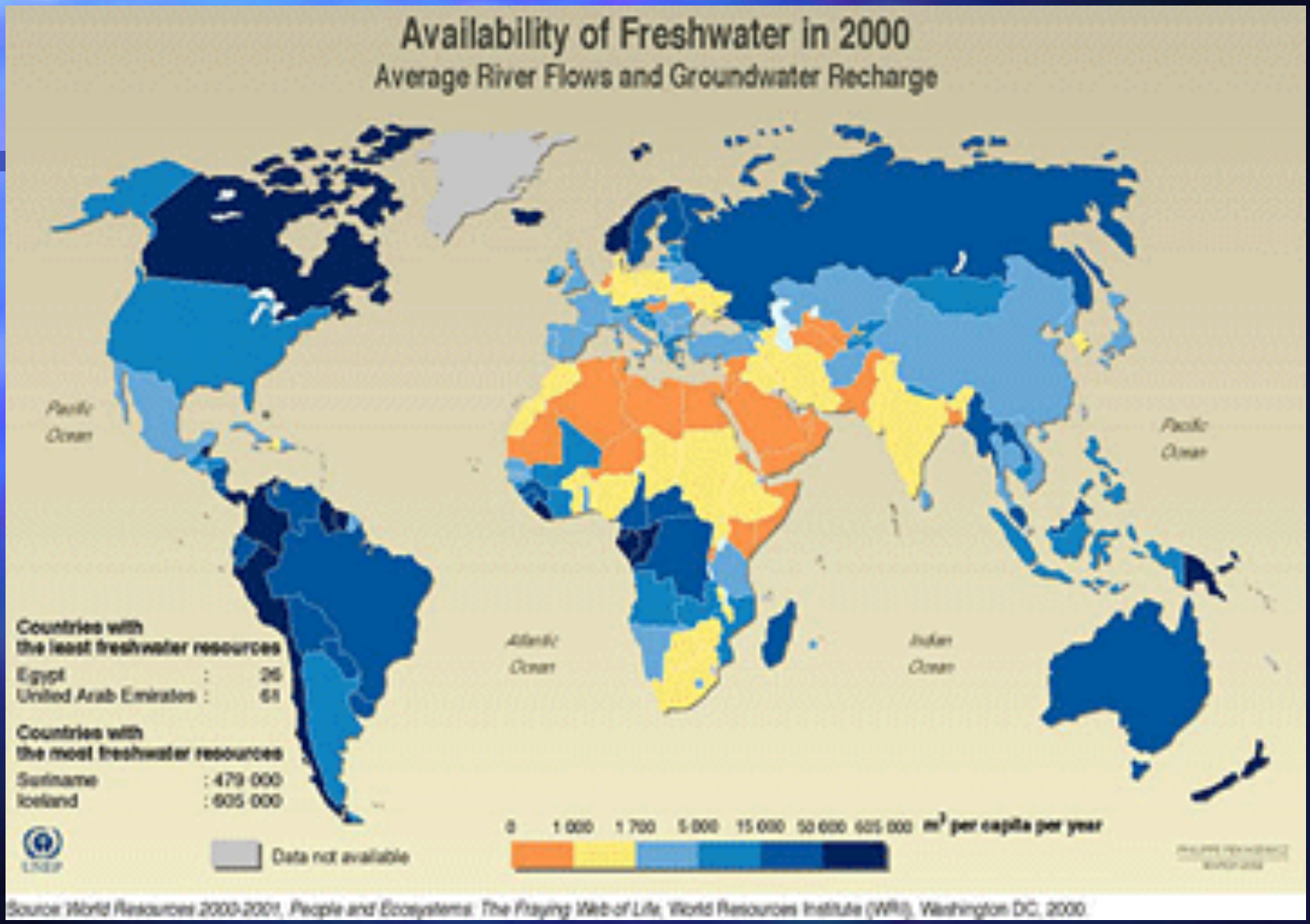
A World of Salt

Total Global Saltwater and Freshwater Estimates

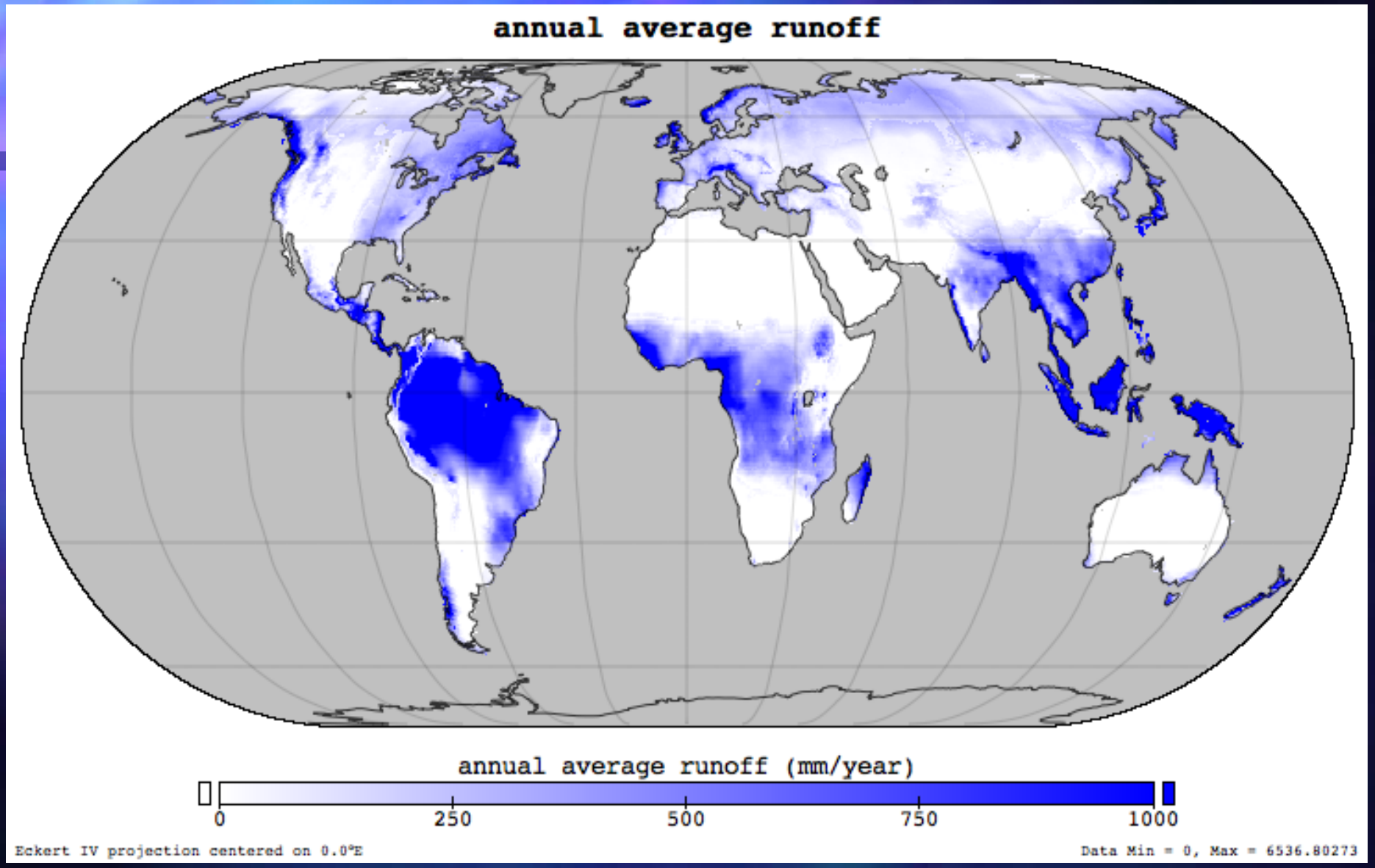


Source: Igor A. Shiklomanov, State Hydrological Institute (SHI, St. Petersburg) and United Nations Educational, Scientific and Cultural Organisation (UNESCO, Paris), 1999.

Importance of Geographic and Temporal Variability



Source: World Resources Institute, Washington DC, 2000.


annual average runoff
annual average runoff (mm/year)
0
250
500
750
1000
Eckert IV projection centered on 0.0°E
Data Min = 0, Max = 6536.80273

Israel's Ministry of Foreign Affairs

Israel's Chronic Water Problem (2011)

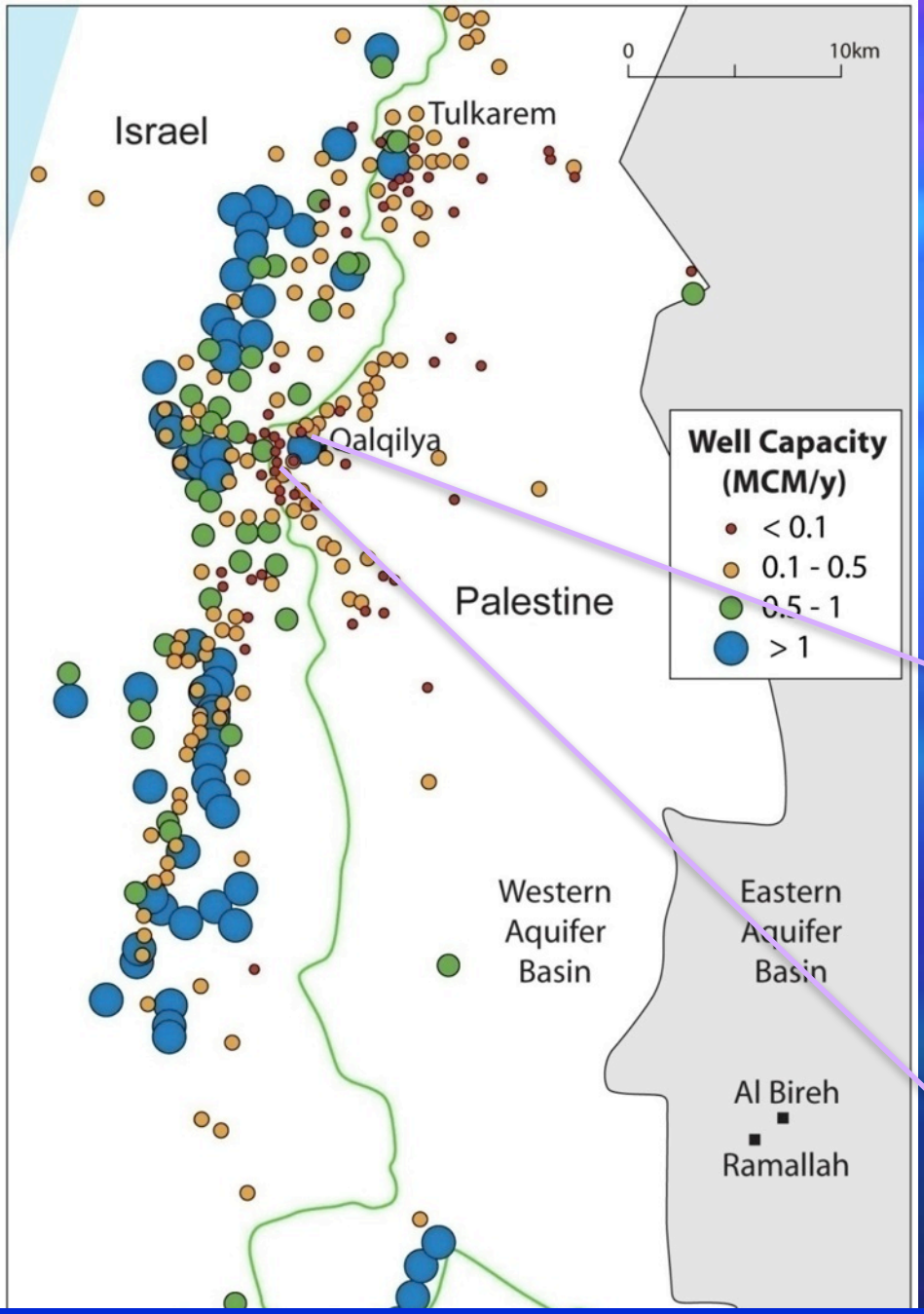
"Water is considered as a national resource utmost importance. Water is vital to ensure the population's well-being and quality of life and to preserve the rural-agricultural sector. Israel has suffered from a chronic water shortage for years. In recent years however, the situation has developed into a crisis …"

"crisis so severe that it is feared that by the next summer it may be difficult to adequately supply municipal and household water requirements."

http://www.mfa.gov.il/MFA/Facts%20About%20Israel/Land/Israel-s%20Chronic%20Water%20Problem

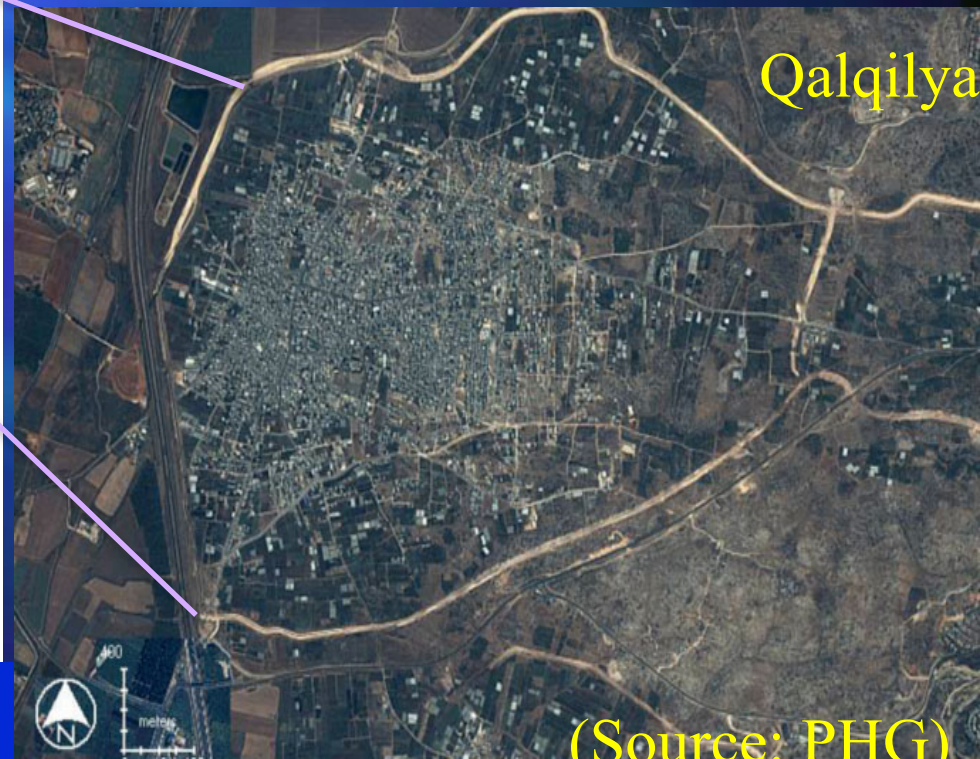
Map source: http://www.washingtonpac.com/polisrael.htm

Comparison of well capacity of Palestinian and Israeli well in the Western Aquifer



(Modified from Messerschmid 2005)

The Israeli Wall separates Palestinians from their water



(Source: PHG)

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Territories consume 1/5 per capita
Agriculture consumes 40-50%

http://www.mfa.gov.il/MFA/Facts%20About%20Israel/Land/Israel-s%20Chronic%20Water%20Problem

Map source: http://www.washingtonpac.com/polisrael.htm

Key Questions

- **Is water Scarce? Are we facing a water crisis?**

Socially produced scarcity?

Yes, biophysical changes exist… (drawdown of aquifers, climate change…)

Often scarcity only in some realms /populations

Infrastructure, investment, question of priorities?

Human focus, ecological focus, etc… (land uses, deforestation, source water protection…infrastructure?)

UNDP, 2006

"with population rising and demands on the world's water expanding, so the argument runs the future points to a 'gloomy arithmetic' of shortage. We reject this starting point. The availability of water is a concern for some countries. But the scarcity at the heart of the global water crisis is rooted in power, poverty and inequality, not physical availability."

Source: UNDP, human development report, 2006, new york, oxford university press.

Global Water Challenges

- Over 1 B people do not have regular access to safe potable water
- 10M + /year die from unsafe water/sanitation
- Populations in LDCs often pay 10-100X
- Considerable unevenness in terms of availability and access (e.g. US v. LDCs, Palestine/ Israel)
- Consumption *increasing* for agriculture, and industrial uses, as we also face increasing *uncertainty* Climate Change, Pollution issues
- No single laws, governance structure

A Governance Crisis?

Water governance refers to how we make decisions about how to use and manage water.

Marseille, 2012, World Water Forum
Karen Bakker, OECD…

Disasters? Droughts? Floods?

How central is social and spatial inequality to understanding differentiated water use, access, or quality?

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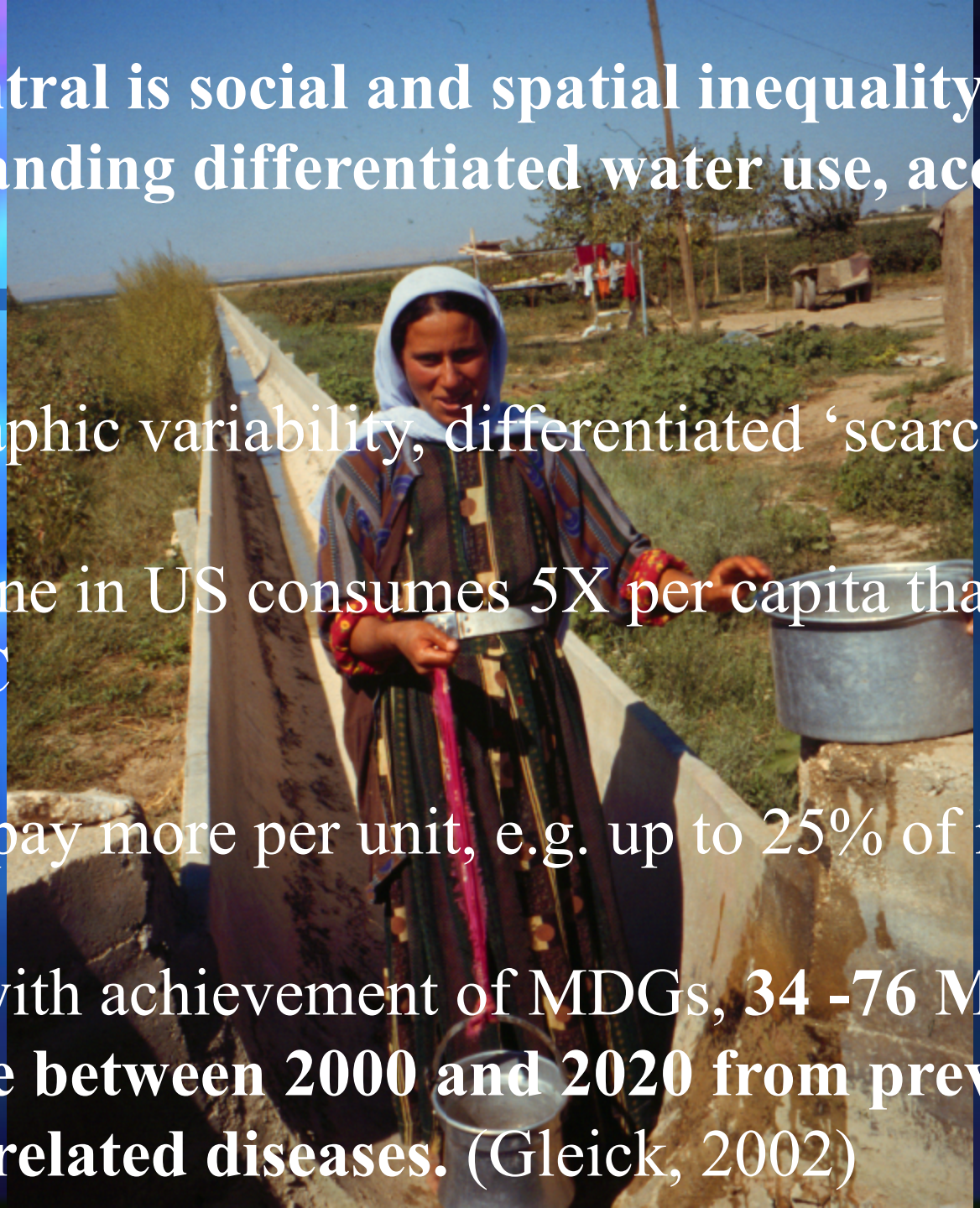

Geographic variability, differentiated 'scarcities'

Someone in US consumes 5X per capita than someone in LDC

LDCs pay more per unit, e.g. up to 25% of income?

Even with achievement of MDGs, **34 -76 M people will die between 2000 and 2020 from preventable water related diseases.** (Gleick, 2002)

How might urban center prepare for water crises (floods and drought)

- Yes, infrastructure, but…
- 'Other choices' (energy, biodiversity, SWP)
- Make choices more explicit? Silos?
- Non-stationarity
- Uncertainty
- Novel and adaptive governance?

Where we are headed…

(but not there yet!)

- Upgrades needed (new systems)
- Landscape resilience (e.g. rain gardens)
- Water-Energy-Food nexus
- Adaptive capacity/resilience
- Flexible governance (learning, etc…)
- Demand management (e.g. wastewater)
- Limits: fixed infrastructure, institutions, culture (e.g. FEMA)
- Vulnerable populations/sites/ecologies
- Water Quality

Known ‘unknowns’

- Demands for water likely increasing (urbanization, energy…)
- Transformative governance, how to do it better?
- How to better engage people who are affected (top down not possible)
- Groundwater, uncertainties
- Techno-fix unlikely to succeed
- Difficult trade-offs

Key words

- Scale?
- Seasonality-temporality?
- Variability/ vulnerability?
- Institutional/ Governance?
- Nimble/ Flexible/ Fixed?
- Short term / long term?
- Tradeoffs?

Questions ?