

Water and WaTER

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WaTER.ou.edu





Water → Safe Water

- Historically, what pathway caused deaths due to cholera (London – 1850s), typhoid (Chicago, 1880s) and cryptosporidium (Milwaukee, 1993)?
- According to British Medical Society, what health advance has saved more lives than any other in the past 160 years?



Global Water/Sanitation

- ~ 2 B people lack safe / reliable drinking water
- ~ 4 B people lack safe / reliable sanitation
- ~ 700K deaths a year (a child every 45 seconds) – comparable to AIDS/malaria
- 1.2 billion people survive on less than \$1US per day; poorest pay most for safe water

* WHO JMP 2017



Global Water Crisis



Water/sanitation → health → education →
development → PEACE!



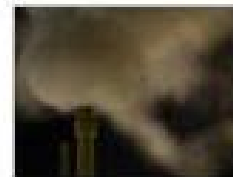
14 NAE Grand Challenges



Make solar energy economical



Provide energy from fusion



Develop carbon sequestration methods



Manage the nitrogen cycle



Provide access to clean water



Restore and improve urban infrastructure



Advance health informatics



Engineer better medicines



Reverse-engineer the brain



Prevent nuclear terror



Secure cyberspace



Enhance virtual reality



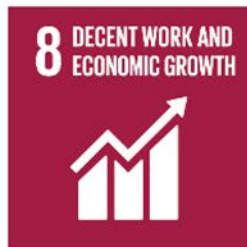
Advance personalized learning



Engineer the tools of scientific discovery



SUSTAINABLE DEVELOPMENT GOALS





The WaTER (Water Technologies for Emerging Regions) Center

The WaTER Center aims to promote peace by advancing health, education and economic development through sustainable water and sanitation solutions for impoverished regions.

Education:

Undergrad Minor in “Water & Sanitation for Emerging Regions”

- All majors
- 18 hours – technology/financial/social
- In country internship

Service Learning:

Sooners Without Borders (SWB)

- International / domestic projects
- Open to all majors

Biennial Prize / International Conference

- \$25 K – first award in 2009

Directors:

Jim Chamberlain
Robert Knox
David Sabatini
Randy Kolar
Peter Lochery
Robert Dreibelbis
Yang Hong
Bob Nairn



WaTER Directors with 2015 OU International Water Prize winner Peter Lochery (*above*)
Students in Field Methods course (*below*)



Sooners Without Borders builds an eco-latrine for the OU WaTER Conference

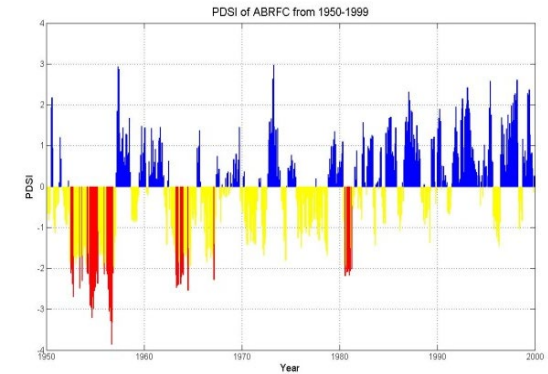


EDUCATION.

- Undergraduate courses specific to water, sanitation, and health
- Undergraduate minor: “Water and Sanitation for Health and Sustainable Development” (the WaTER Minor)
 - Core courses
 - Elective courses: anthropology, social entrepreneurship, social sciences, etc.
- Peace Corps prep
- Sooners Without Borders – service organization on campus
- Work in: El Salvador, Dominican Republic, Bolivia, India, Cambodia, Ethiopia, Uganda, Cote d’Ivoire



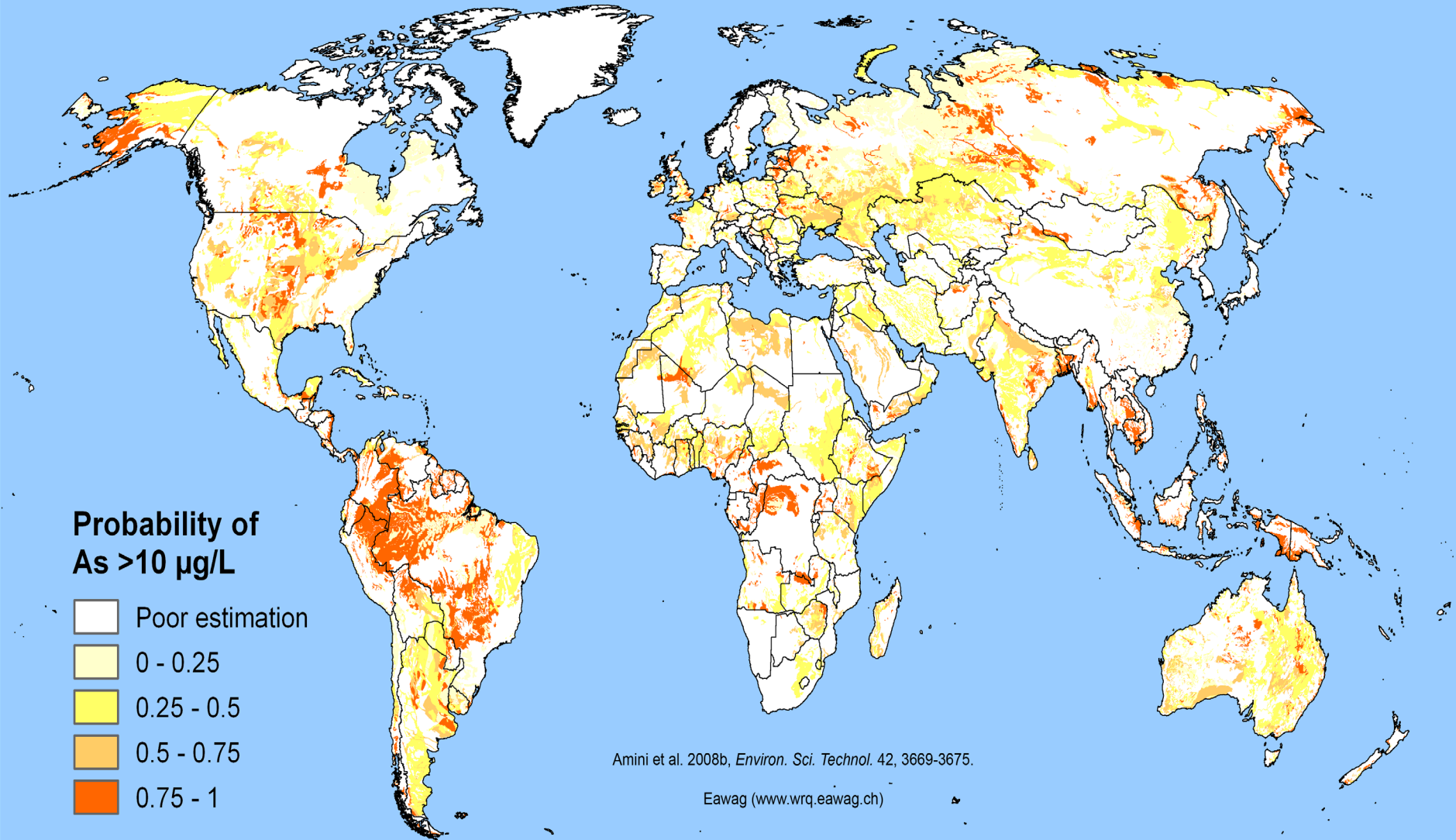
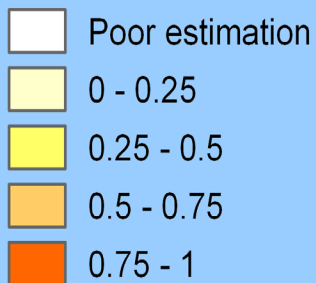
- Water Security – Quantity, Quality and Equity
- OU strengths, Oklahoma history, importance to emerging regions
- Sustainable solutions – integrate human, economic/business, and technical factors – **sustainable systems**
- Three research focus areas
 - Water resources / climate change – dust bowl
 - Passive wetlands treatment – mine drainage (Tar Creek) and wastewater / sanitation
 - Drinking water treatment – arsenic & fluoride



Naturally Occurring Arsenic

Modeled global probability of geogenic arsenic contamination in groundwater for reducing and for high-pH/oxidizing aquifer conditions

**Probability of
As >10 µg/L**



Amini et al. 2008b, *Environ. Sci. Technol.* 42, 3669-3675.

Eawag (www.wrq.eawag.ch)



- Impacted ~ 1/2 of gw supply – treatment vs other water
- Alternate water \$\$ - pilot test of Bayoxide (granular ferric oxide) – technically viable / cost competitive

Arsenicosis - Cambodia





Sustainable Solutions



Engineering



Anthropology
(Dr. Paul Spicer)



Business
(Dr. Lowell Busenitz)

PASSIVE TREATMENT SYSTEMS IN BOLIVIA (NAIRN)

- Centuries of mineral extraction
- Irrigation with metal contaminated waters
- Coupled with lack of sewage/ water treatment
- Multiple partners both in Bolivia and the US (e.g., Engineers in Action, Rotary International)



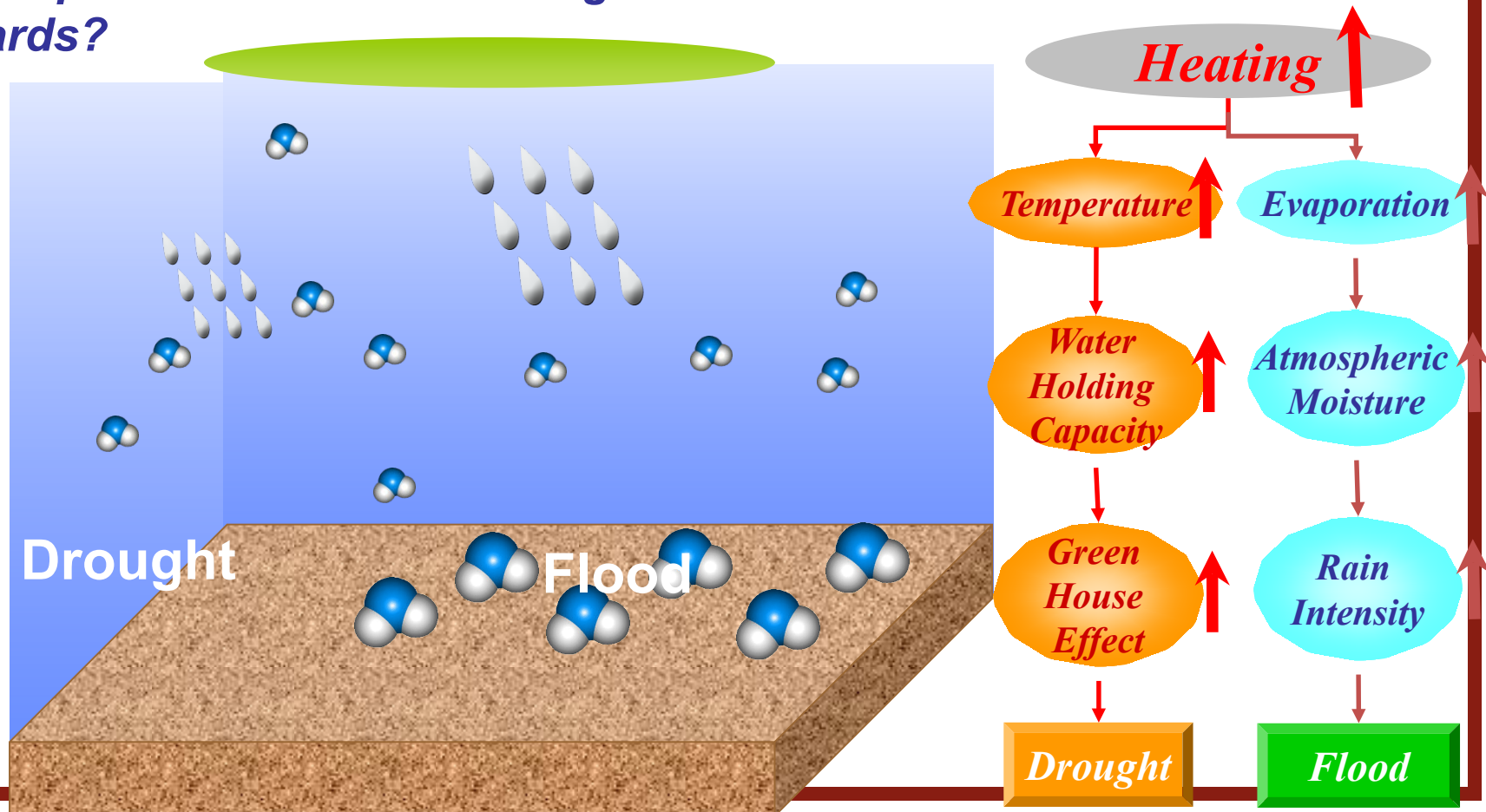


Climate/Water Resources

(HONG)

The hydrologic cycle has been intensifying as a result of warming climate:

Expect more Flood / Drought / Heat Wave / Ice Storms / Natural Hazards?





Outreach: Capacity Building, Workshop and



Researchers and graduate students have transferred our technology and systems to build local capacity by providing remote assistance, on-site workshops, and hands-on training in:

Africa (Kenya, Namibia, Rwanda)

South Asia (Pakistan, Nepal, Bhutan)

Central/South America (Panama, Colombia)



NASA-SERVIR CREST Modeling Workshop Commencement at RCMRD of Kenya



Zac Flamig Hosted CREST Hydrologic Model Training Workshop in Kigali, Rwanda





Martha Gebeyehu

Ethiopian Kale Heywet Church Development Commission

Past Prize Winners

Steve Luby (Stanford University) – '09

Ben Fawcett (University of Queensland) – '11

Ada Oko-Williams (WSA) – '13

Peter Lochery (CARE) – '15

Eric Stowe (Splash) – '17





2019 OU International WaTER Conference / Prize Ceremony
September 16-17, 2019



Water Technologies
for Emerging Regions
"Water and Sanitation for All"

Questions?

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