Nature: The Wave of Change for Water

DR. HEATHER TALLIS
Lead Scientist
“The smaller the thing you study, the bigger the problems you can address”
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What’s the Role of Nature?

- Hydropower
- Drinking Water Quality
- Groundwater
Hydropower Infrastructure
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Amaluza Dam, Ecuador
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- Largest dam in Ecuador
- 2009 energy crisis from low water here
- Increased sedimentation rates from land use change
Amaluza Dam, Ecuador

- Cosmogenic nuclides
- Areas with 75-80% vegetation cover have pre-anthro erosion rates
- Areas with lower cover have up to 10 times higher erosion

Vanacker et al. 2007
~7,000 Global Dams
Huge Potential for Nature
What role will it play?
Surface Drinking Water
Medellin, Colombia
Medellin, Colombia

- 2nd largest city in Colombia
- Drinking water for 3.8 million people
- 3 reservoirs
- Major agriculture expansion in watersheds
Medellin, Colombia

- Cyanobacterial blooms fueled by ag runoff
- 50-100 year pollution legacy in sediments
- Natural vegetation can retain up to 89% of phosphorus runoff
Watershed Scale Investment Design
Desbaratado Watershed, Colombia
GLOBAL POTENTIAL: REVEALED TODAY
Groundwater
Africa’s Water Needs

70% of countries are behind on MDG water access targets

80% of the population relies on groundwater

Adelana et al. 2012, UN-Water 2012
Failing Wells

Uganda & South Africa - 40-50% failure rates

Mali - 90% failure within 1 year
‘Sustainability’ in Water Development
Does the pump still work?

Mechanical Failure
Contamination
Dry Well
Ghana – at least 1/3 of failures
Extractable Water

Aquifer productivity

- Very High: >20 l/s
- High: 5-20 l/s
- Moderate: 1-5 l/s
- Low-Moderate: 0.5-1 l/s
- Low: 0.1-0.5 l/s
- Very Low: <0.1 l/s

Studies Used in Map

Study data
- Local scale studies (<62500 km²)
- Regional studies (>62500 km²)

confidence
- 1 - high
- 5 - low

Map data
- Regional or qualitative map data
- Quantitative country map data
Huge Aquifer discovered in Northern Kenya

‘Sustainability’ in Water Development

Does the pump still work?

Help provide clean water
Donate Now >
Speak Out >
Sponsor a Child >

Harvey 2004
How do we get there?
What’s Stopping Us?

CAS researcher on South-North transfer project:
“We had other choices, but construction is easier. You pay. Companies build it.”
Science Shortfalls

Groundwater: tech leapfrog?
Science Shortfalls

Groundwater: tech leapfrog?
Science Shortfalls
What actually works at scale?
Incentives
BE THE WAVE OF CHANGE