



# Nature: The Wave of Change for Water

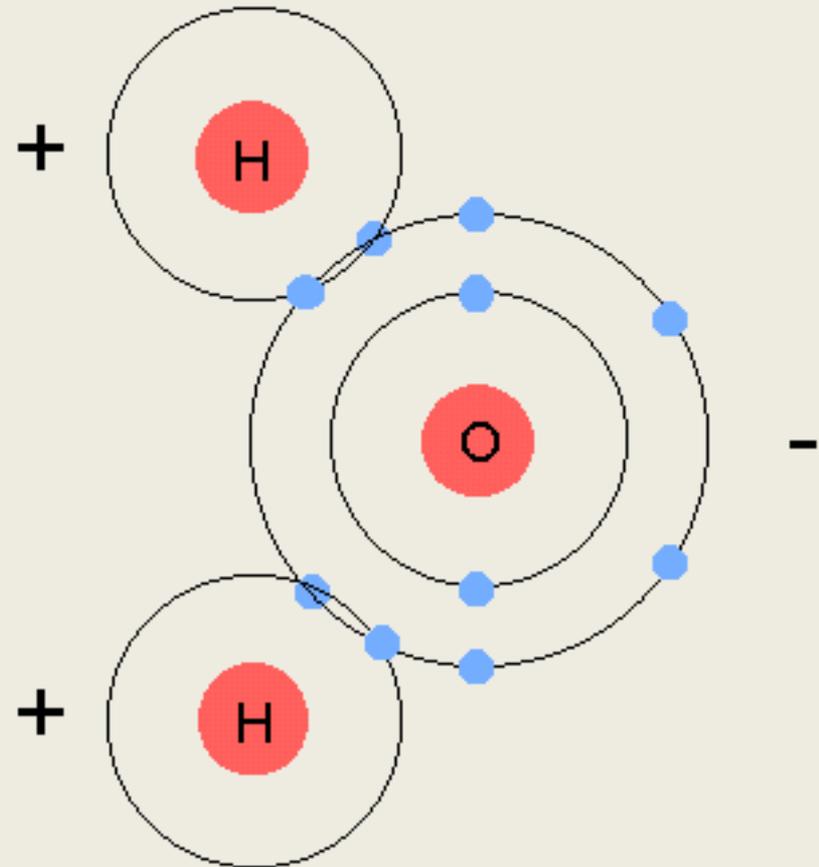
DR. HEATHER TALLIS  
*Lead Scientist*



“The smaller the thing you study,  
the bigger the problems you can address”



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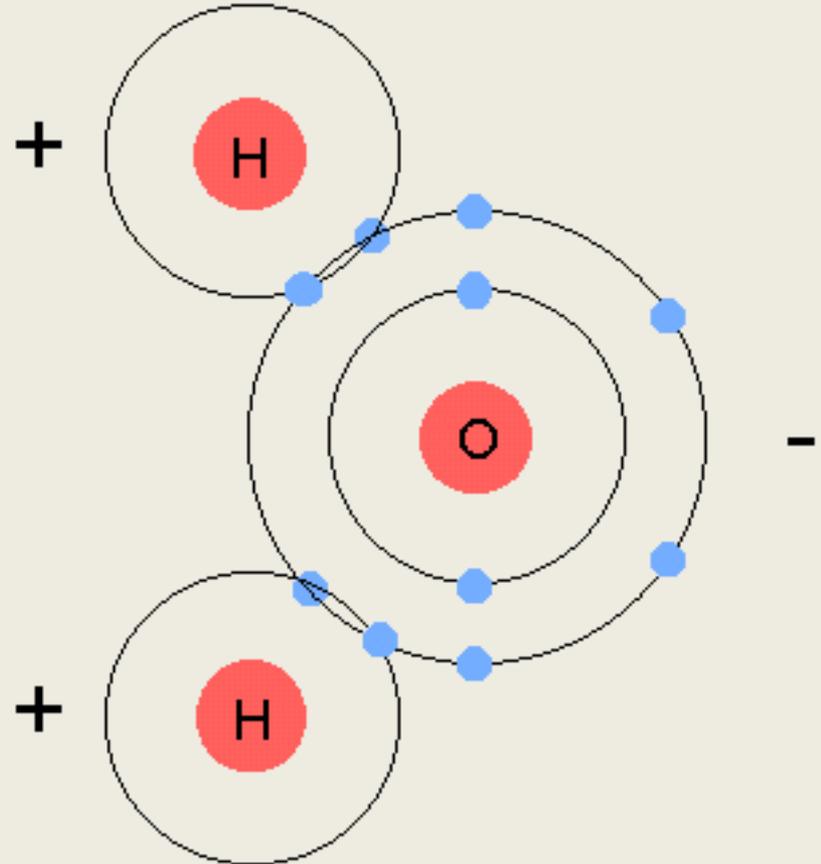


# What's the Role of Nature?

Hydropower

Drinking Water Quality

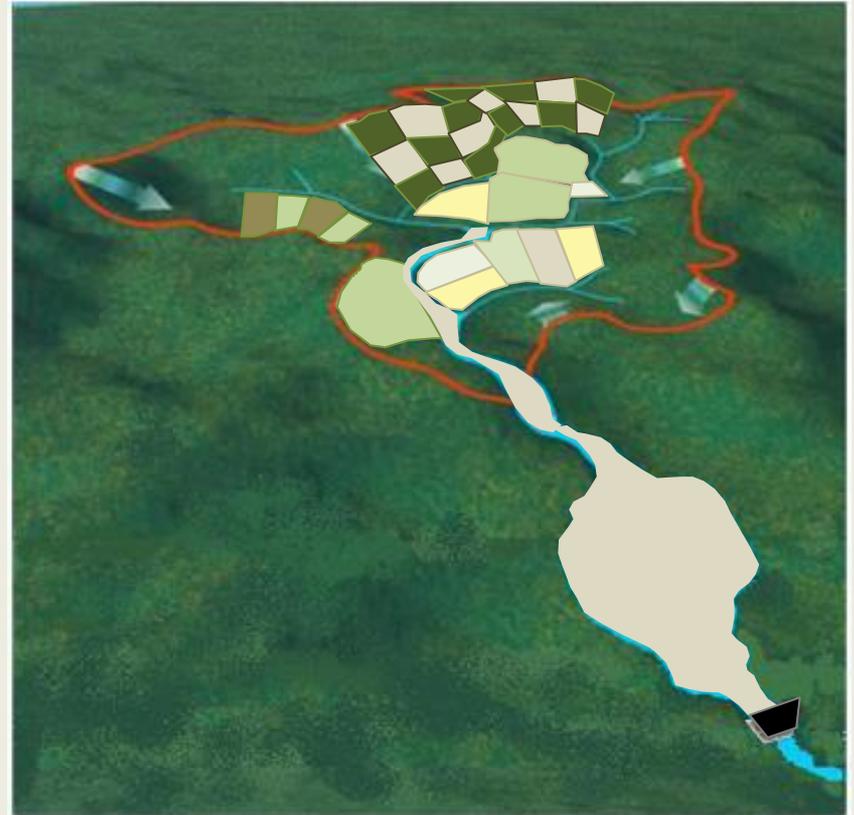
Groundwater



# Hydropower Infrastructure



# Hydropower Infrastructure



# Amaluza Dam, Ecuador



# Amaluza Dam, Ecuador



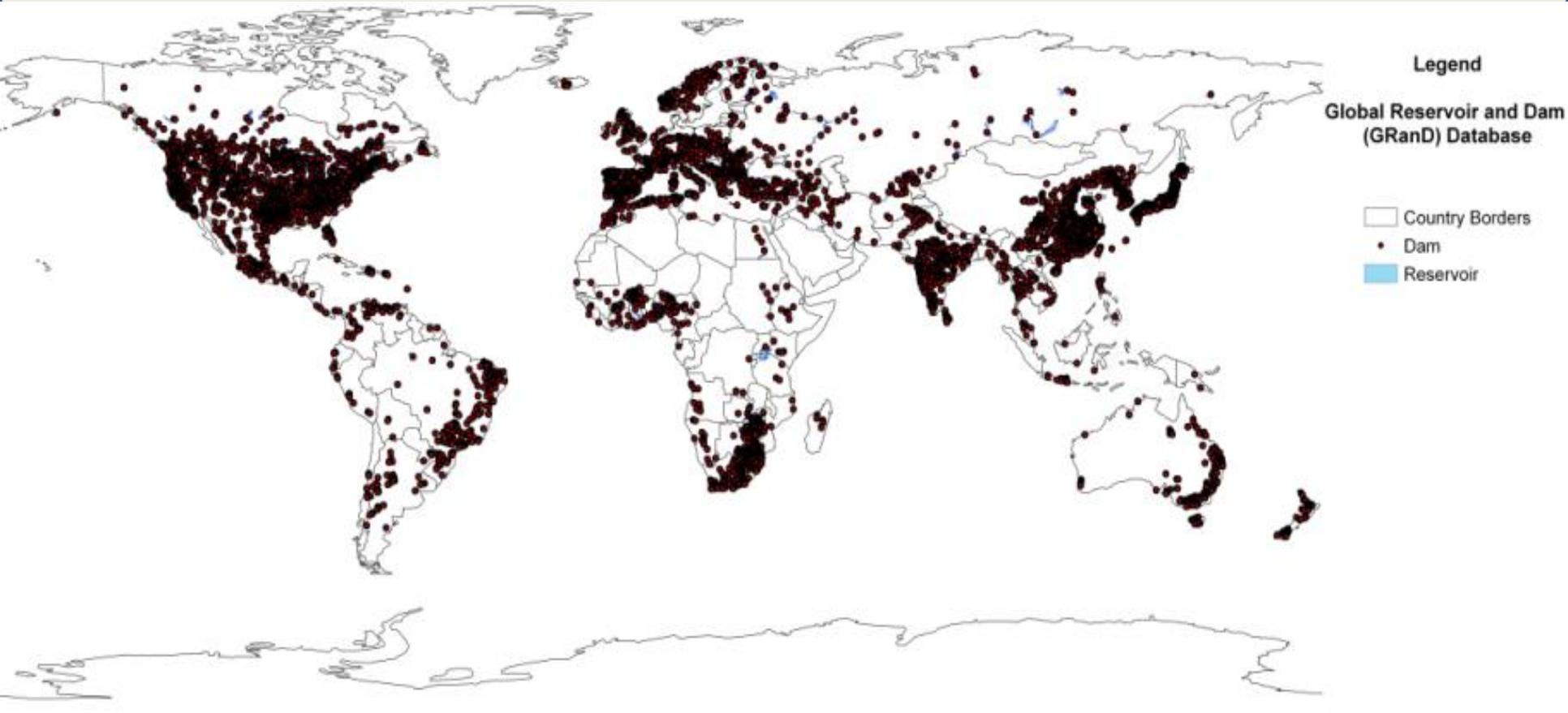
- Largest dam in Ecuador
- 2009 energy crisis from low water here
- Increased sedimentation rates from land use change

# 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

~7,000 Global Dams

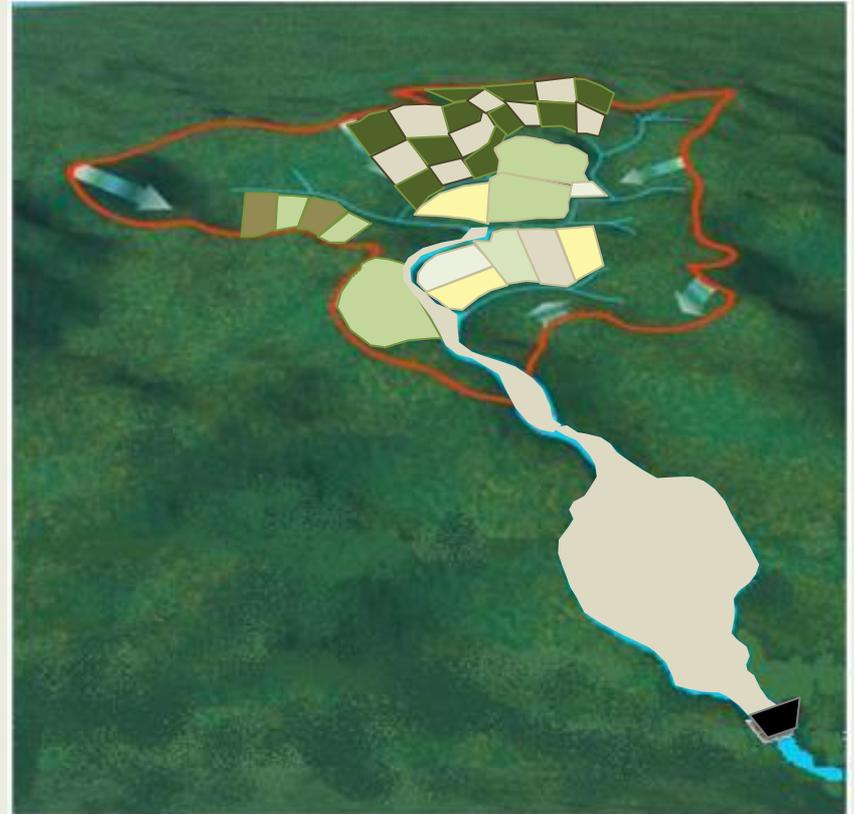


# Huge Potential for Nature

What role will it play?



# Surface Drinking Water



# Medellin, Colombia



# Medellin, Colombia

- 2<sup>nd</sup> largest city in Colombia
- Drinking water for 3.8 million people
- 3 reservoirs
- Major agriculture expansion in watersheds



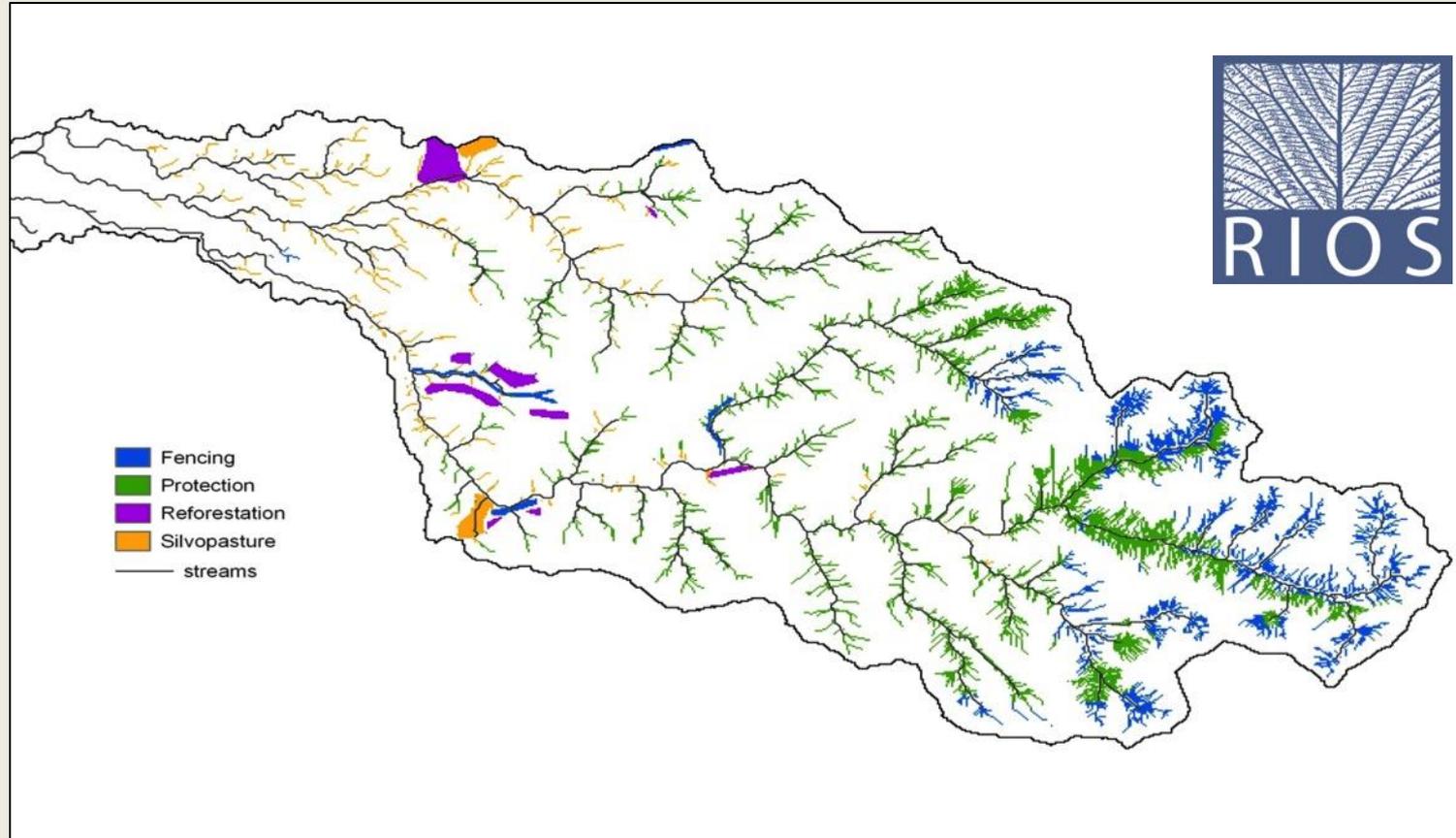
# Medellin, Colombia

- 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



# Continental Scale Targeting

## Conserving Nature for Water Security Medellín

### POPULATION



### URBAN WATER SOURCES



### WATER QUANTITY RISK

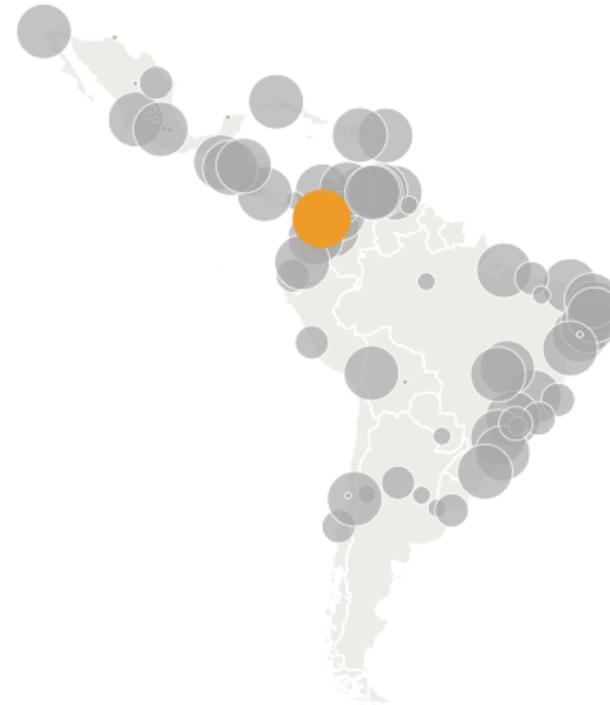


### WATER QUALITY RISK



### REGIONAL COMPARISON

Annual Phosphorous Yield Category



### DASHBOARD OPTIONS

To highlight a single city, click a dot in one of the graphs or map, or select the dropdown below. To compare cities, select with the dropdowns. A city can be displayed by clicking a dot in the map.

Medellín

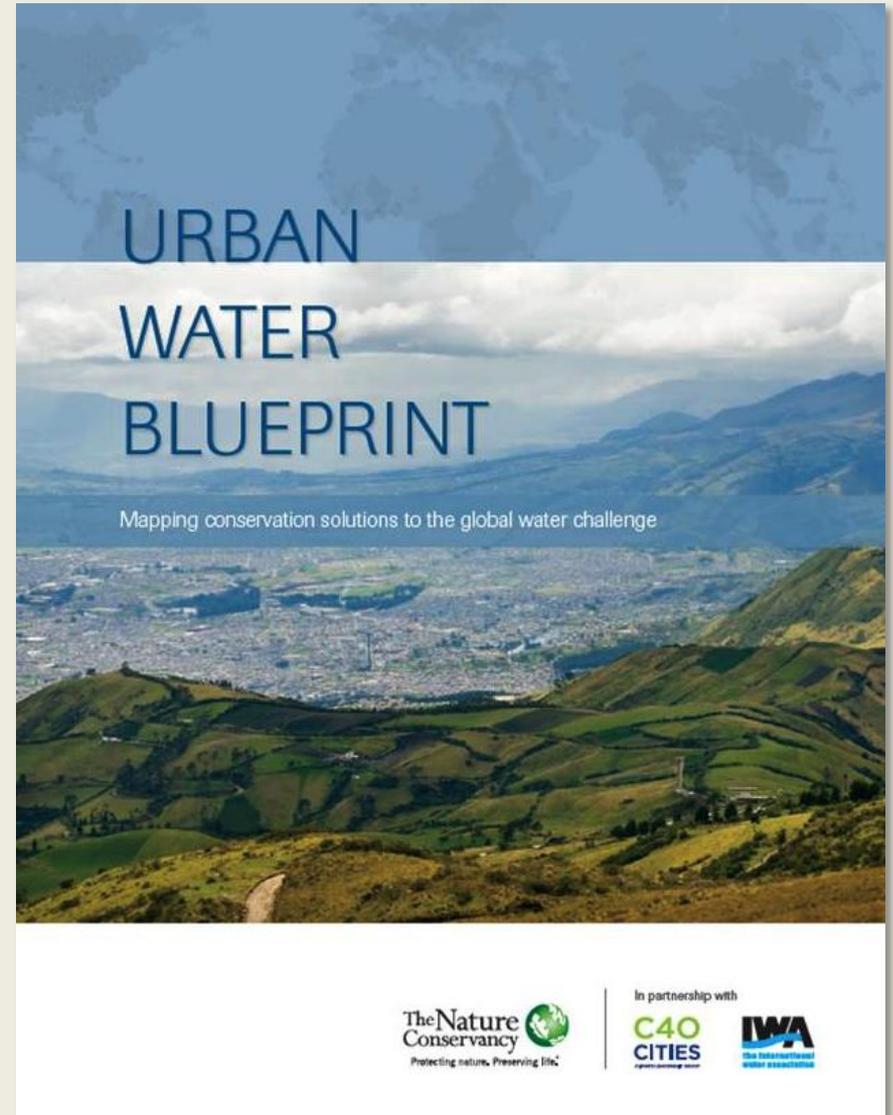
-- Select City --

Highlight LACC Priority Cities

Reset Selection

# GLOBAL POTENTIAL: REVEALED TODAY

THE NATURE CONSERVANCY



The Nature  
Conservancy   
Protecting nature. Preserving life.

In partnership with

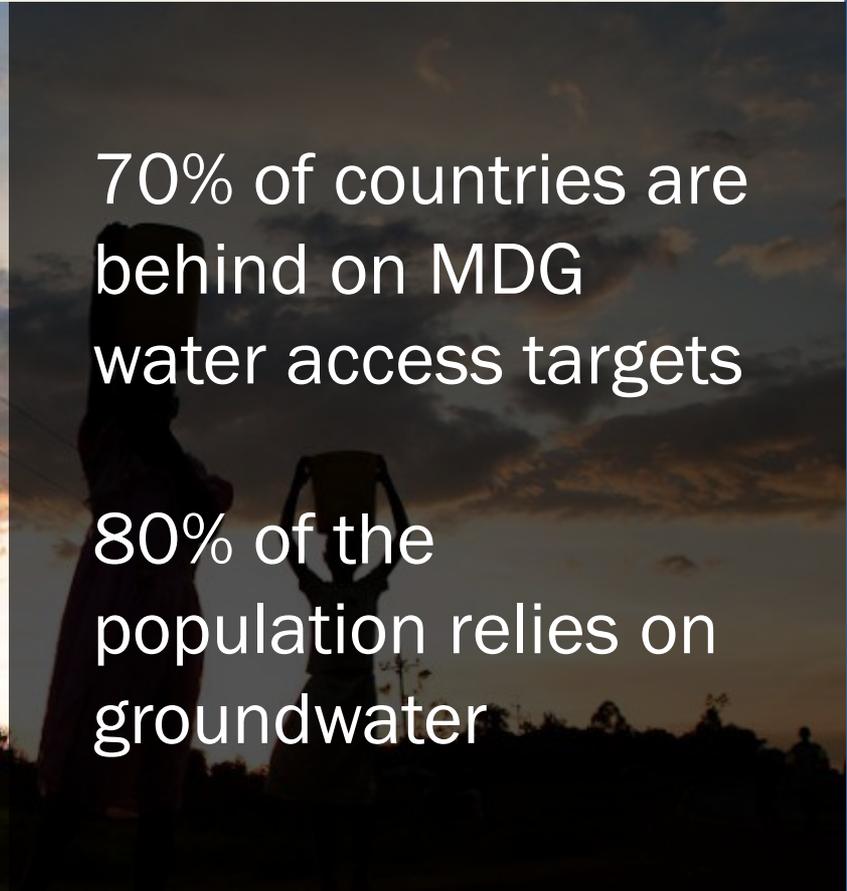
C40  
CITIES  
a partnership with

IWA  
the international  
water association

# Groundwater



# Africa's Water Needs



70% of countries are behind on MDG water access targets

80% of the population relies on groundwater

# 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

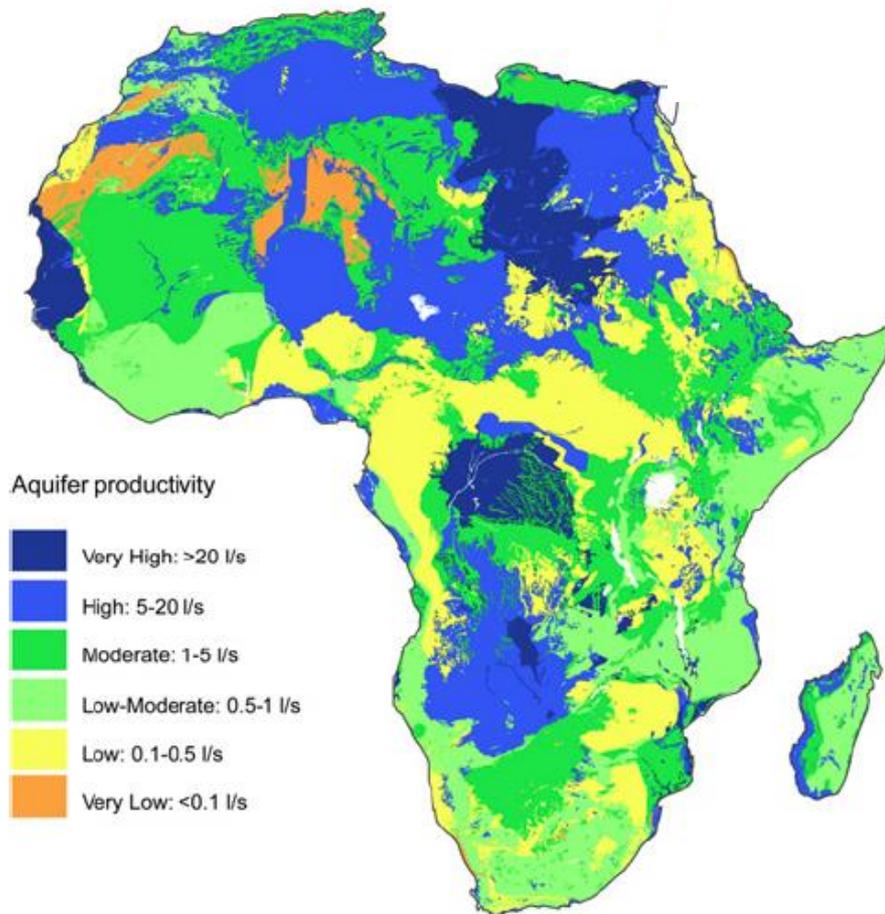
Contamination

Dry Well

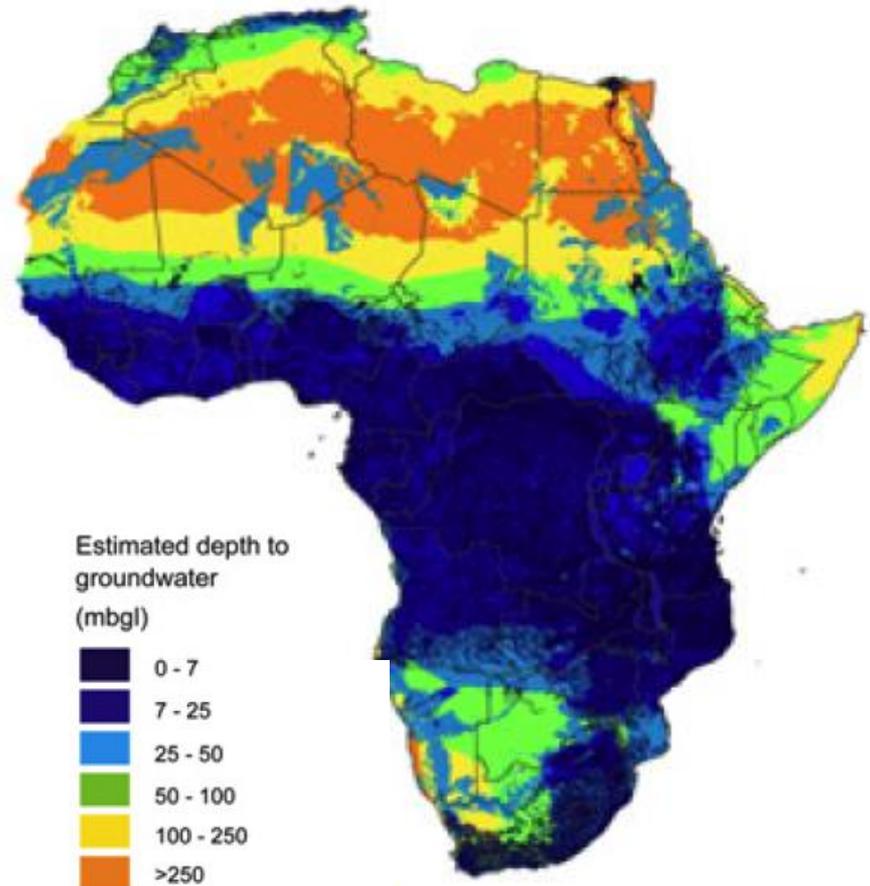
*Ghana – at least 1/3  
of failures*



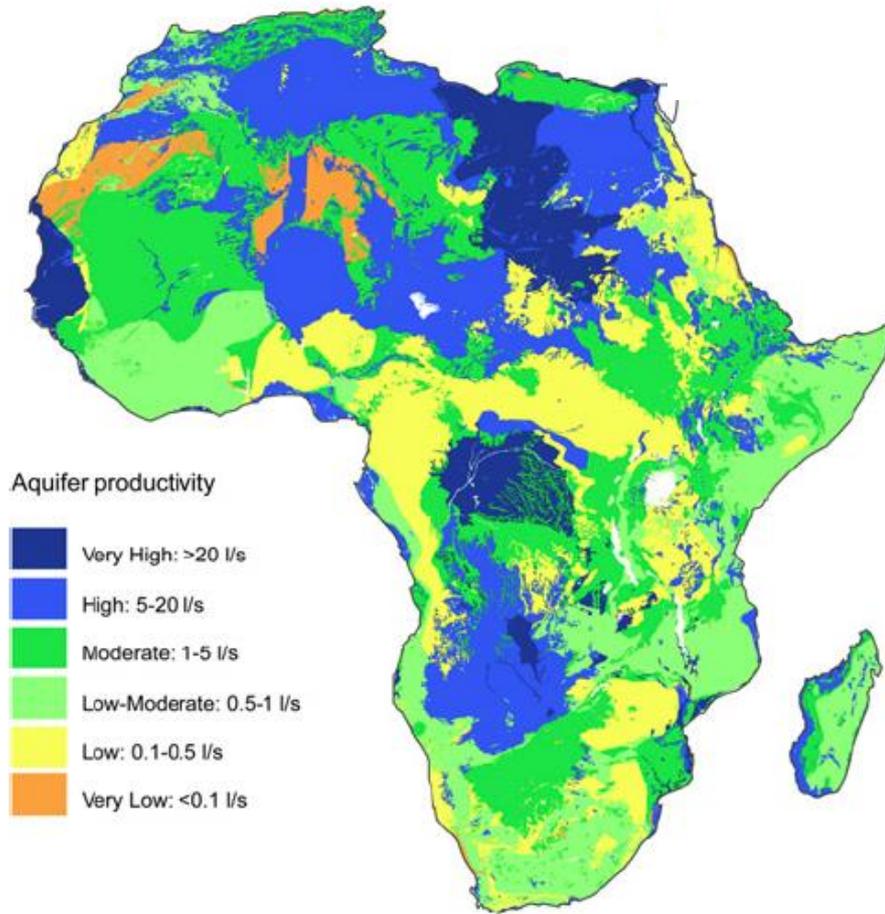
# Extractable Water



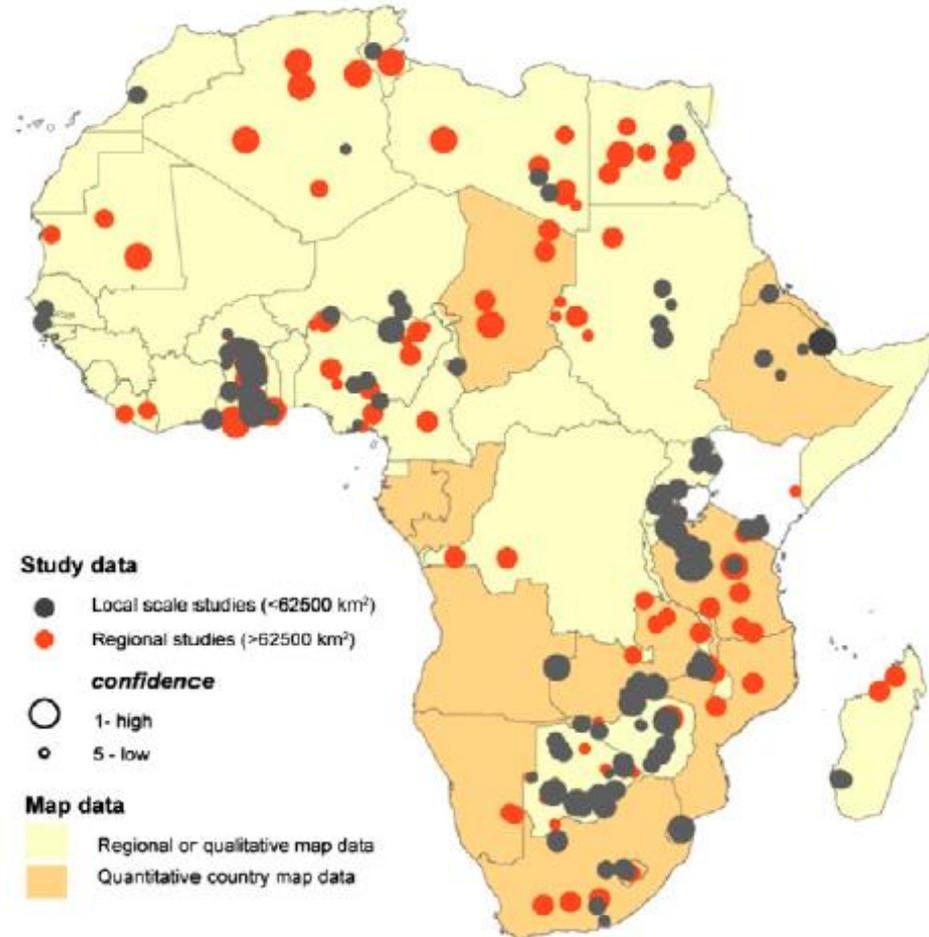
# Depth to Groundwater



# Extractable Water



# Studies Used in Map



# Huge Aquifer discovered in Northern Kenya

New York Times, Sept. 2013



# 'Sustainability' in Water Development

Does the pump still work?

**Help provide  
clean water**

[Donate Now >](#)

[Speak Out >](#)

[Sponsor a Child >](#)

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[Tweet](#) 42

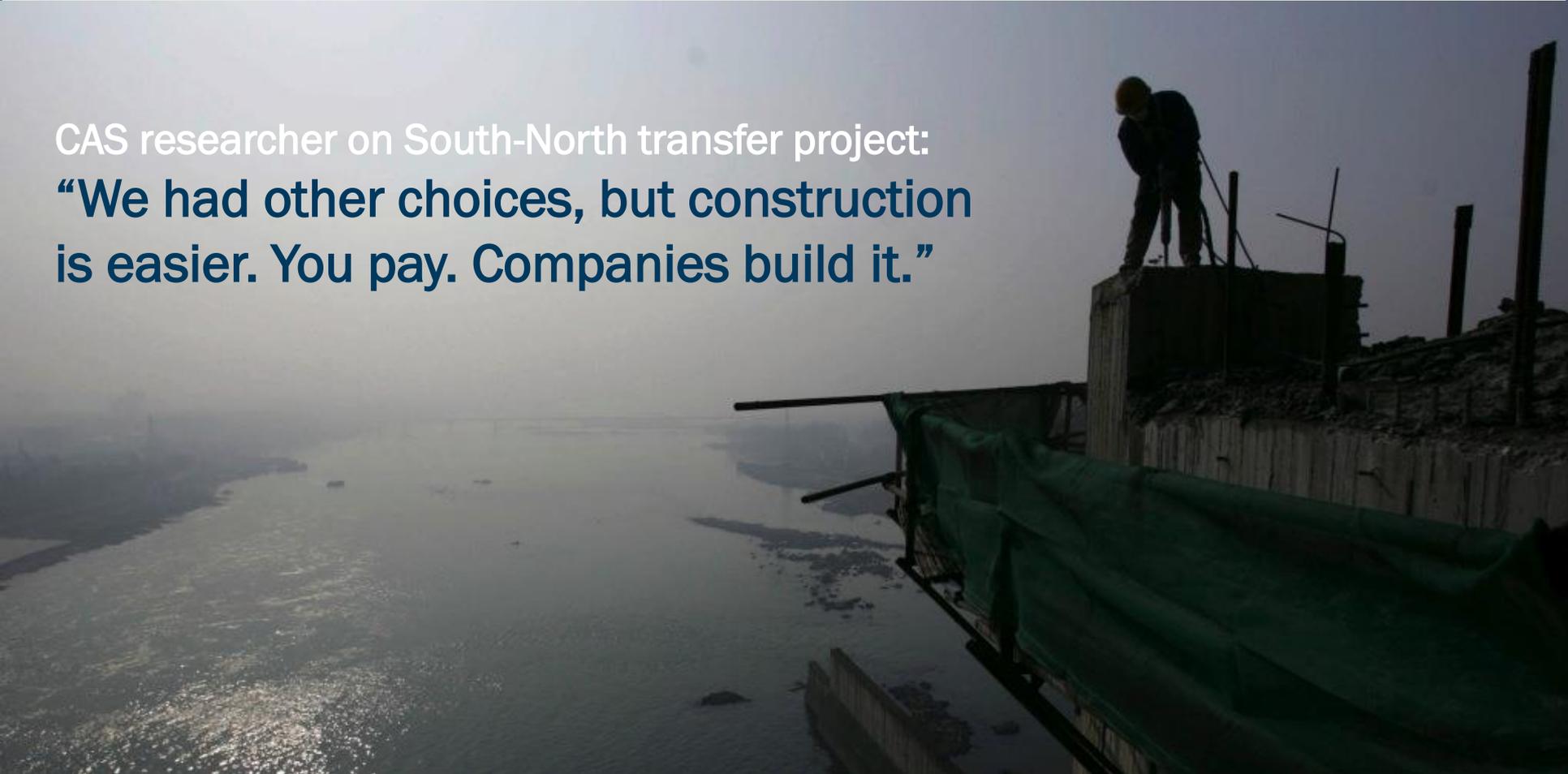


How do we get there?



# 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?



REMOTE HYDROLOGY

## Ongoing drought-induced uplift in the western United States

Adrian Antal Borsa,<sup>1\*</sup> Duncan Carr Agnew,<sup>1</sup> Daniel R. Cayan<sup>1,2</sup>

# Science Shortfalls

What actually works at scale?



# Incentives





**BE THE WAVE OF CHANGE**