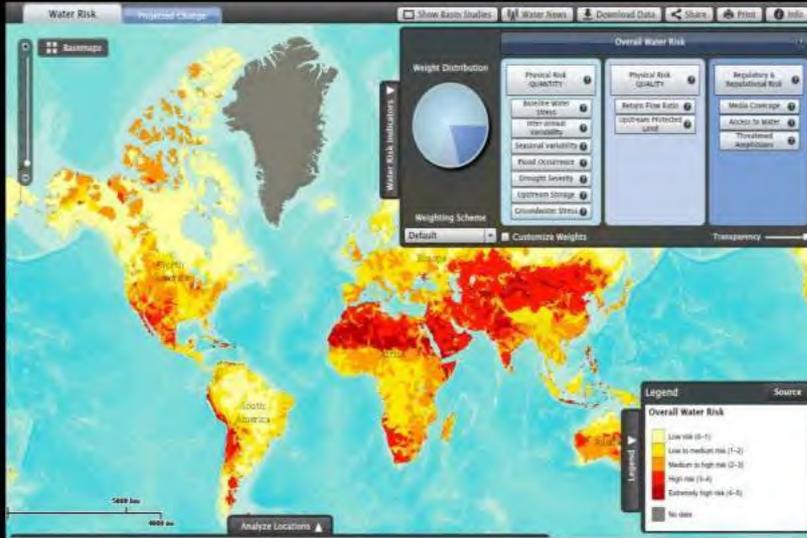# 2013 Latin American Cities Conferences
PERU: STRENGTHENING AND INVESTING IN WATER MANAGEMENT

November 8, 2013

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WORLD RESOURCES INSTITUTE

World Resources Institute

The World Resources Institute is a Global Environmental Think-Tank

WRI's Natural Infrastructure for Water Program

Objective:

Build a **global movement** to make **investing in forests and ecosystems for water** standard practice among governments and businesses alike.
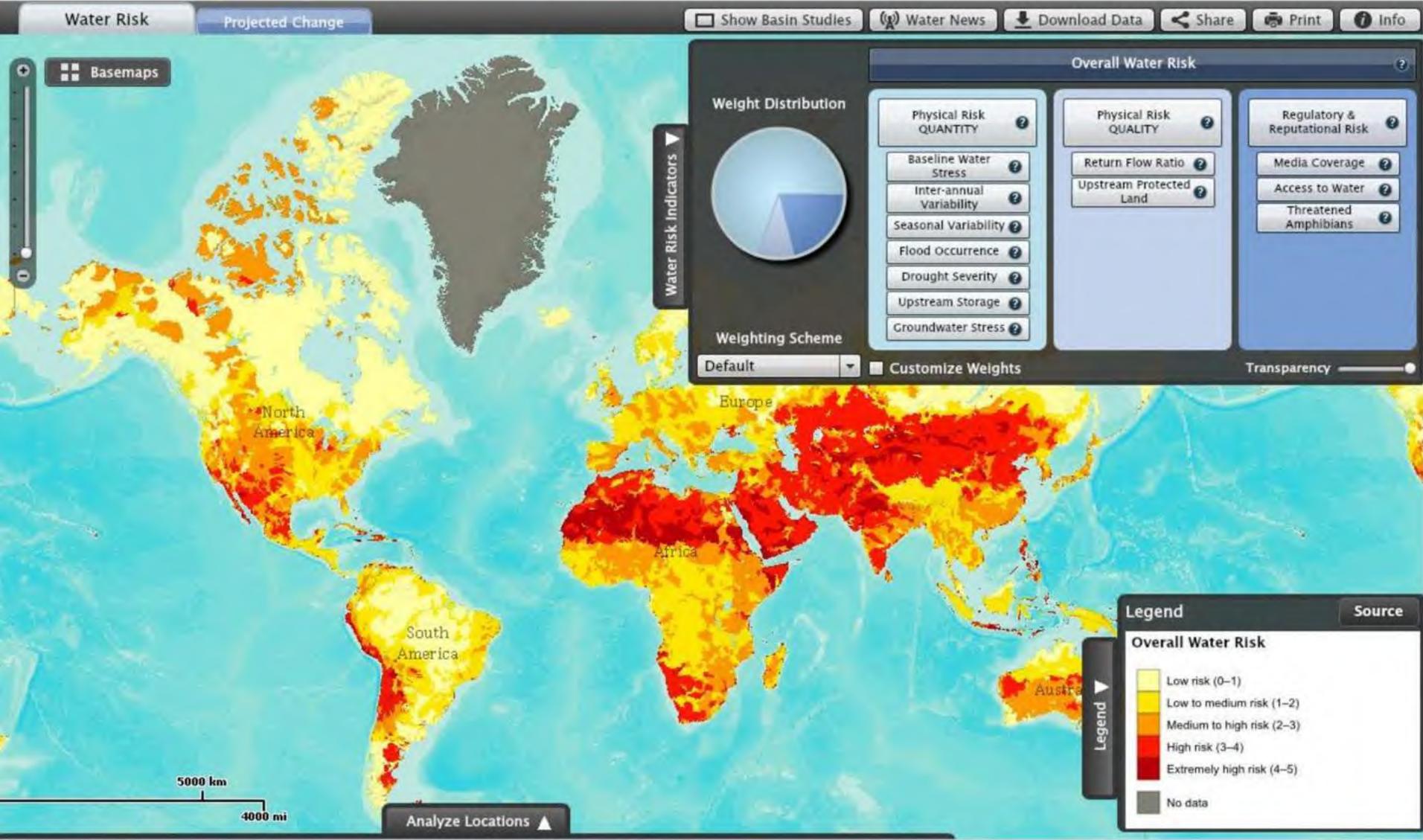
Water Initiative
Increasing Investment in Natural Infrastructure

(1) Identify and Map Water Risk

(2) Mobilize and Equip Champions

(2) Make the Business Case

(3) Advance Needed Policies, Incentives & Design Elements

SCALE

GLOBAL WATER RISK MAPPING

ZOOM IN FOR MORE DETAIL – 15,000 CATCHMENTS

BUILDING ON SCIENCE : EXPERT REVIEWERS

- CDP Water Disclosure Project
- Ceres
- Columbia University
- Deloitte Consulting LLP
- Global Adaptation Institute
- Global Water Strategies
- Nanjing University
- National Geographic
- Pacific Institute
- The Nature Conservancy

- The World Bank
- US Environmental Protection Agency
- University of Michigan at Ann Arbor
- University of North Carolina Chapel Hill
- University of Virginia
- Water Footprint Network
- World Business Council for Sustainable Development
- Yale University

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BUILDING ON BUSINESS : AQUEDUCT ALLIANCE

GE Goldman Sachs Shell skollglobal threatsfund

Bloomberg DOW TALISMAN ENERGY

DuPont John Deere Procter & Gamble United Technologies Veolia Water

Government of the netherlands Government of Sweden

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12 WATER RISK INDICATORS
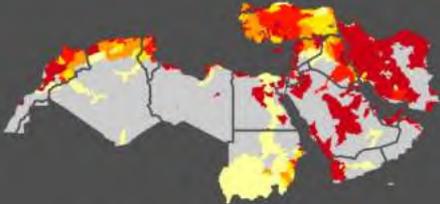
Baseline Water Stress
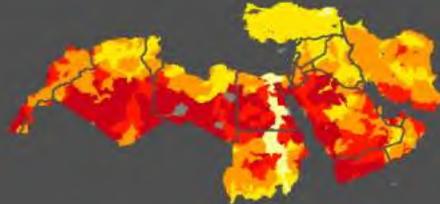
Inter-annual Variability

Seasonal Variability
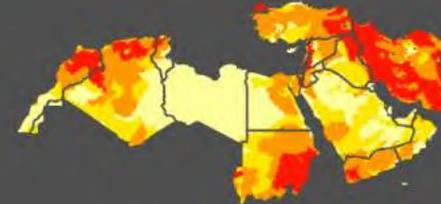
Flood Occurrence
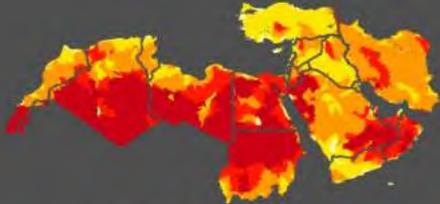
Drought Severity

Upstream Storage

Groundwater Stress
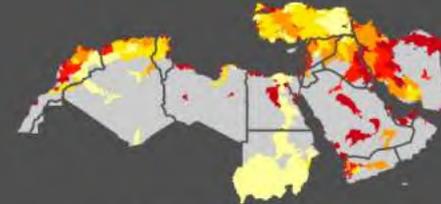
Return Flow Ratio
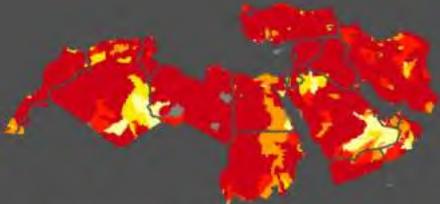
Upstream Protected Land

Media Coverage

Threatened Amphibians

Access to Water
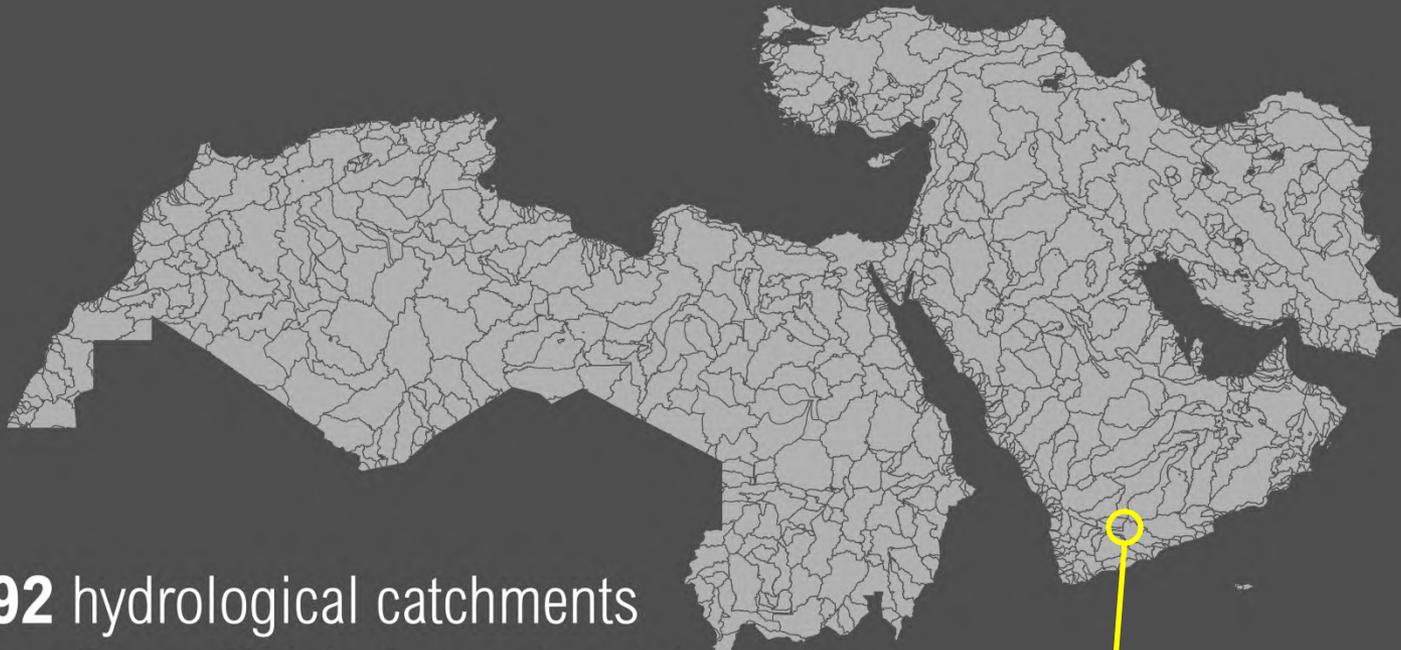
1392 hydrological catchments
696 months of runoff data for each catchment

58 years of monthly runoff data

1950 JAN

2008 DEC
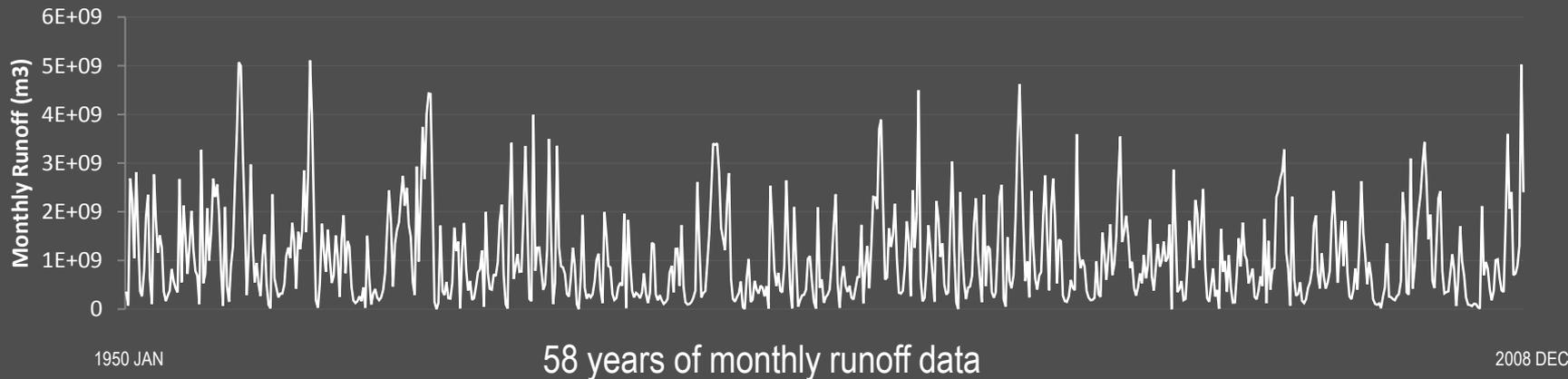
Extremely High
21.0%

High
6.9%
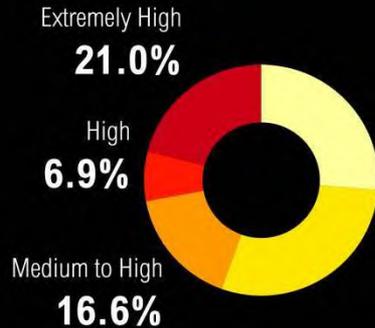
Medium to High
16.6%

45% of the population in
Brazil's large cities is experiencing
**medium to extremely high level
of competition in water use**
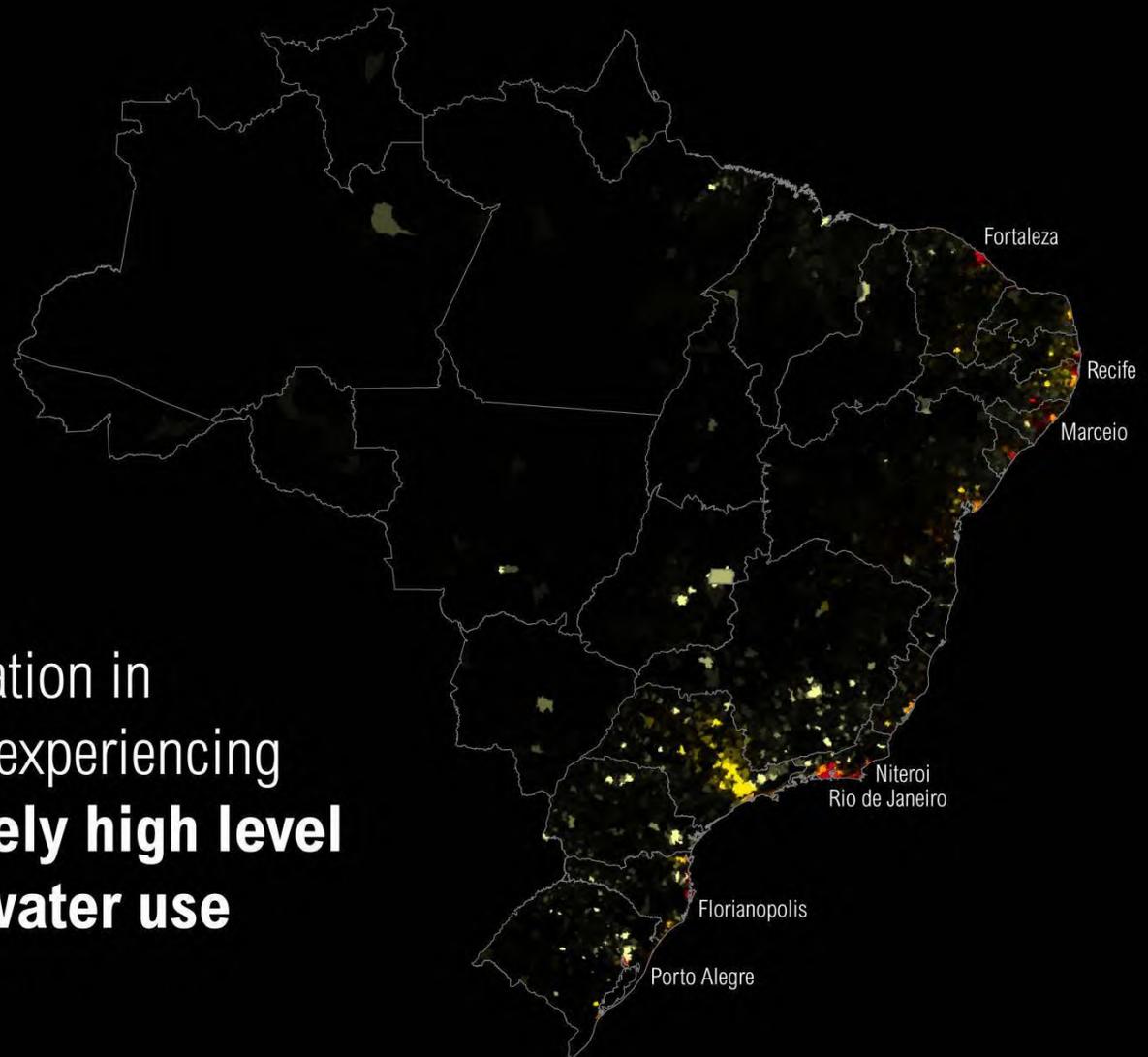
Fortaleza

Recife

Marceio

Niteroi
Rio de Janeiro

Florianopolis

Porto Alegre

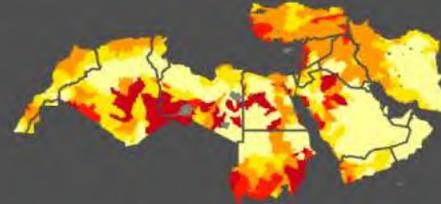**NOTE: 1)** Higher color saturation indicates higher population; **2)** large city is defined as city with a population of 1 million or more;
3) Baseline Water Stress measures ratio of total water demand to available supply, taking into account how much water has been used upstream.
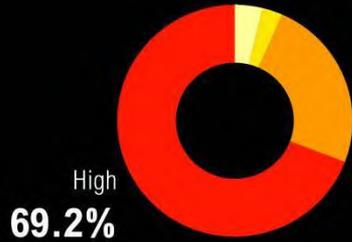
High
69.2%

54 million people in Brazil's large cities are exposed to **high flood risk**
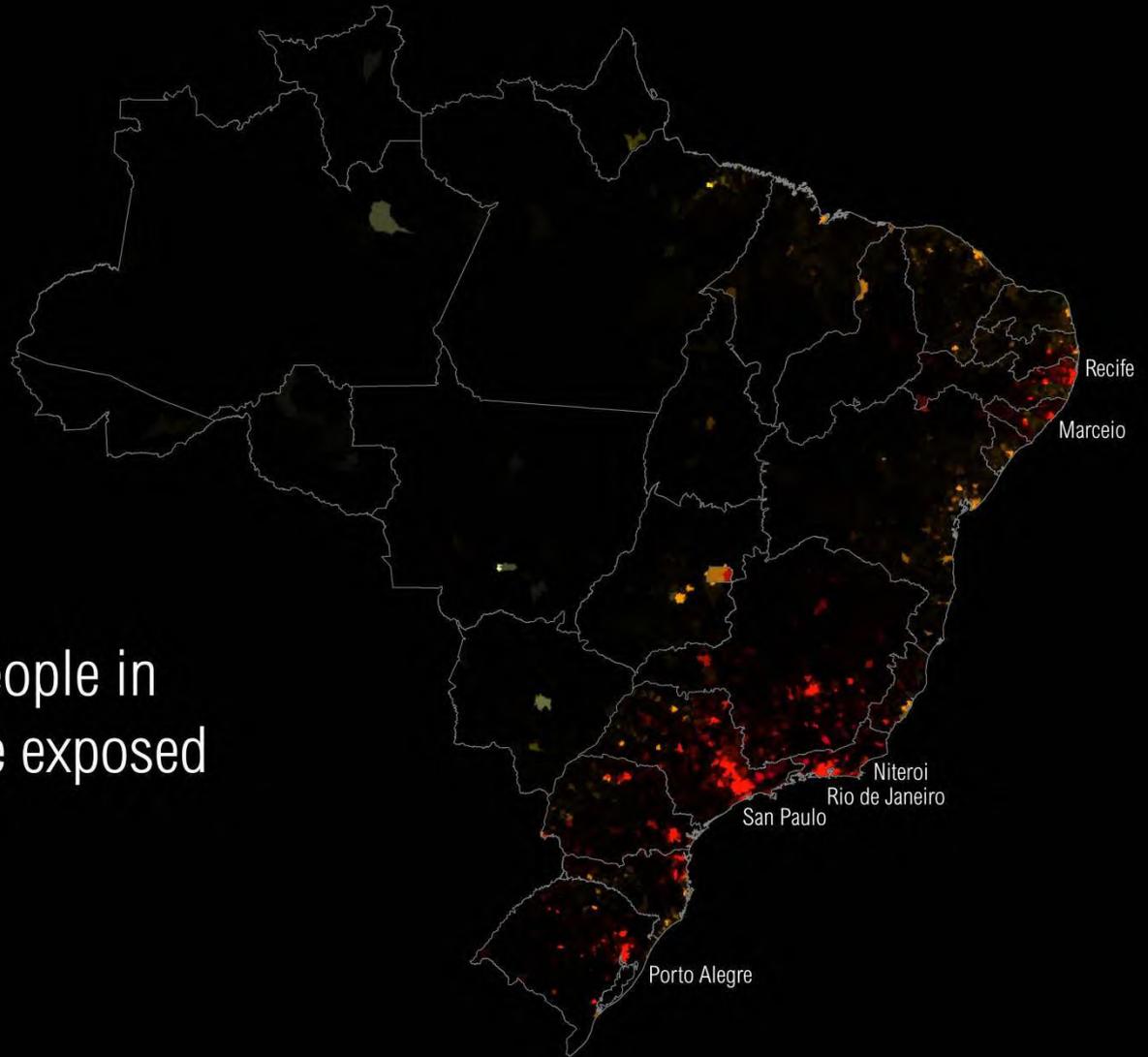
Recife

Marceio

Niteroi
Rio de Janeiro
San Paulo

Porto Alegre

NOTE: 1) Higher color saturation indicates higher population; **2)** large city is defined as city with a population of 1 million or more.

Peru's densely populated coastline faces high water demand relative to available supply

BASELINE WATER STRESS IN PERU

Extremely High Risk **8%**

High Risk **6%**

Medium to High Risk **4%**

Low to Medium Risk **15%**

Arid & Low Water Use **2%**

Low Risk **64%**

Colombia

Ecuador

Brazil

Peru

Bolivia

Chile

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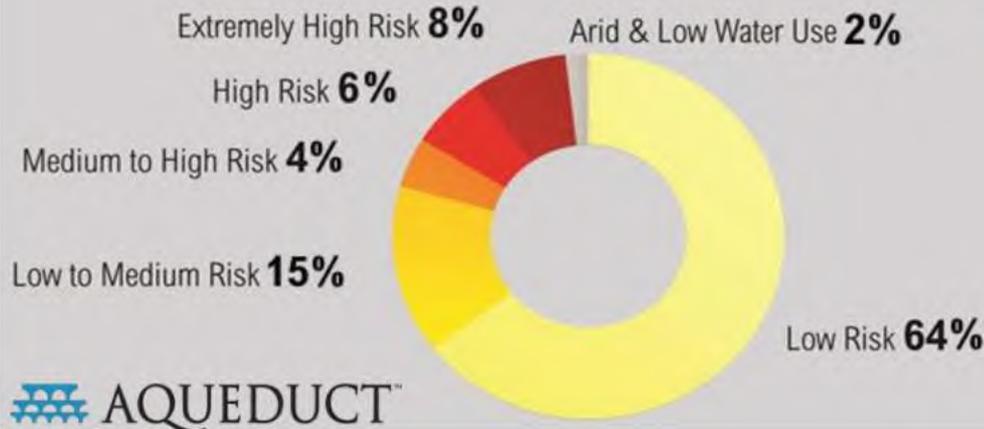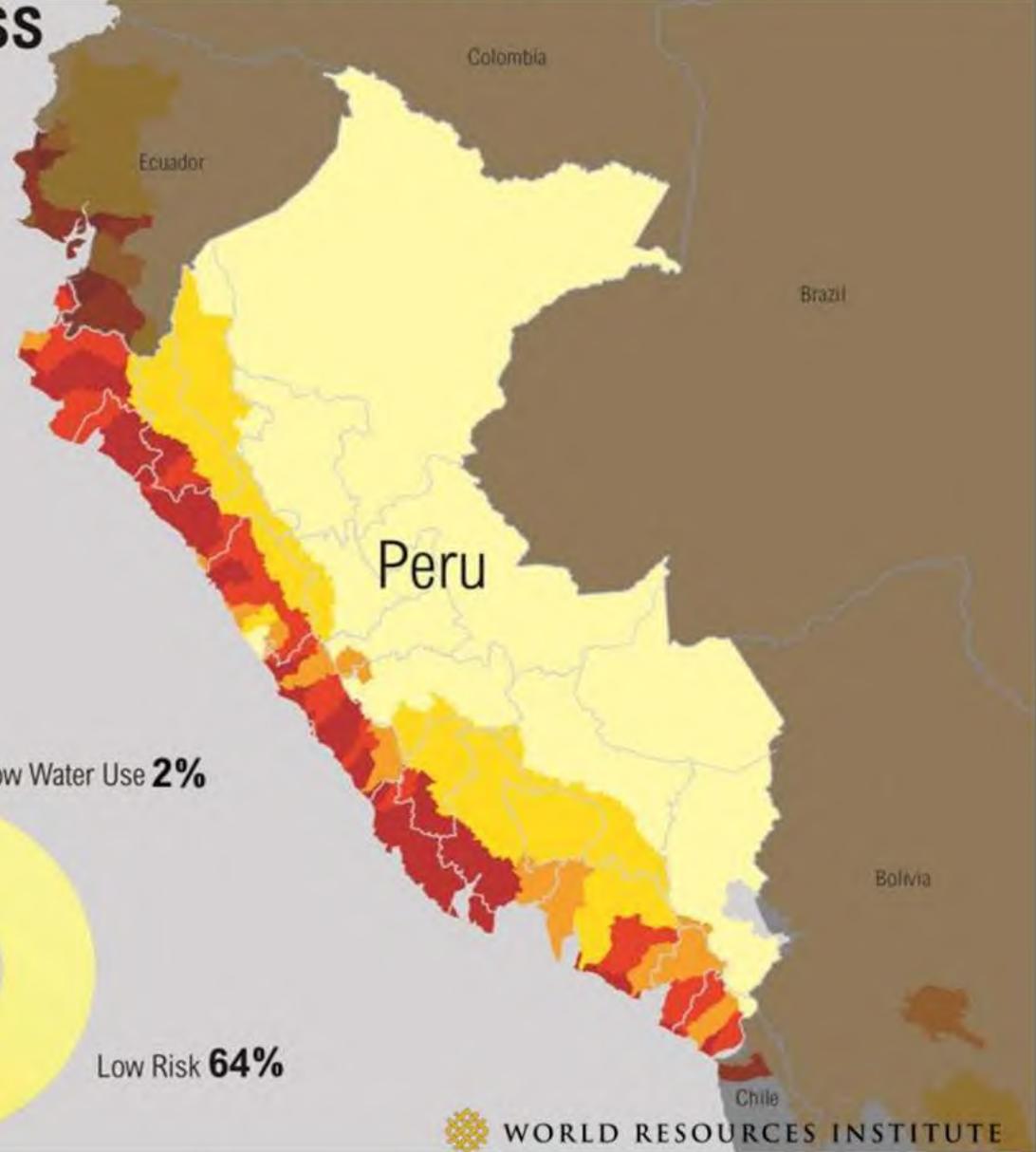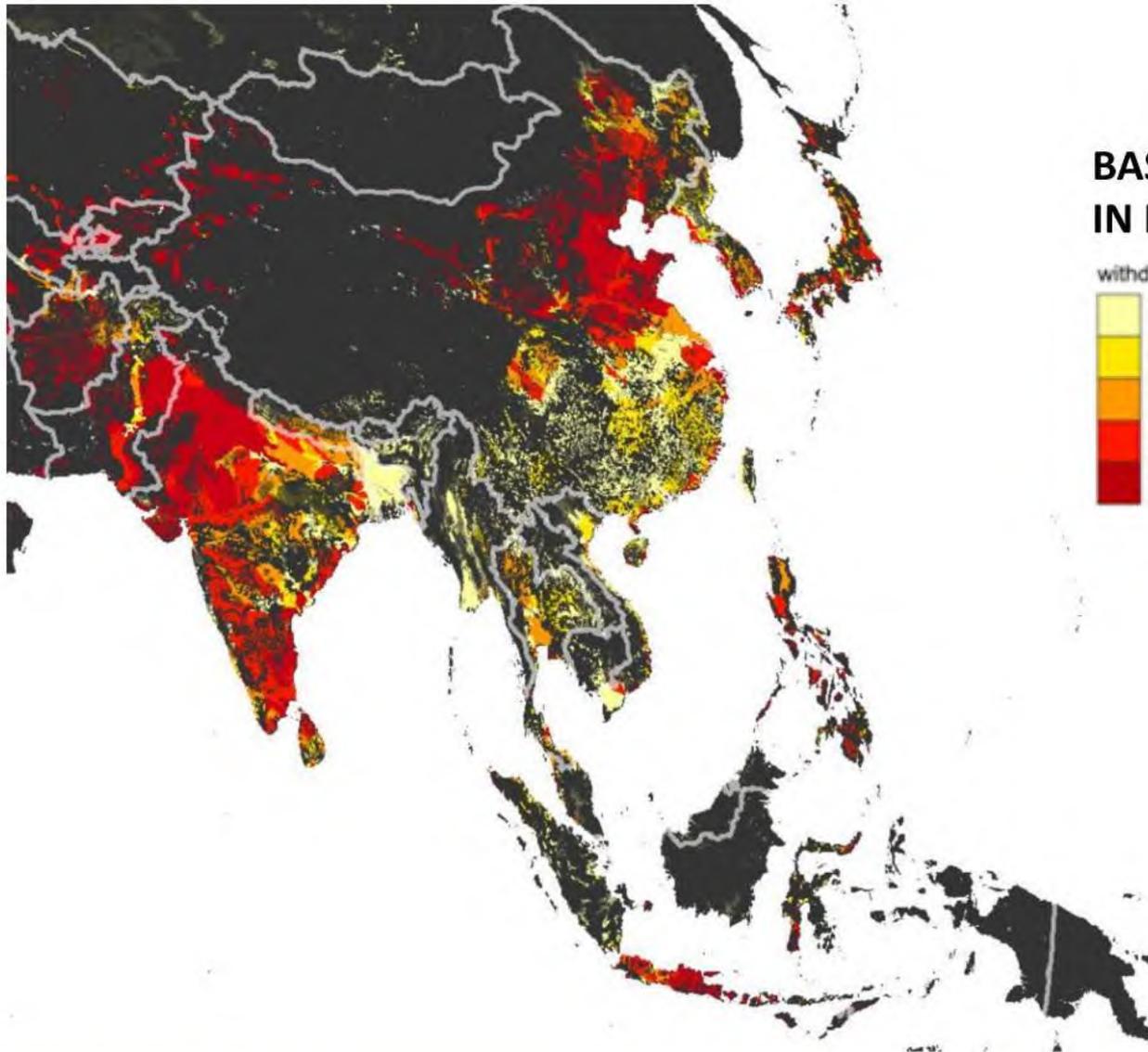
THREATS TO **FOOD**

BASELINE WATER STRESS IN IRRIGATED AREAS

withdrawals / available flow

- Low (<10%)
- Low to medium (10–20%)
- Medium to high (20–40%)
- High (40–80%)
- Extremely high (>80%)

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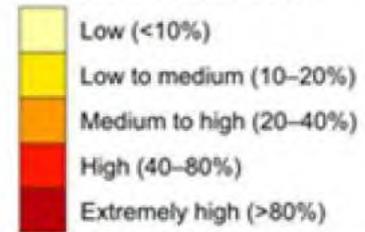
SUPPLY CHAIN RISK : COTTON

Projected change in water stress by 2025
Source: WRI Aqueduct, Monfreda et al. (2008)

COTTON:
61% to face
HIGHER STRESS
by 2025

Wetter, but high stress

Drier, but low stress

Lower stress   Near normal conditions   Higher stress

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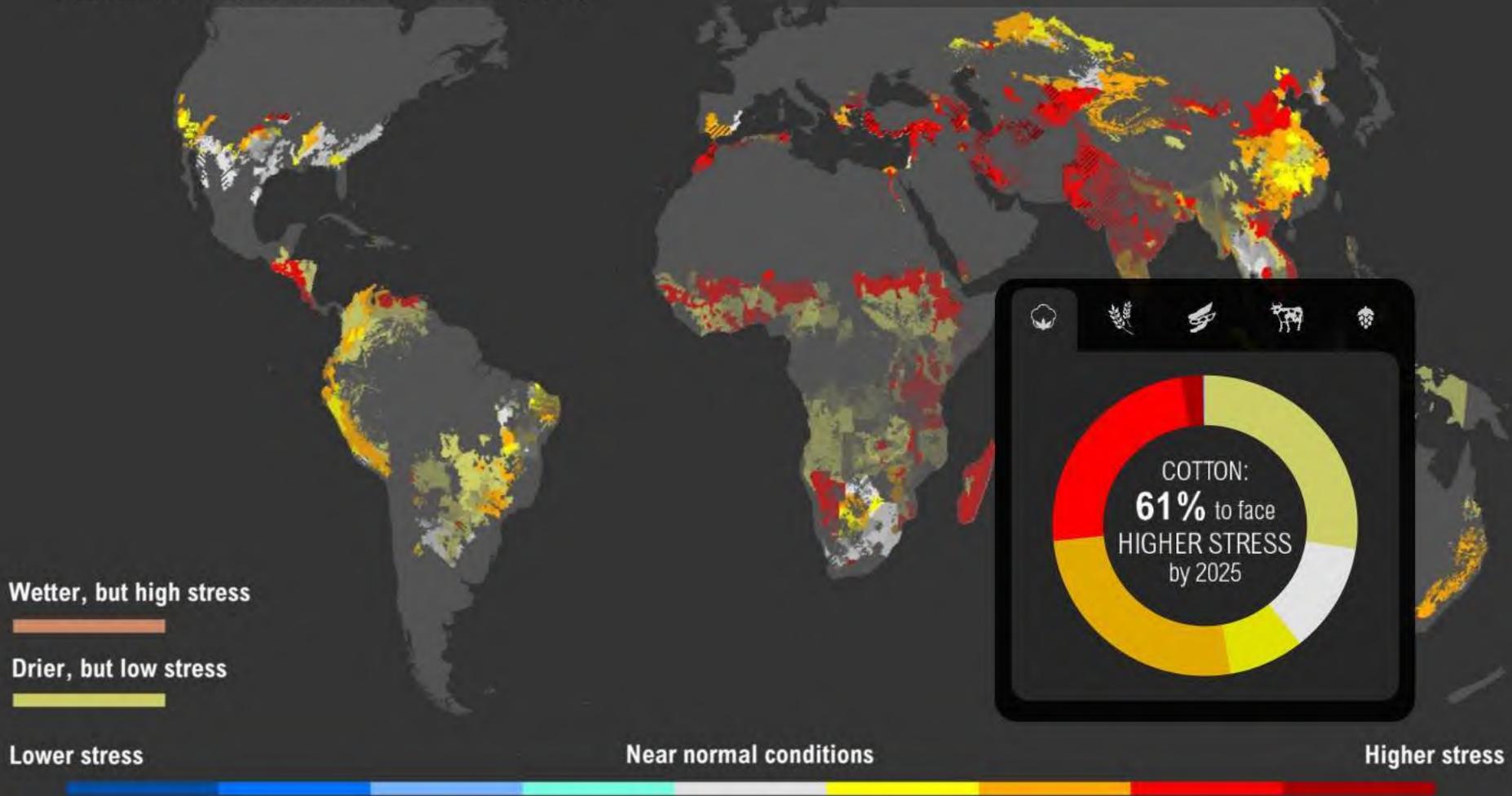
THREATS TO NATIONAL SECURITY

Global Water: Present to 2025

- Aqueduct maps used in 2011 National Intelligence Estimate on Water Security requested by Secretary of State Hillary Clinton

Present Water Stress
(Water Withdrawal Ratio)

- Low stress (less than 10 percent)
- Moderate stress (10 to 20 percent)
- Medium-high stress (20 to 40 percent)
- High stress (40 to 80 percent)
- Extremely high stress (80 percent or more)
- Arid and low water use
- No data or out of area

Projected Change in Water Stress to 2025

- Significantly less stressed
- Moderately less stressed
- Near-normal conditions
- Drier but still low stress
- Moderately more stressed
- Severely more stressed
- Extremely more stressed
- Exceptionally more stressed
- Uncertainty in magnitude
- Uncertainty in direction
- No data or out of area

Present water stress is defined as the ratio of total freshwater withdrawals (circa 2000) to annual renewable freshwater supply (1960-90 climatological norm), a quantity often referred to as the water withdrawal ratio (WWR). This provides an assessment of freshwater availability in a typical year relative to recent levels of socioeconomic demand for fresh water. High levels of water stress indicate that socioeconomic demand for freshwater approaches (or exceeds) the annual renewable supply.

The projected change in water stress is calculated as the ratio of projected water stress to present water stress during a 10-year time frame centered on the year 2025. The analysis looks at the A1B scenario of economic and environmental change used by the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report. The projected change in water stress indicator has categories which are analogous to a drought severity scale. For example, areas with a projected category of "extremely more stressed" are projected to experience the same level of water stress as areas experiencing "extreme drought" today.

Analysis is done at a level below the nation-state. For large countries (e.g. China, India, Russia, United States, etc.) aggregation of stress at the nation-state level would mask the risk of social disruption at local levels.

Source: World Resources Institute and ISciences, LLC.

Boundary representation is not necessarily authoritative.

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Coalition of Champions

Beneficiaries: Making the Business Case

Need to know:
- Who uses the water
- How they use it
- How they benefit from "clean" water
- How they fit into a broadly-defined investment framework

Map and Engage Beneficiaries

rst PMBus System Power
Management and Protection IC

LM25066

- Improves reliability
- Reduces power consumption

BRAZIL DRY SEASON
POWER PRICE UP 60%

Source: Rio Times
Photo: flickr: queulat00

Real Dollars!!!

Developing countries: By 2020, US$1.8-2.3 Trillion *annual* investment in infrastructure up to 1/3rd expected to go to water.*

OECD countries: US$400-600 Billion *each year* for water infrastructure.**

Direct a portion for natural infrastructure =

Big uptick for ecosystems and resilient cities

*Source: *Hutton, 2012 – Global Costs and benefits of drinking water supply and sanitation interventions to reach MDG target and universal coverage;*
***OECD, Infrastructure to 2030: Mapping Policy for Electricity, Water and Transport*

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Summary financials of green vs. gray infrastructure approaches for securing clean drinking water (Portland, ME)

Present value of investments over 20 years, USD millions

Most optimistic scenario

Gray infrastructure upgrade (membrane filtration) — $155 M

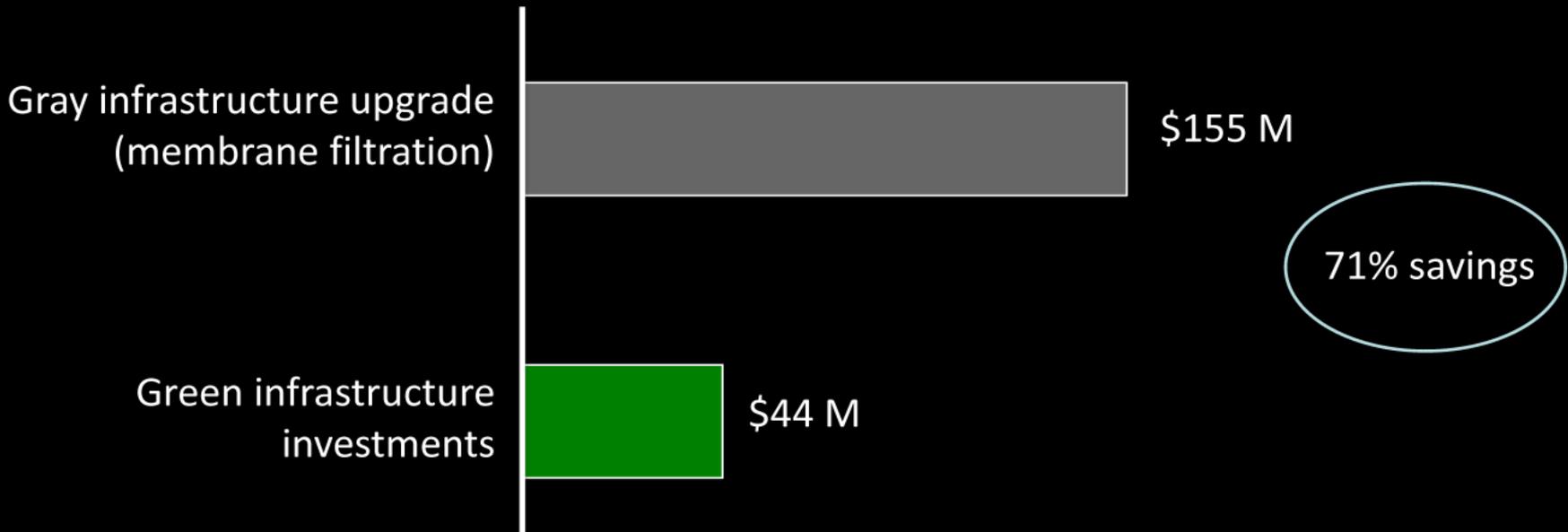Green infrastructure investments — $44 M

71% savings

World Resources Institute

Detailed financials of green vs. gray infrastructure approaches for securing clean drinking water (Portland, ME)

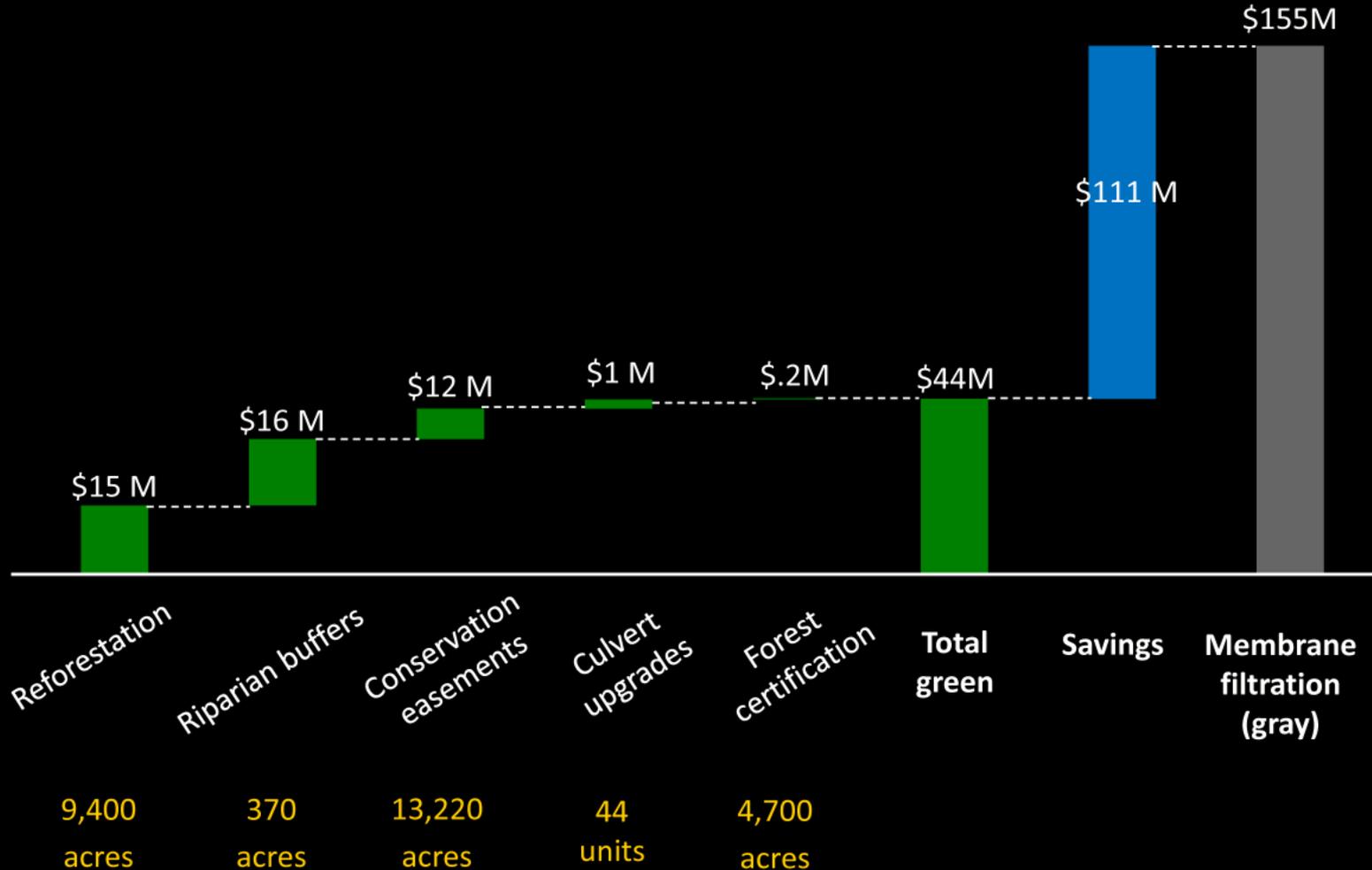Present value of investments over 20 years, USD millions

Most Optimistic Scenario

Chart data:

Category	Value
Reforestation	$15 M
Riparian buffers	$16 M
Conservation easements	$12 M
Culvert upgrades	$1 M
Forest certification	$.2M
Total green	$44M
Savings	$111 M
Membrane filtration (gray)	$155M

Reforestation	Riparian buffers	Conservation easements	Culvert upgrades	Forest certification
9,400 acres	370 acres	13,220 acres	44 units	4,700 acres

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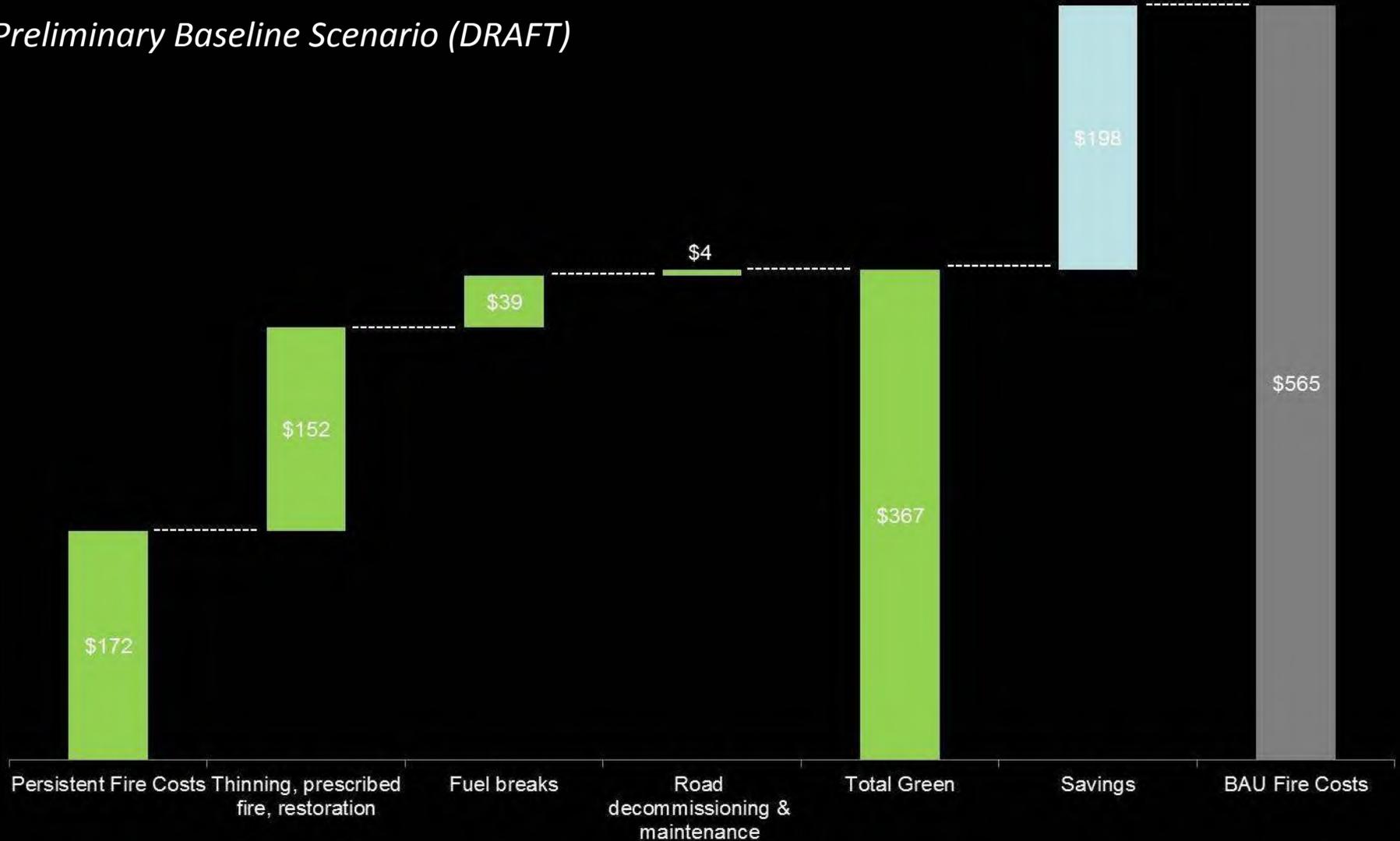
Green vs. gray infrastructure approaches for addressing catastrophic fire risk & securing clean drinking water (Northern Front Range, CO)

Present value of investments over 20 years, USD millions

Preliminary Baseline Scenario (DRAFT)

$198

$4

$39

$152

$367

$565

$172

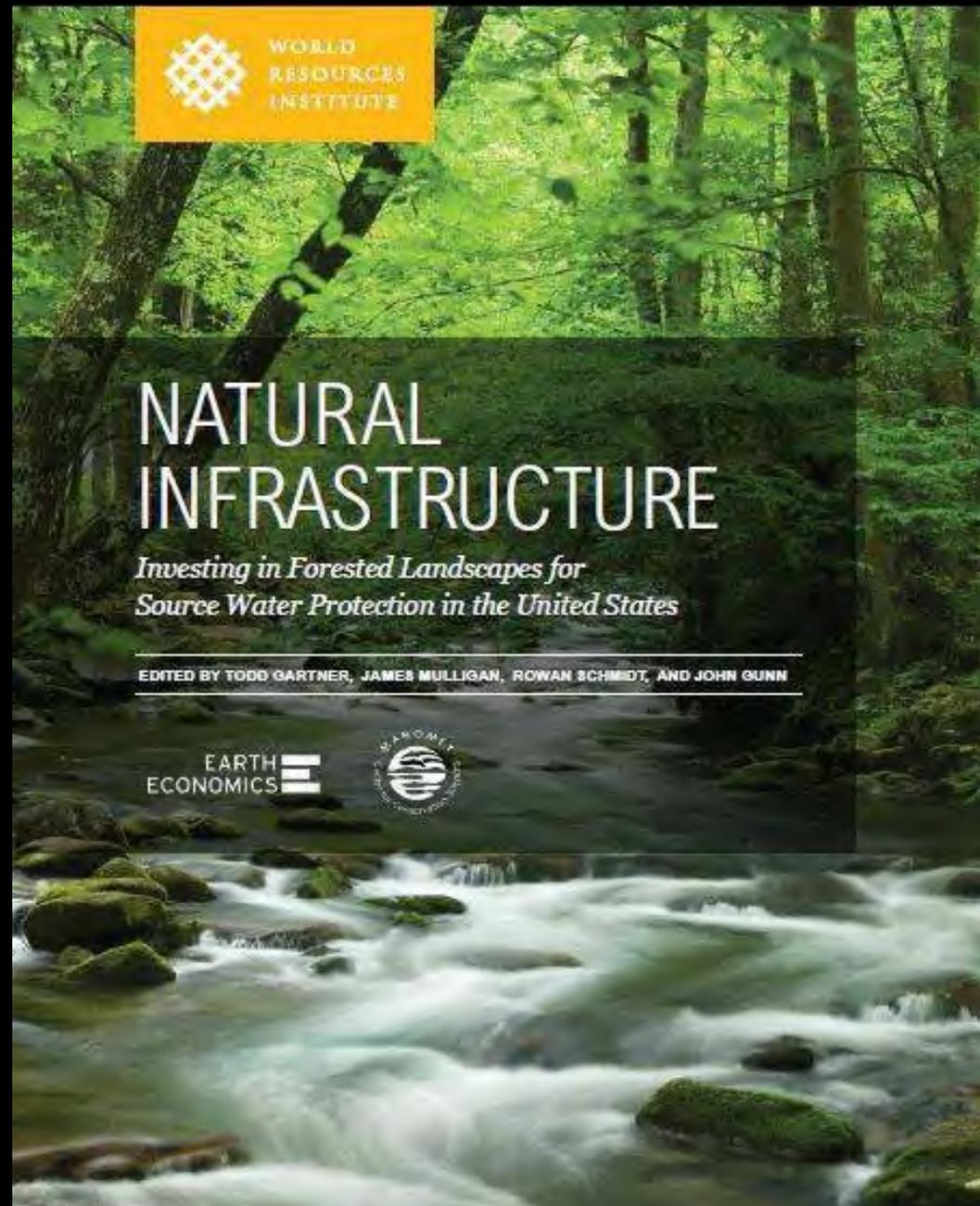| Persistent Fire Costs | Thinning, prescribed fire, restoration | Fuel breaks | Road decommissioning & maintenance | Total Green | Savings | BAU Fire Costs |

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Ancillary/Co-Benefits

- Sharing lessons learned

- Policy frameworks

- Incentives

- Guidance/Roadmaps

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WRI's Natural Infrastructure for Water Program

{ **Forests**
Wetlands
Floodplains } **=** { **Clean Water &**
Reduced Flood
Risk
@ lower cost } **+** { **Sequestered**
Carbon
Habitat
Resilient
Communities
Recreation
Clean Air
Rural Livelihoods }

Transform the way we manage water

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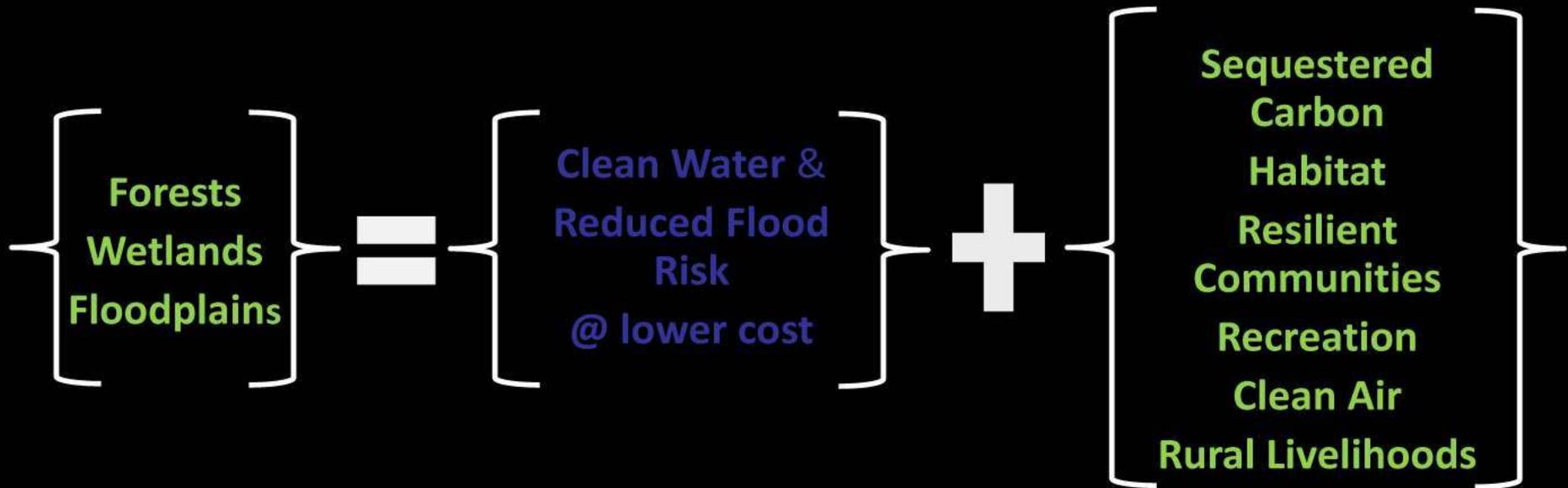
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