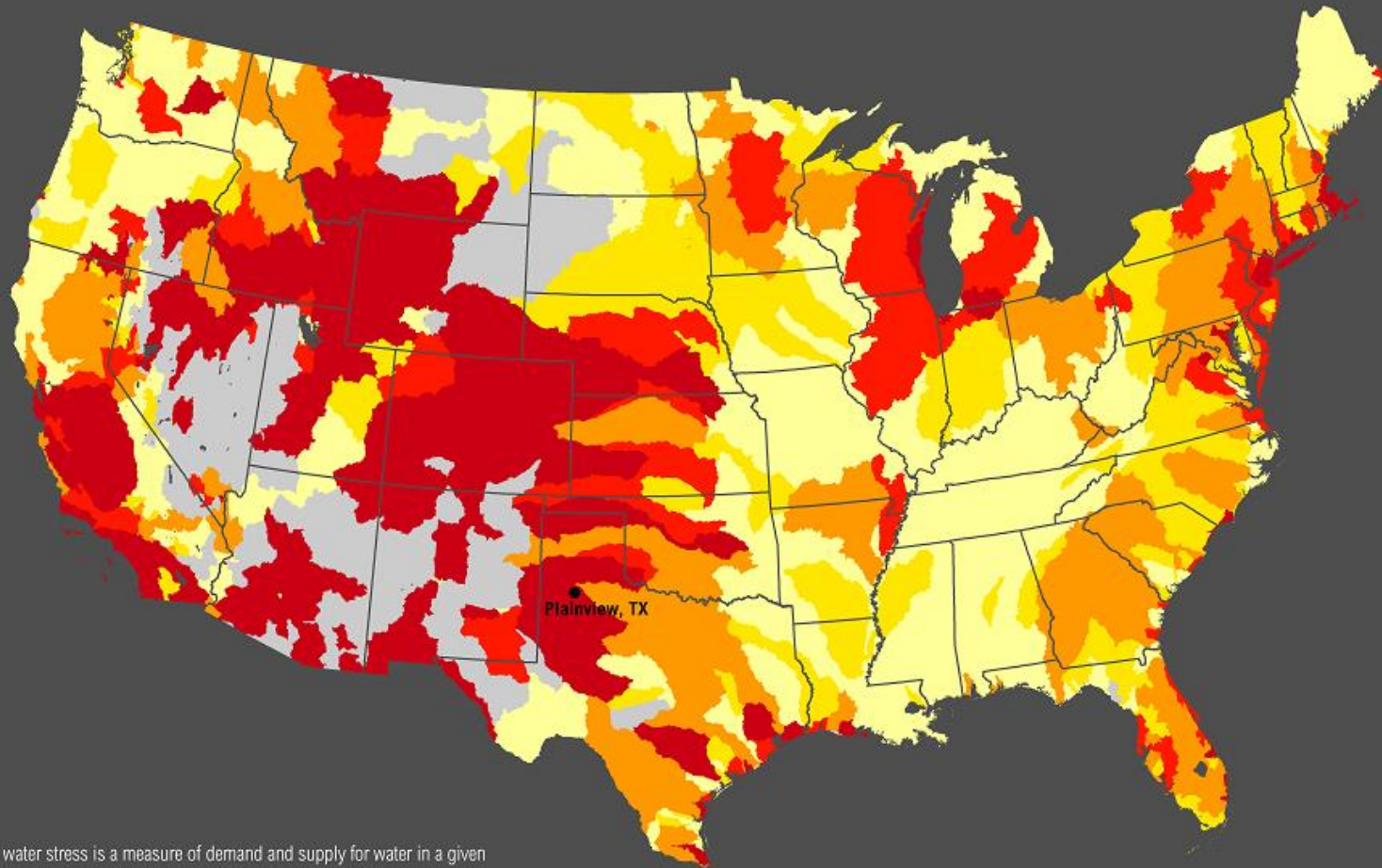WORLD RESOURCES INSTITUTE

Nature as Water Infrastructure for Smart Growth:
Benefits Beyond the 4-walls of the Utility

Todd Gartner | Senior Associate, WRI

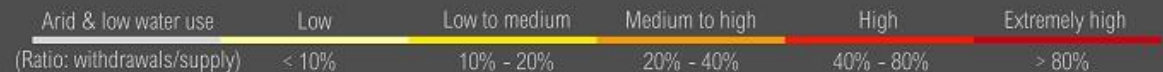New Partners for Smart Growth Conference, Portland, OR, February 12, 2016

WATER STRESS IN THE UNITED STATES
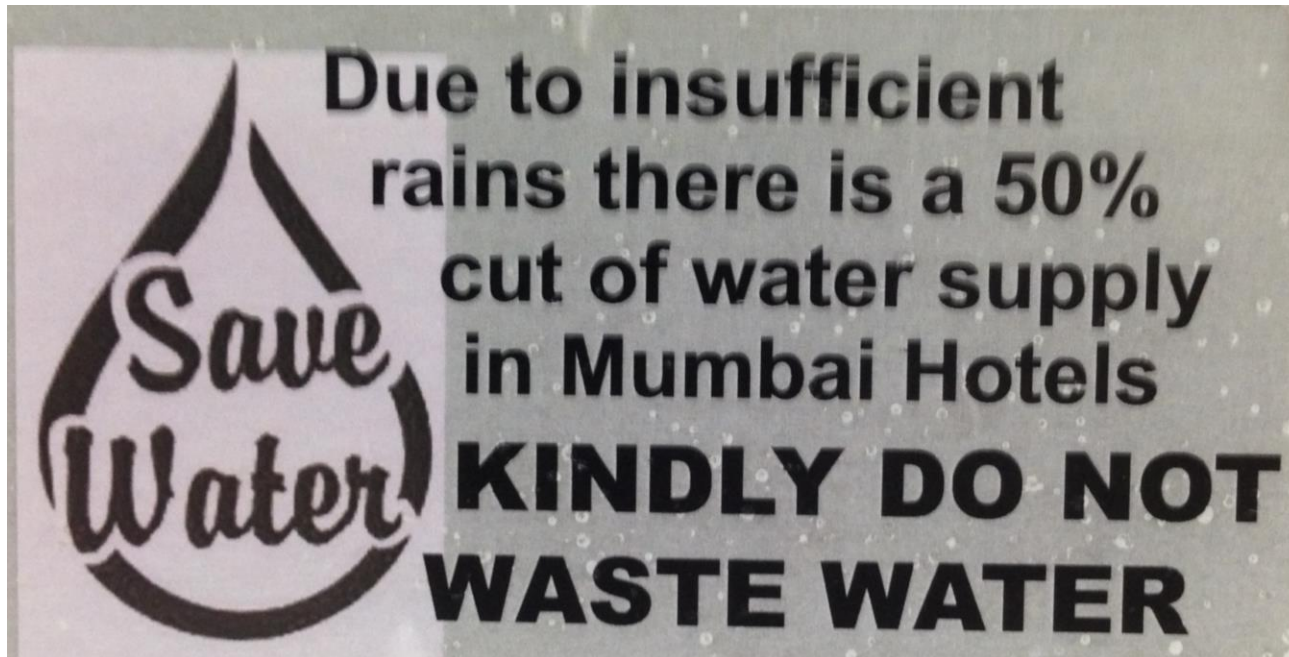
☰ AQUEDUCT

Plainview, TX

NOTE
1. Baseline water stress is a measure of demand and supply for water in a given area, and is calculated as the ratio of local water withdrawal over renewable water supply.
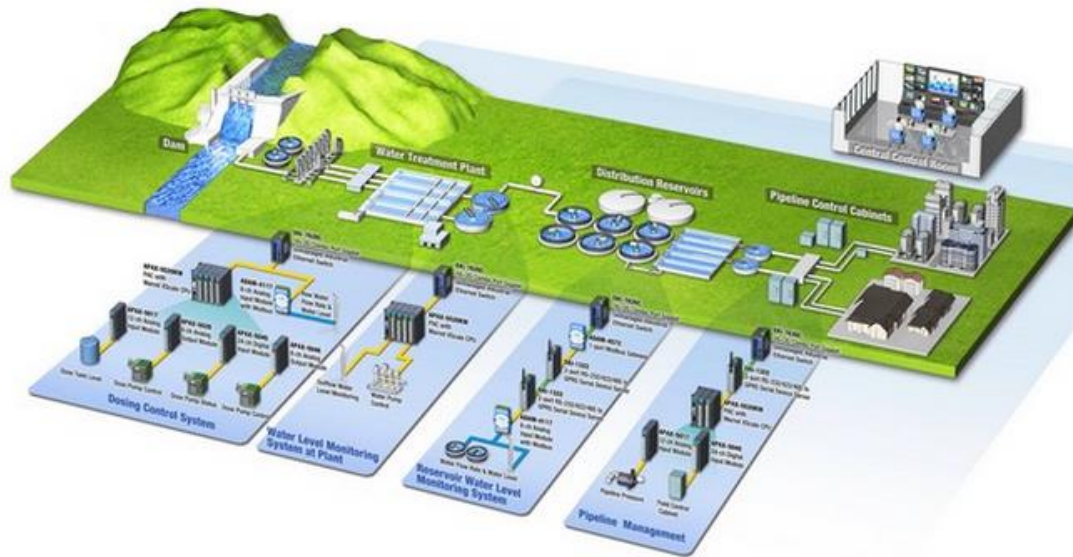
REFERENCES
Aqueduct methodology: aqueduct.wri.org

Water woes are magnified when drought strikes places like Plainview, Texas, where baseline water stress is **extremely high**.

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Arid & low water use	Low	Low to medium	Medium to high	High	Extremely high
(Ratio: withdrawals/supply)	< 10%	10% – 20%	20% – 40%	40% – 80%	> 80%

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RETHINK ENGINEERED INFRASTRUCTURE

Non-revenue water		Energy efficiency		Waste management
Climate resilience		Water Reuse		System monitoring

Source: Advantech

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Land Use Change

CALIFORNIA

TREE COVER LOSS (2001 - 2014)
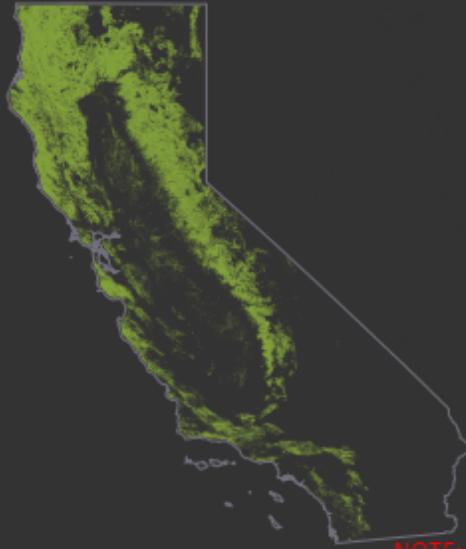
TREE COVER (2000)
10 MHa

PERCENT TREE COVER (2000)
24 %

TREE COVER LOSS (2001 - 2014)
1,118,267
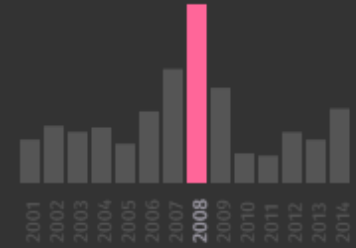
214,408 Ha

TREE COVER GAIN (2001 - 2012)
291,917 Ha

Displaying tree cover and loss with >30% canopy density

NOTE: tree cover loss and gain statistics cannot be compared against each other. Learn more

Source: Hansen/UMD/Google/USGS/NASA
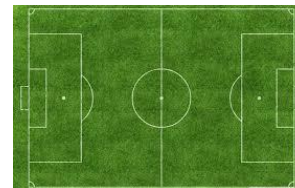
Over 50K soccer fields every yr.

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WHY NATURAL INFRASTRUCTURE – Nature for Water?

- Improve water quality
- Regulate hydrologic cycle
- Mitigate flood
- Reduce erosion
- Improve energy and food security
- Conserve biodiversity
- Protect coastlines
- Sustain livelihoods
- Reduce costs

Source: IUCN 2015

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Natural Infrastructure: Current Challenges

1. Lack of awareness

2. Lack of capacity and resources

3. Lack of business case

4. Lack of access to investment

5. Lack of implementation support

$10 trillion will be spent between now and 2030 on water infrastructure worldwide

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Raise Awareness: GFW Water

Inspire

Break down silos and leverage common risks and opportunities
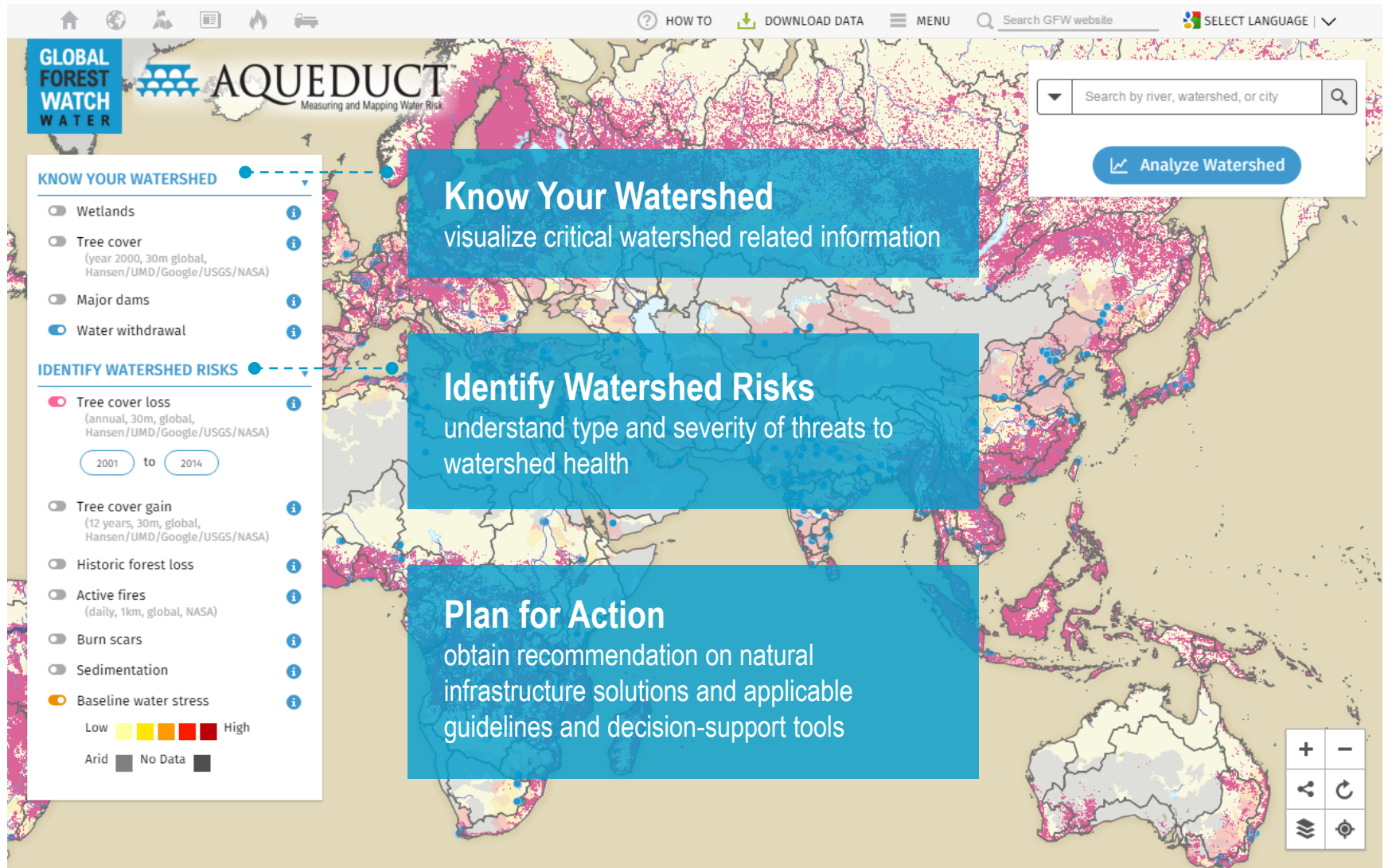
POLICY MAKERS & DEVELOPMENT

Bilateral Development Banks, Policy Makers, NGOs, National/Regional Govs.

Achieve Sustainable Development Goals

BUSINESS & INVESTORS

Corporations, Corporate Consultants, Investors, Asset Managers

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Manage operational & supply chain risks

MUNICIPALITIES & UTILITIES

Municipalities, Water Treatment & Hydroelectric Plant Management

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Improve water and energy security

CIVIL SOCIETY GROUPS

Academics, Reports, Community Based Non-Profits, General Public

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Awareness & Livelihoods

Share success stories of watershed restoration projects

Loess Plateau
Before: 1999

Loess Plateau
After: 2005

- ↓ soil erosion on 920,000 hectares
- 99% ↓ in sediment in water
- 2.5 million people out of poverty
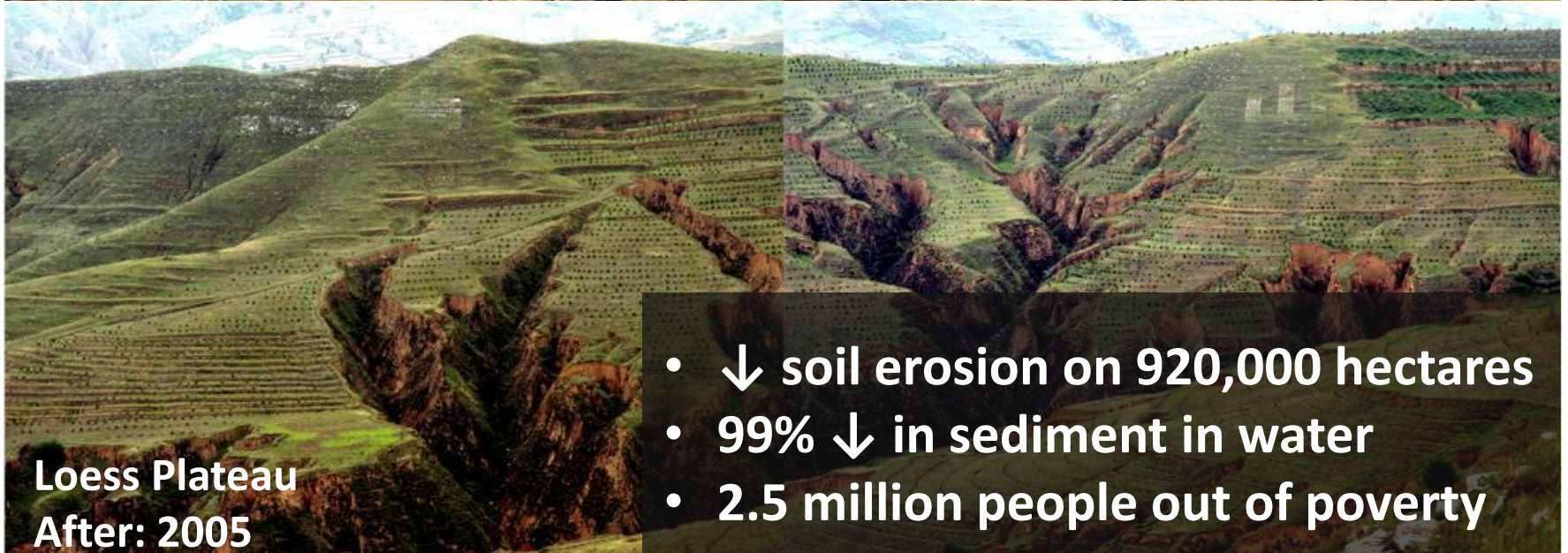
Conduct economic analysis to make the business case

Comparison of costs for natural and built options for cities to meet water quality requirements in the US (millions $)
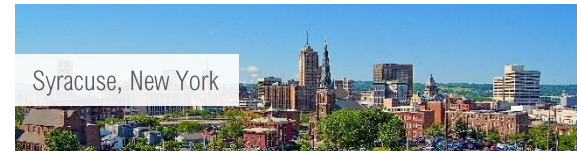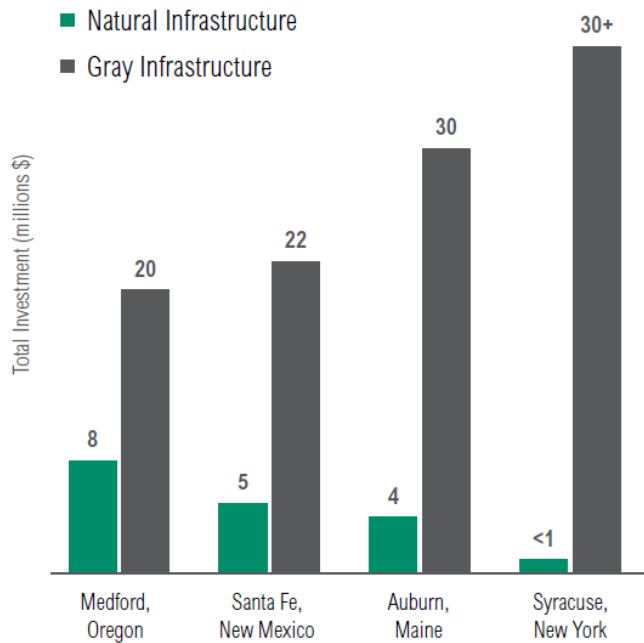
Medford, Oregon

Santa Fe, New Mexico

Auburn, Maine

Syracuse, New York

Source: Gartner, T. et al. 2013. Natural Infrastructure. Washington, DC: Wld Resources Institute

Make the business case for investment in natural infrastructure

Present value of investment over 20 years, USD millions

Most optimistic scenario **(Portland, Maine; USA)**

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

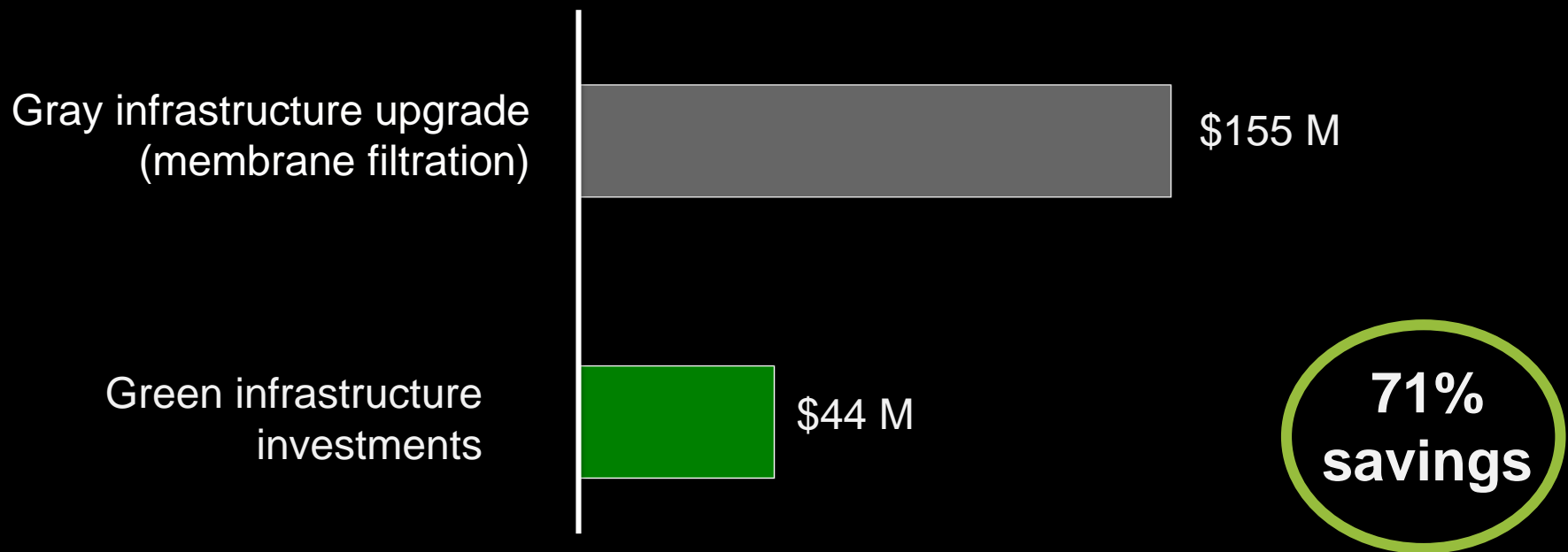|								
$15 M	$16 M	$12 M	$1 M	$.2M	$44M	$111 M	$155M

Reforestation | Riparian buffers | Conservation easements | Culvert upgrades | Forest certification | Total green | Savings | Membrane filtration (gray)

9,400 acres | 370 acres | 13,220 acres | 44 units | 4,700 acres

World Resources Institute
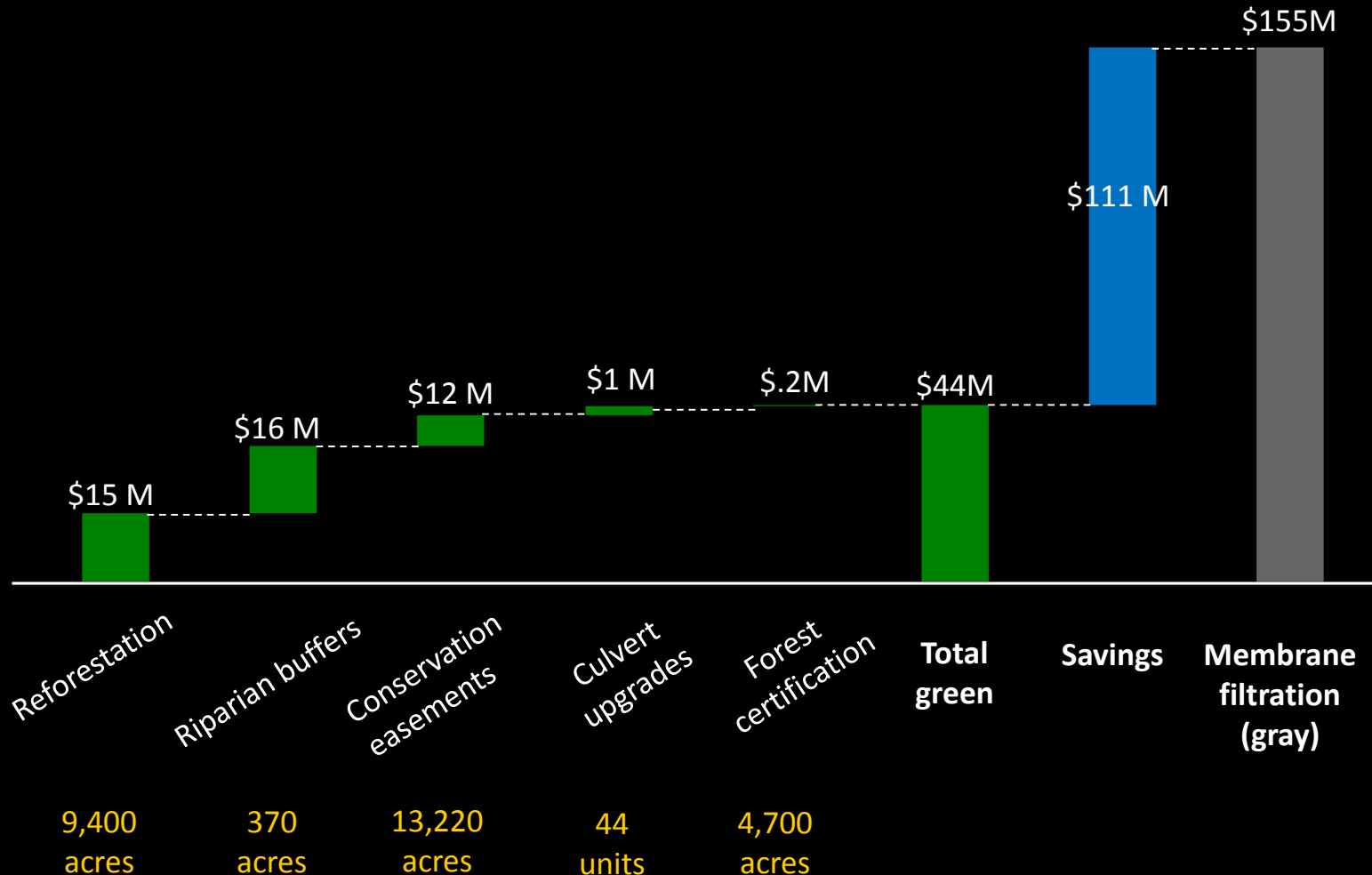
Beijing

PADDY LAND-TO-DRY LAND PROGRAM

Agricultural BMPs to reduce erosion and nutrient runoff

- Pays farmers in headwaters to switch from rice to corn – requires less water and produces less runoff

- Program estimated to produce more than $800 per acre in benefits through increased water yield and quality, but costs only about $530 per acre of farmland

Estimated
$270
Net Benefits
per acre

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Costa Rica

NATIONAL FUND FOR FOREST FINANCING

Forest restoration, conservation and BMPs to reduce sediment

- P3 – Enel pays landowners $10–20/ha, Government contributes an additional $30/ha; $340M distributed

- Environmental improvements on 1 million hectares, involving 10,000 landowners; Reduced siltation and increased longevity of reservoir system

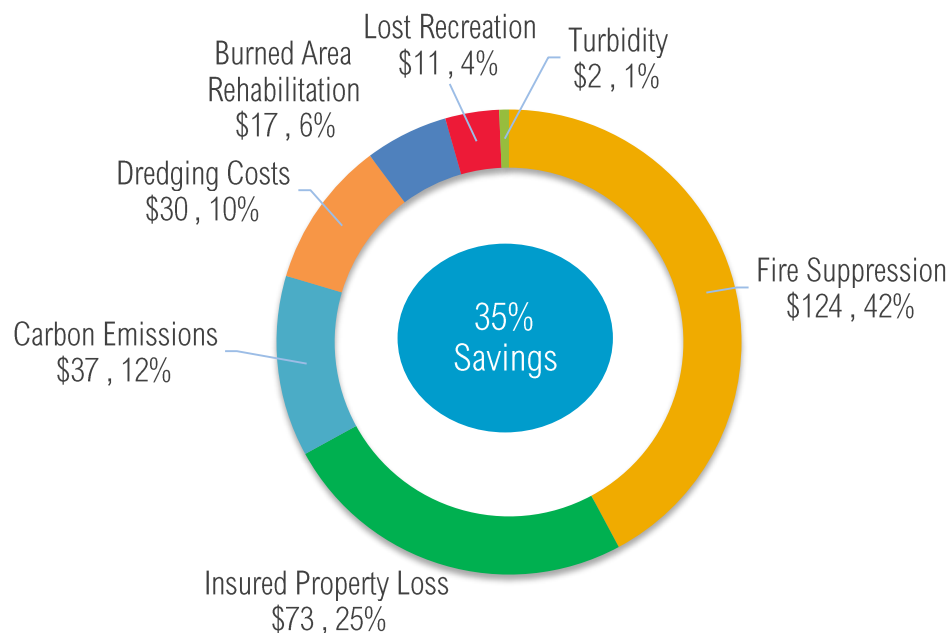Compensation comparable to earnings from cattle
➡ 1 million+ ha engaged

Source: Hanson et al. 2011; Porres, Barton, Chaco-Cascanet, and Miranda 2013

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Colorado

Preliminary summary financials for Northern Front Range, CO
Distribution of (real-time) Savings, USD millions

Base Case Scenario

Burned Area
Rehabilitation
$17 , 6%

Lost Recreation
$11 , 4%

Turbidity
$2 , 1%

Dredging Costs
$30 , 10%

35%
Savings

Fire Suppression
$124 , 42%

Carbon Emissions
$37 , 12%

Insured Property Loss
$73 , 25%

Source: Talberth, J. et al. 2014. Analysis of the Cache la Poudre and Big Thompson
Watersheds of Colorados Front Range – Preliminary Report: WRI and CSE

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Finance

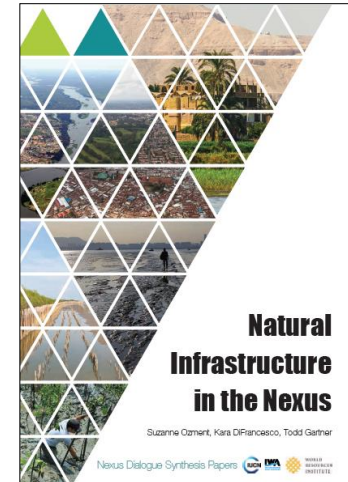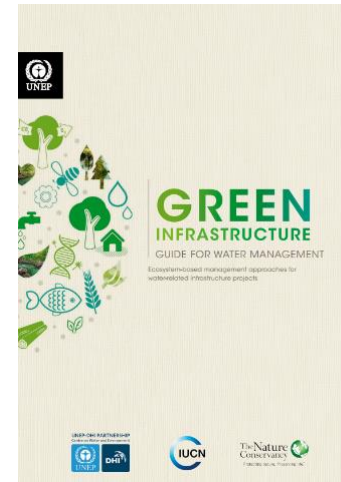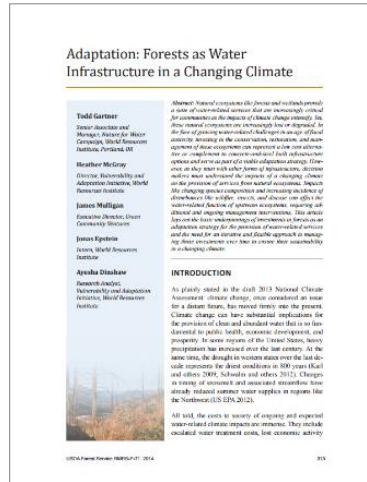## Design innovative and sustainable financial mechanisms

Table 7 | Summary of Natural Infrastructure Finance Mechanisms

FINANCE MECHANISM	TYPICAL REVENUE ALLOCATION			TYPICAL USER OF FINANCE MECHANISM	POTENTIAL SCALE OF INVESTMENT
	LAND ACQUISITION	EASEMENTS	LAND MANAGEMENT ACTIVITIES		
Direct Investment by Governments and Utilities					
Rates	X	X	X	Utility	Med
Indirect Investment by Governments and Utilities					
Property tax incentives			X	Government	Med
Voluntary Donations by Individuals and the Private Sector					
Voluntary surcharge	X	X	X	Private sector, NGO, Utility	Low
Market-based Mechanisms					
Nutrient trading	No additional revenue			Government, NGO	Med
Mitigation banking	No additional revenue			Government	Low–Med
Tradable development rights	No additional revenue			Government	Med
Forest banking	No additional revenue			Private sector	Low

Source: Gartner, T. et al. 2013. Natural Infrastructure. Washington, DC: Wld Resources Institute

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Implement

Provide comprehensive roadmaps and guidelines

Implement

Provide comprehensive roadmaps and guidelines

THEME	SUCCESS FACTOR
Building Momentum	■ Presence of drivers or windows of opportunity for natural infrastructure investments ■ Presence of champions and effective advocates ■ Investment is supported by a sound business and economic case ■ Effective partnerships are established for source water protection ■ Effective public outreach and communication
Designing	■ Landscape assessments are conducted to identify priority areas for investment ■ Sustainable financing mechanisms are available
Implementing	■ Partners have defined responsibilities and the capacity for implementation ■ Capacity to work across different types of landownership
Maintaining	■ Outcomes are monitored and reported based on an agreed upon definition of success ■ Capacity to leverage sufficient funding to achieve landscape scale impacts ■ Capacity to look ahead and plan for the future

Source: Gartner, T. et al. (forthcoming)

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Monitor on-the-ground projects and adaptively manage – share lessons learned

Todd Gartner

Senior Associate, WRI

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