Presentation from

2016 World Water Week in Stockholm

www.worldwaterweek.org

SIWI

SIWI WORLD WATER WEEK

Understanding Risks and Maximizing Natural Infrastructure Benefits for Water Security

World Water Week, Stockholm | August 30, 2016

THE SCHERMAN FOUNDATION

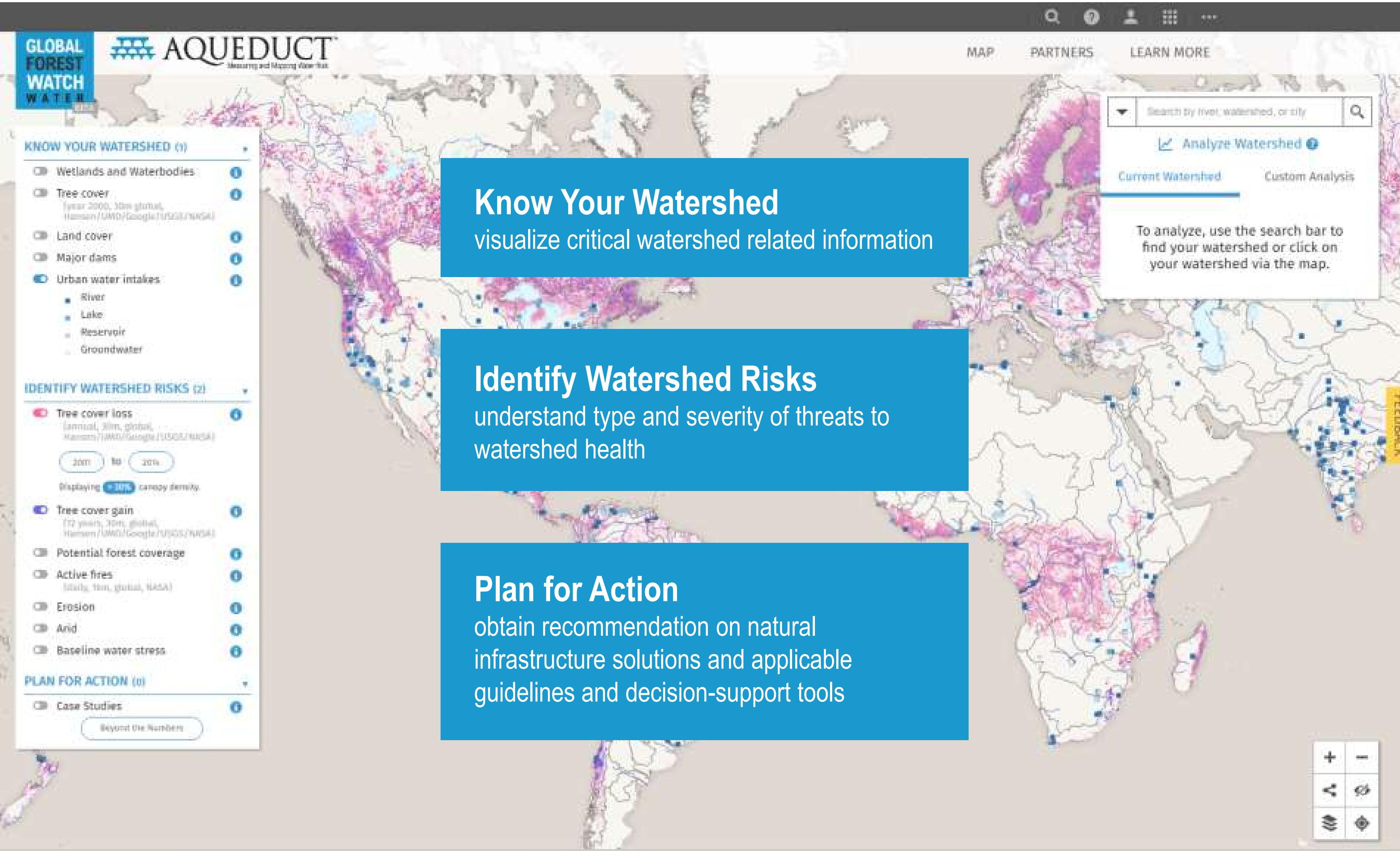
GLOBAL FOREST WATCH WATER

BETA

WORLD RESOURCES INSTITUTE

Todd Gartner | Senior Associate, WRI

World Water Week, Stockholm | August 30, 2016

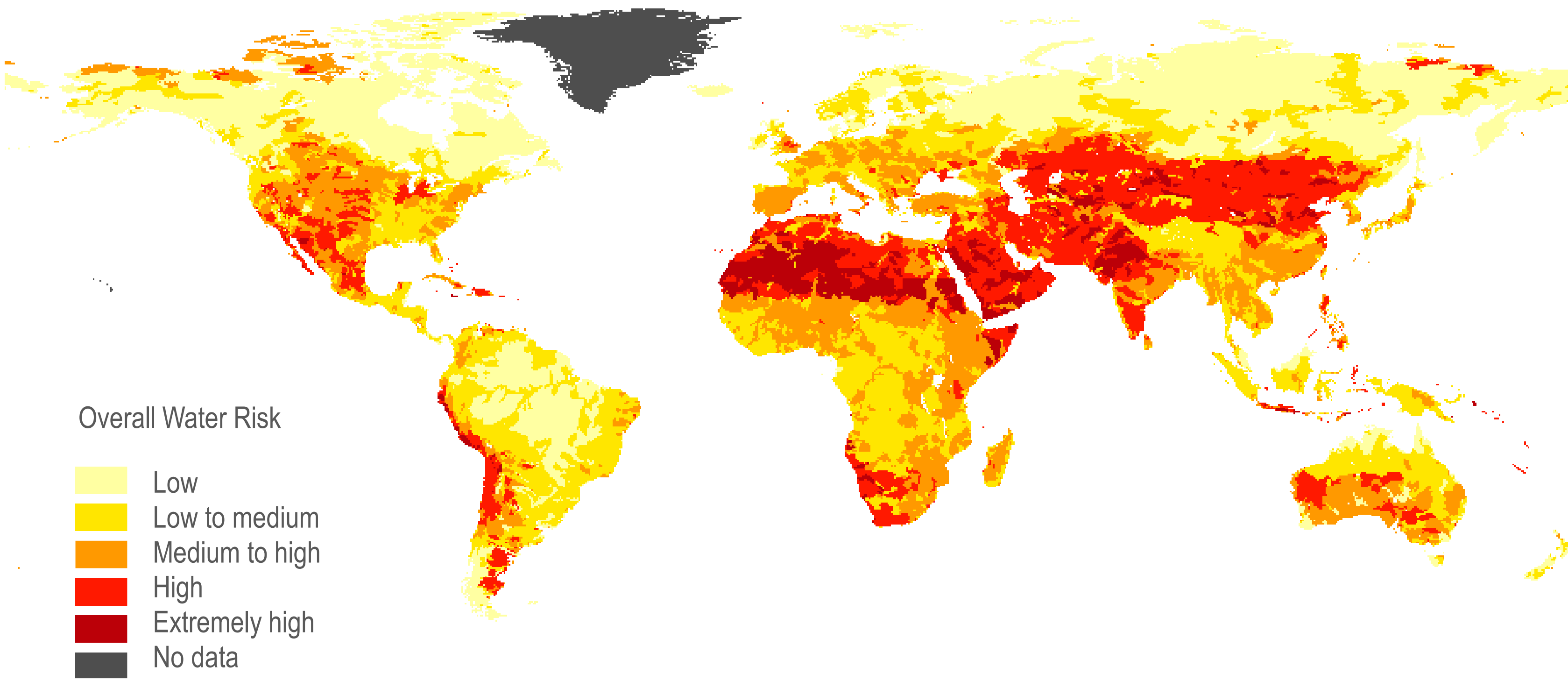


Know Your Watershed
visualize critical watershed related information

Identify Watershed Risks
understand type and severity of threats to watershed health

Plan for Action
obtain recommendation on natural infrastructure solutions and applicable guidelines and decision-support tools

CURRENT WATER STRESS

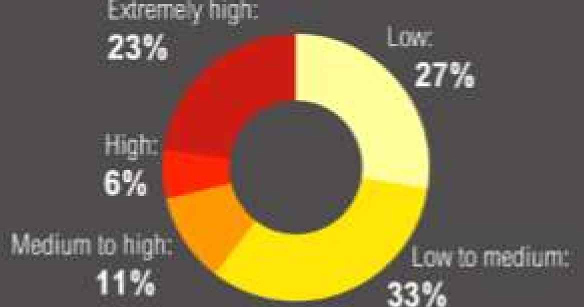


AQUEDUCT

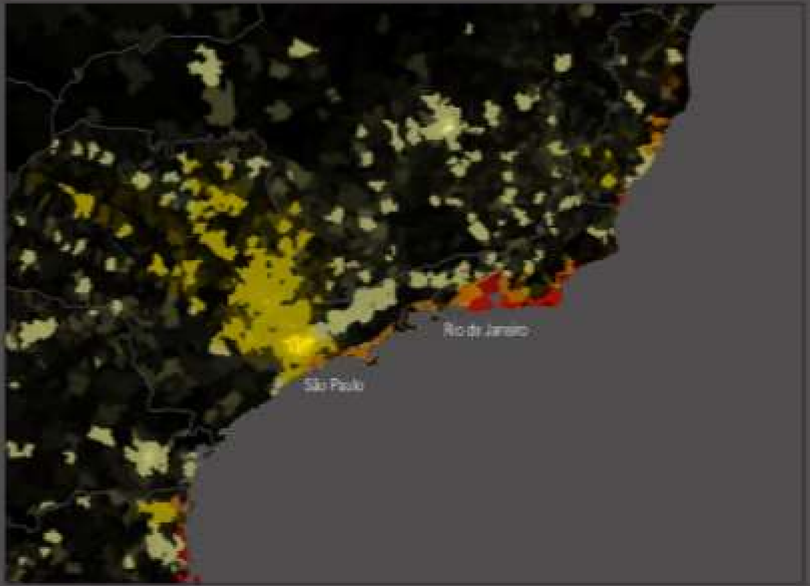
Sources: WRI Aqueduct 2014

BRAZILIAN POPULATION DENSITY & **BASELINE WATER STRESS**

DISTRIBUTION OF URBAN WATER STRESS



40% OF BRAZIL'S URBAN POPULATION
FACES **MEDIUM TO EXTREMELY HIGH WATER STRESS**



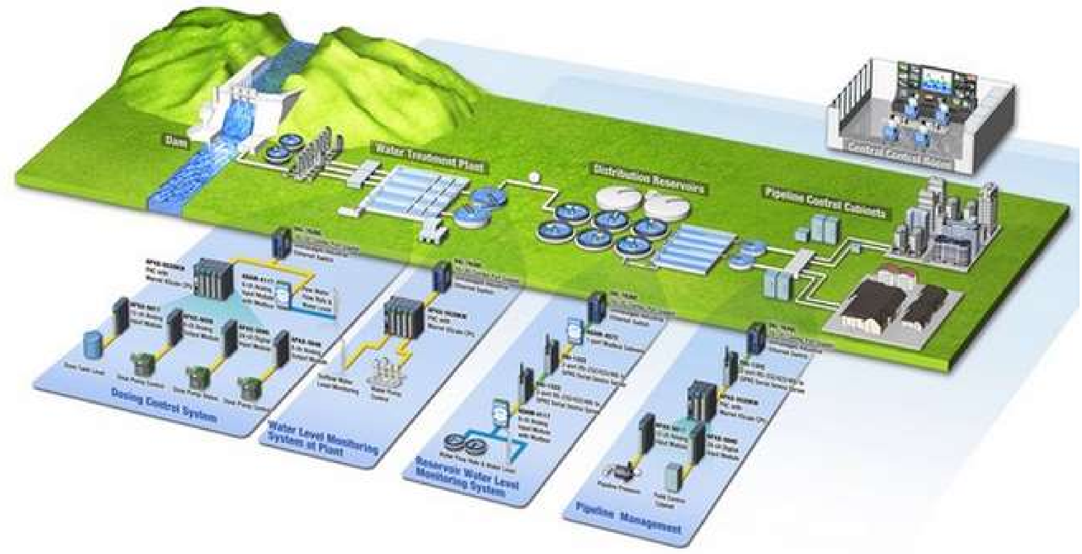
2014

Sources: Water Stress, WRI Aqueduct 2013; Population, WRI Aqueduct 2013
Notes: Higher color saturation indicates higher population.
Urban is defined as living in a city of 1 million or more.

For more: http://bit.ly/1xTiS2O

WORLD RESOURCES INSTITUTE

BUSINESS AS USUAL



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

SOUTH AMERICA TREE COVER LOSS

Tree cover loss in Brazil 2012 - present: 7M+ ha or the size of Ireland

FOREST CHANGE

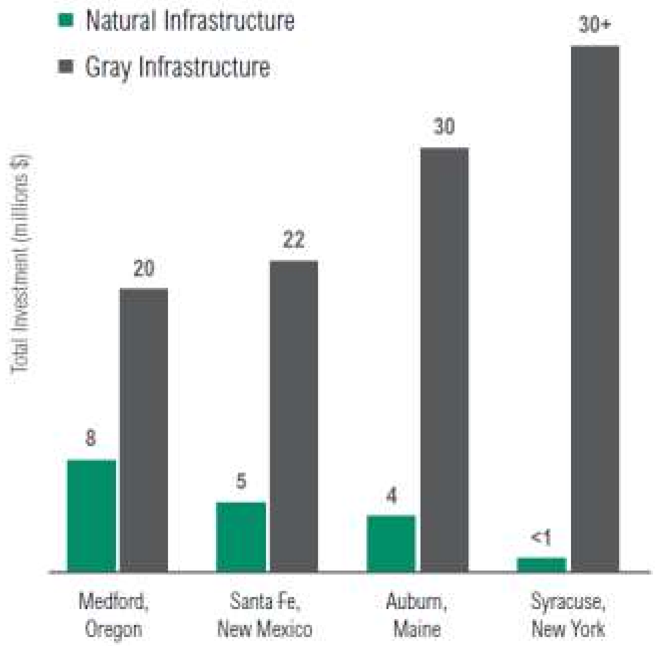
- Tree cover loss

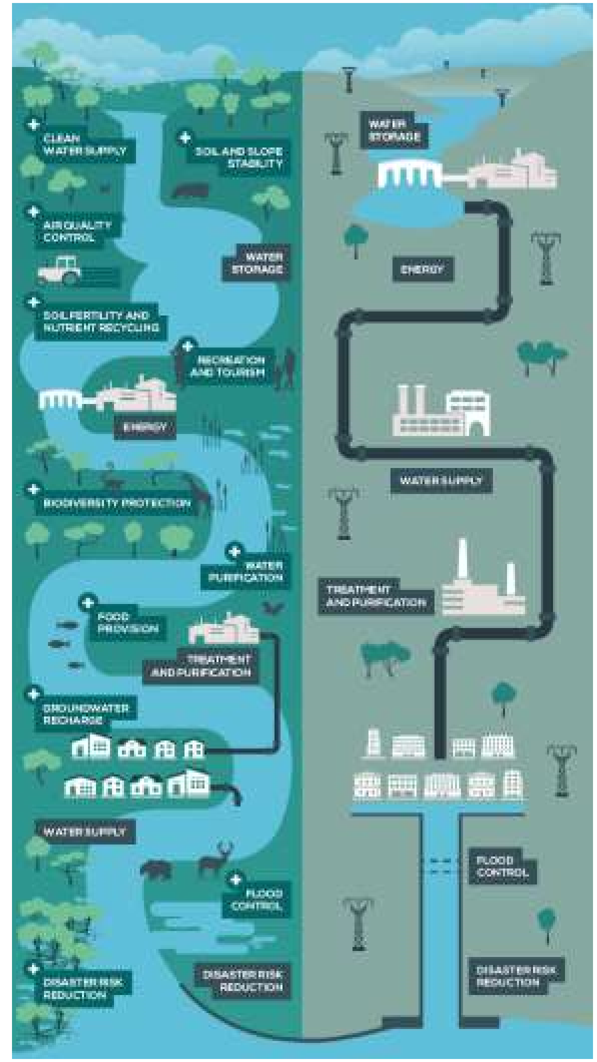
  Displaying loss with > 30 % canopy density.

  Tree cover loss is not always deforestation.

WHY GREEN + GRAY?

Reduce treatment costs and capital expenses

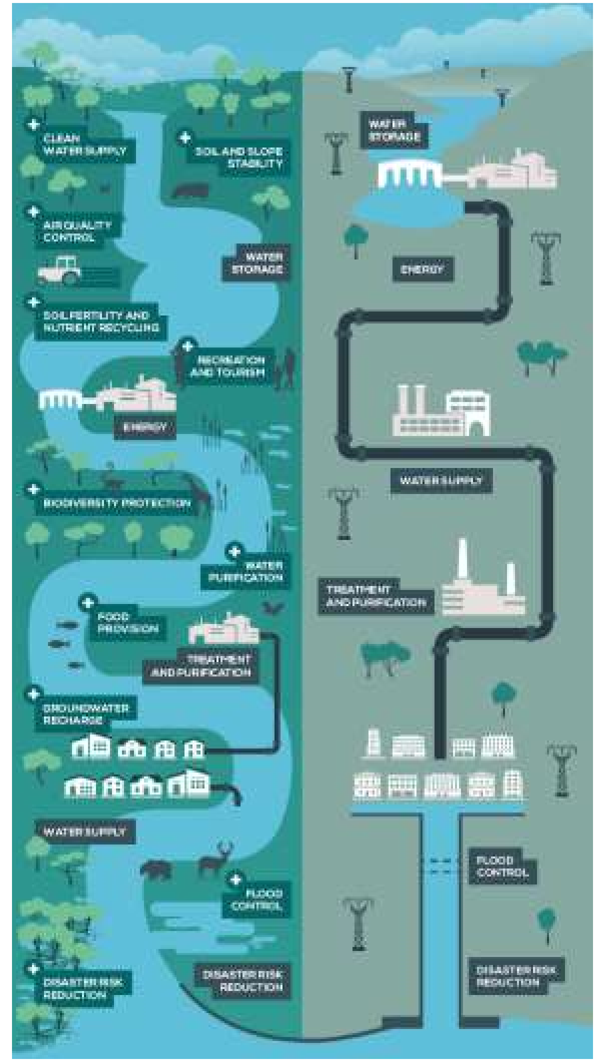




Source: IUCN 2015

WHY GREEN + GRAY?

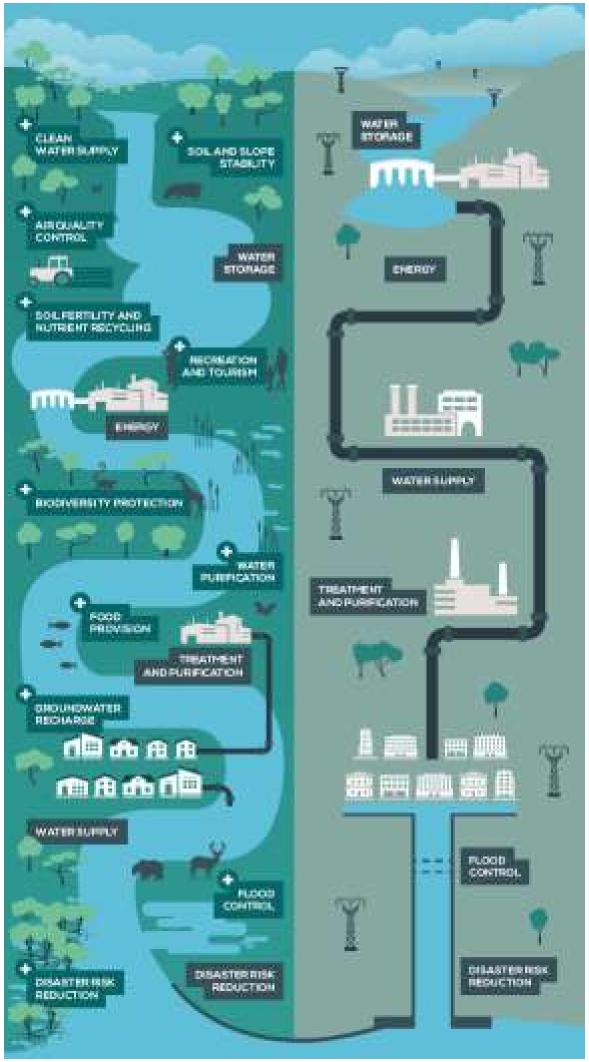
Improve climate resilience



Source: IUCN 2015, App Developer

WHY GREEN + GRAY?

Meet Sustainable Development Goals



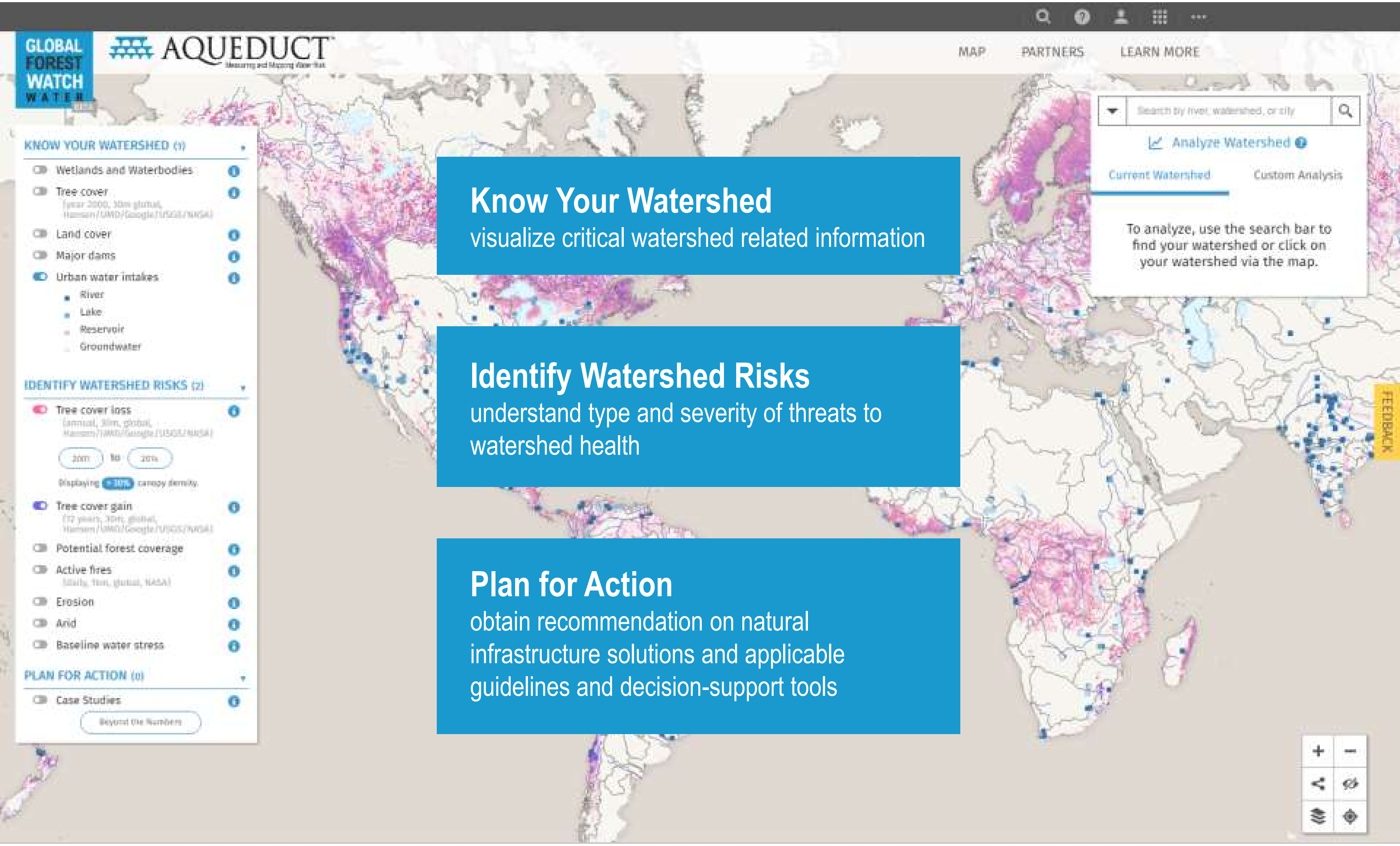
Source: IUCN 2015

THE SCHERMAN FOUNDATION

WORLD RESOURCES INSTITUTE

GLOBAL FOREST WATCH WATER

BETA



Know Your Watershed

visualize critical watershed related information

Identify Watershed Risks

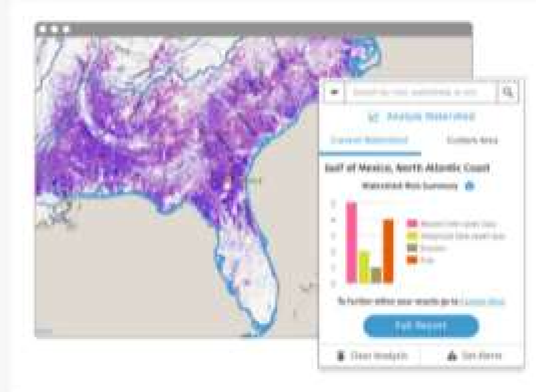
understand type and severity of threats to watershed health

Plan for Action

obtain recommendation on natural infrastructure solutions and applicable guidelines and decision-support tools

Powerful Information

GFW Water enables anyone with internet access to visualize critical watershed information, identify threats to watershed health, and screen for sustainable natural infrastructure solutions.

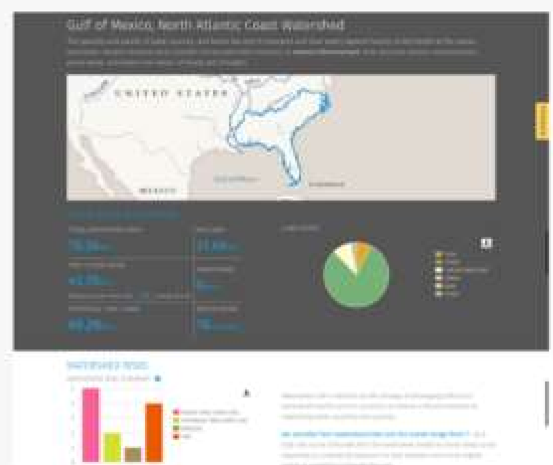


Custom Insights

Select point on the map and obtain results for your watershed of interest.

Report and Share

Go behind the numbers and learn about the importance of healthy watersheds. Save, print, or share your report with the world.



USERS PROFILES

Downstream beneficiaries:

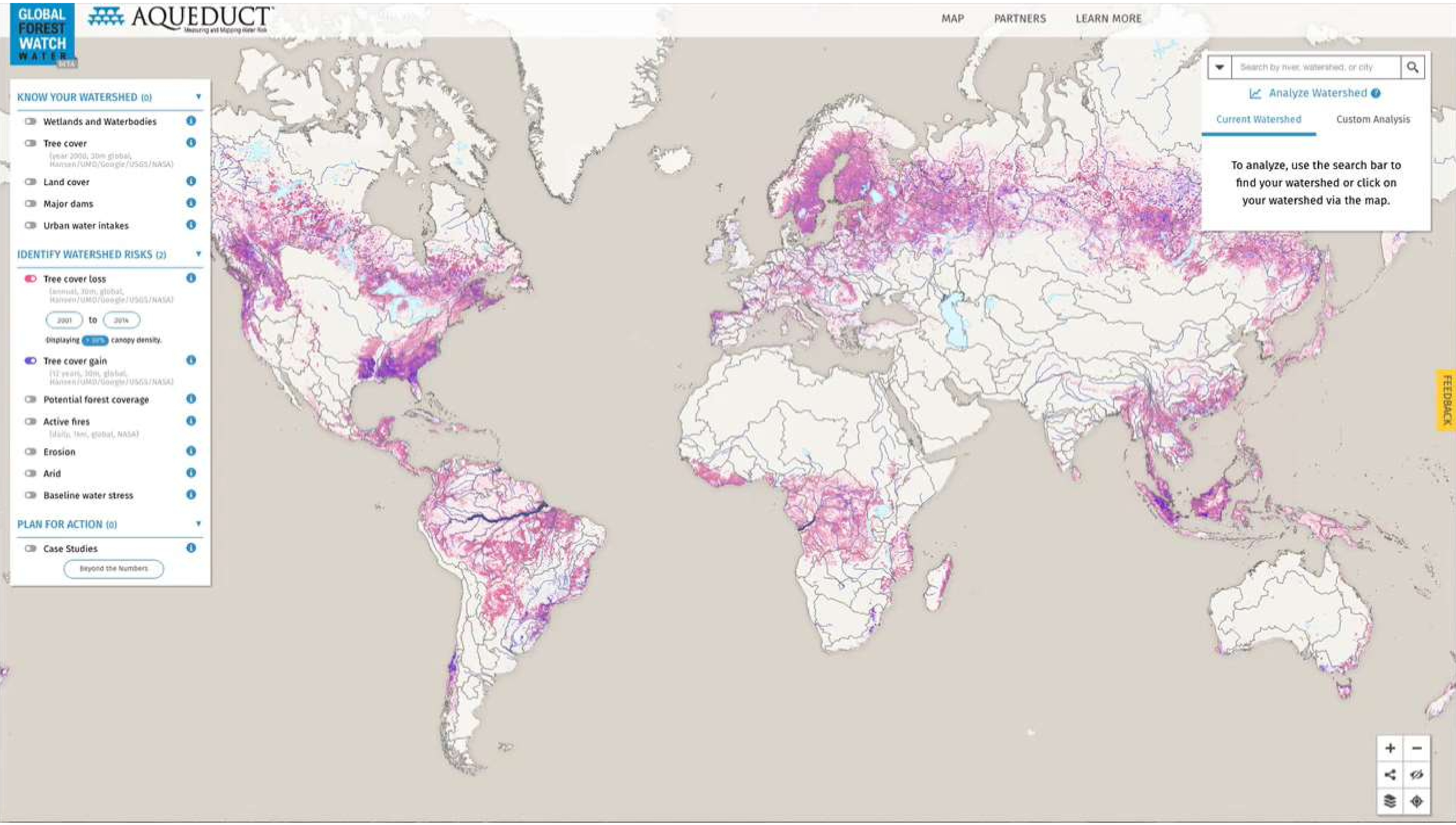
Make smart water infrastructure investments. Explore watershed risks and find information to improve operations and protect water at lower cost.

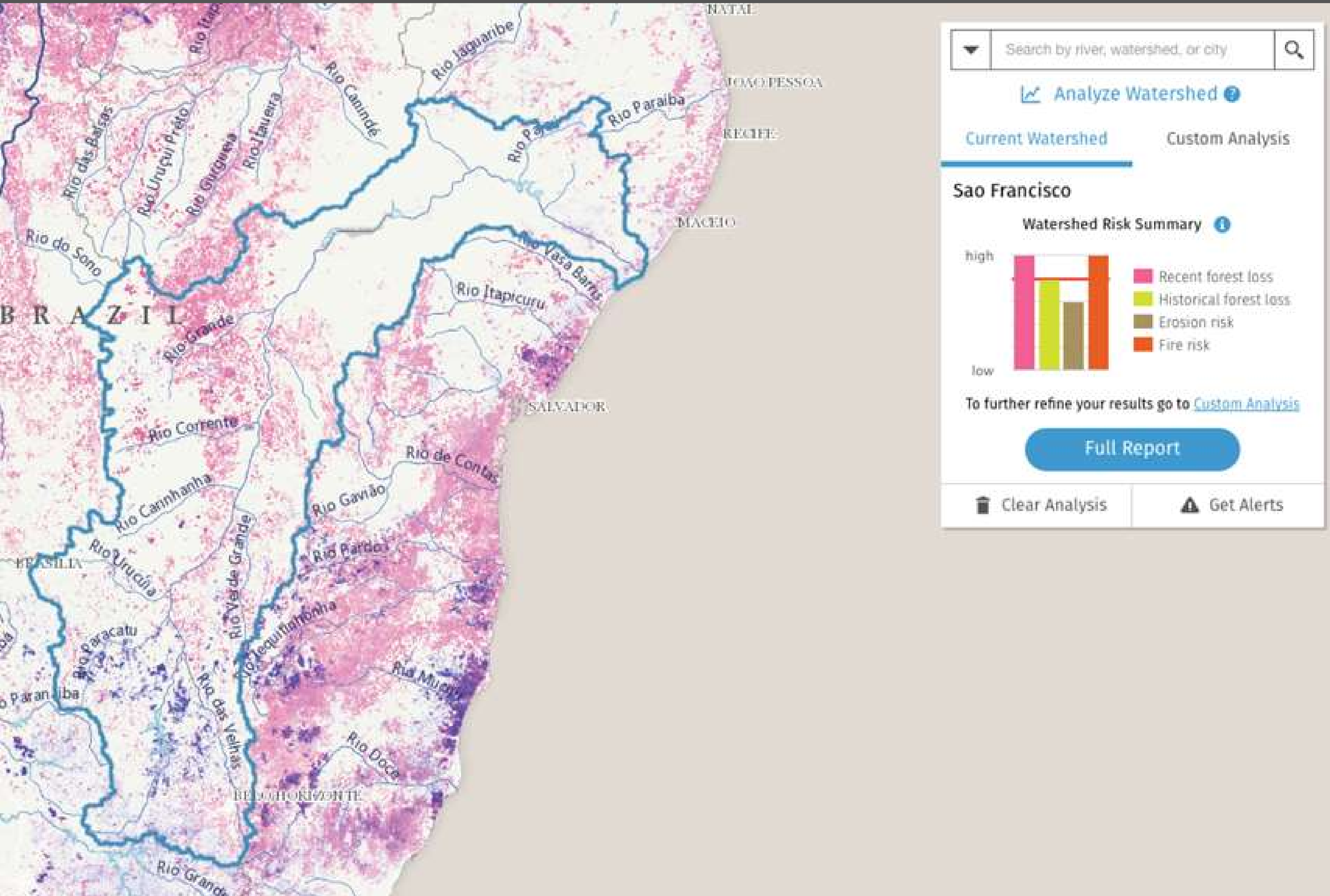
Financing & Development:

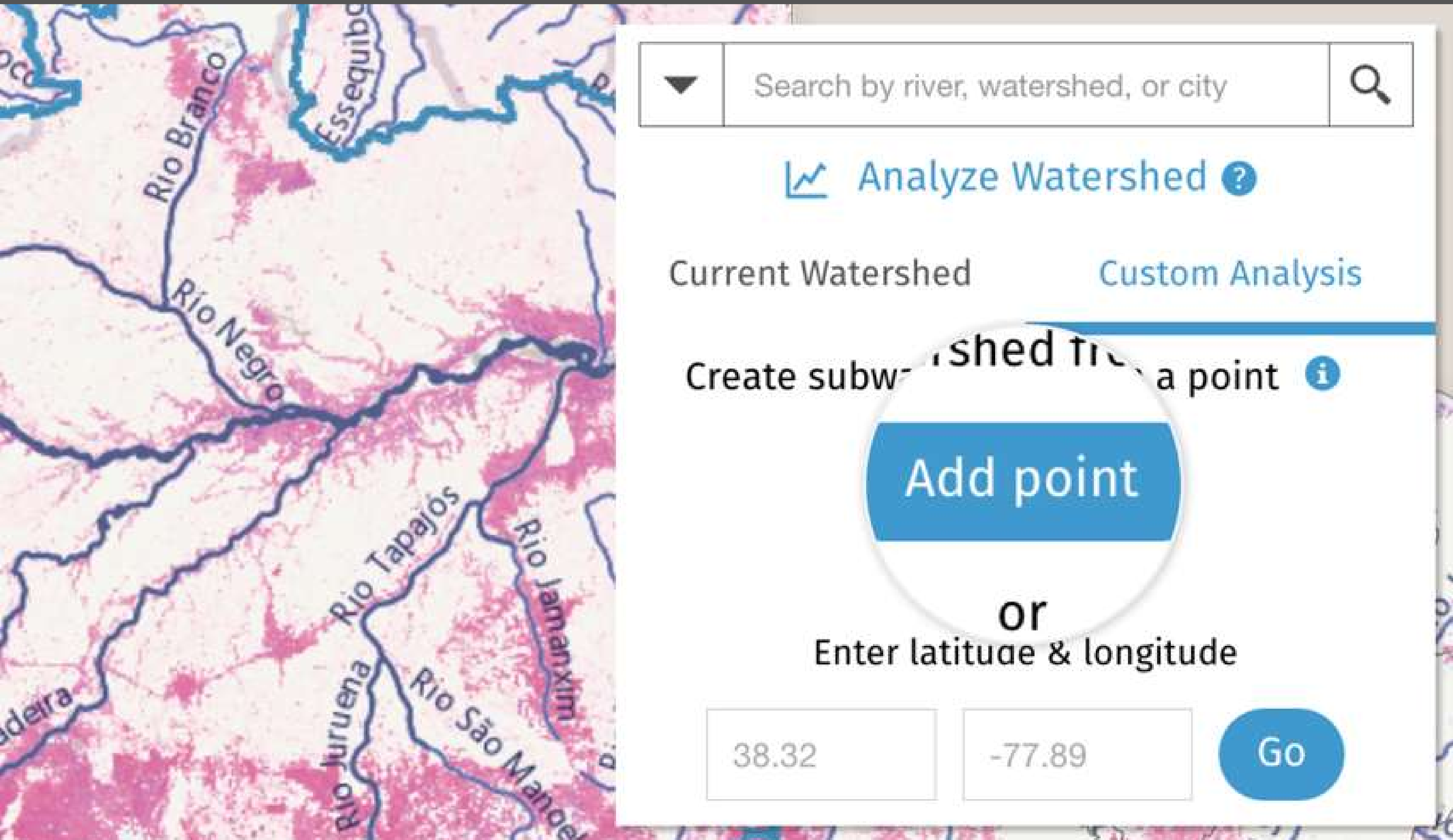
Enhance water security and bolster economic development. Maximize effectiveness of investment portfolio. ID a project pipeline.

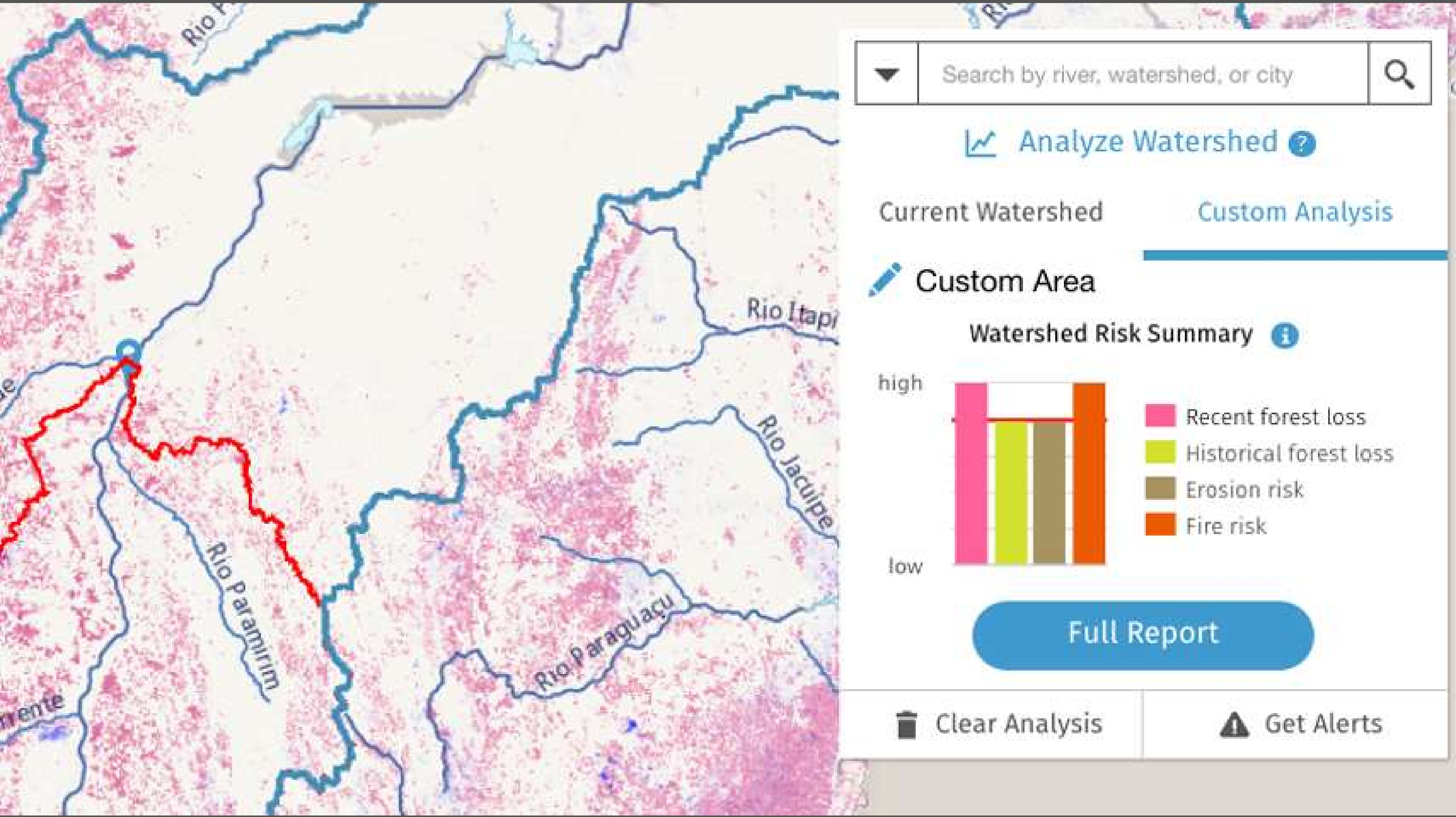
Research & Civil Society:

Use data to support efforts. Explore new project ideas and find the information to advance your research and campaigns to protect watersheds.


GLOBAL FOREST WATCH WATER
AQUEDUCT
MAP
PARTNERS
LEARN MORE
KNOW YOUR WATERSHED (0)
Wetlands and Waterbodies
Tree cover
Land cover
Major dams
Urban water intakes
IDENTIFY WATERSHED RISKS (2)
Tree cover loss
to
Displaying canopy density.
Tree cover gain
Potential forest coverage
Active fires
Erosion
Arid
Baseline water stress
PLAN FOR ACTION (0)
Case Studies
Analyze Watershed
Current Watershed
Custom Analysis
To analyze, use the search bar to find your watershed or click on your watershed via the map.
FEEDBACK


Search by river, watershed, or city
Analyze Watershed
Current Watershed
Custom Analysis
Sao Francisco
Watershed Risk Summary
high
low
Recent forest loss
Historical forest loss
Erosion risk
Fire risk
To further refine your results go to Custom Analysis
Full Report
Clear Analysis
Get Alerts
NATAL
JOAO PESSOA
RECIFE
MACEIO
SALVADOR
BRASILIA
BELO HORIZONTE
BRAZIL
Rio Jaguaribe
Rio Canindé
Rio Paraiba
Rio das Balsas
Rio Uruçui Preto
Rio Gurgueia
Rio Itaueira
Rio do Sono
Rio Vasa Barris
Rio Itapicuru
Rio Grande
Rio Corrente
Rio de Contas
Rio Carinhanha
Rio Gavião
Rio Pardo
Rio Urucuia
Rio Verde Grande
Rio Jequitinhonha
Rio Paracatu
Rio das Velhas
Rio Mucuri
Rio Doce
Rio Grande


Rio Branco
Essequibo
Rio Negro
Rio Tapajós
Rio Jamanxim
Rio Juruena
Rio São Manoel
Search by river, watershed, or city
Analyze Watershed
Current Watershed
Custom Analysis
Create subw
shed fr
a point
Add point
or
Enter latitude & longitude
38.32
-77.89
Go



Search by river, watershed, or city
Analyze Watershed
Current Watershed
Custom Analysis
Custom Area
Watershed Risk Summary
high
low
Recent forest loss
Historical forest loss
Erosion risk
Fire risk
Full Report
Clear Analysis
Get Alerts
Rio Itapi
Rio Jacuípe
Rio Paramirim
Rio Paraguaçu

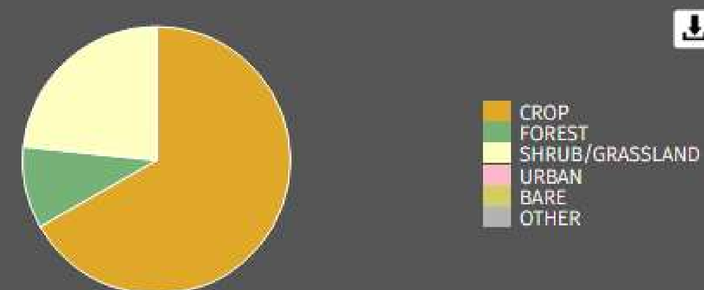
Upper Sao Francisco Watershed

A watershed's health directly affects the quantity and quality of water sources as well as water transport and treatment costs. Healthy forested lands provide critical watershed functions as natural infrastructure by minimizing erosion and pollutants, purifying water, and reducing the impact of floods and droughts.

KNOW YOUR WATERSHED

TOTAL WATERSHED AREA 34MHa	WETLAND 3MHa
TREE COVER (2000) 9MHa Displaying tree cover with > 30 canopy density	MAJOR DAMS 164Dams
POTENTIAL TREE COVER 34MHa	WATER INTAKE 11Locations

LAND COVER



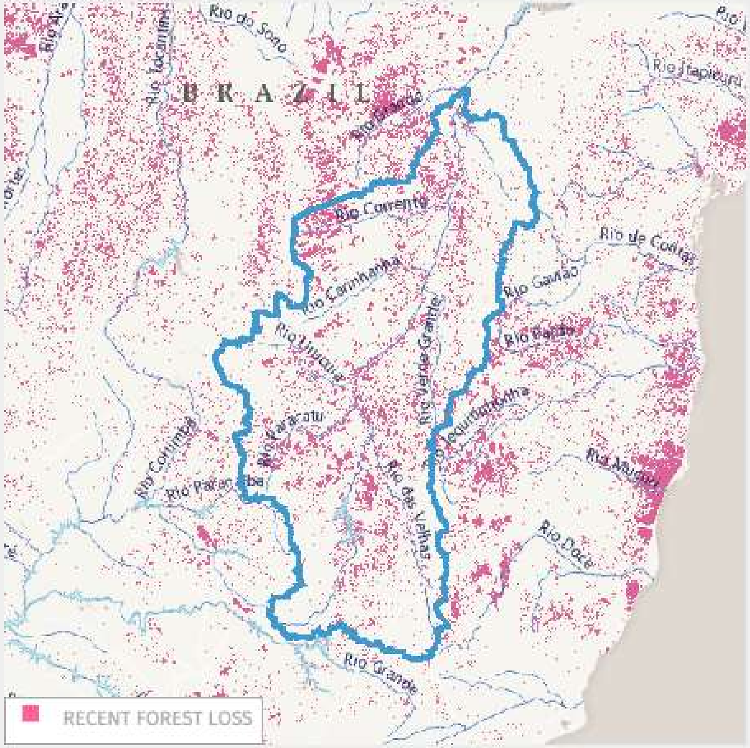
RECENT FOREST LOSS

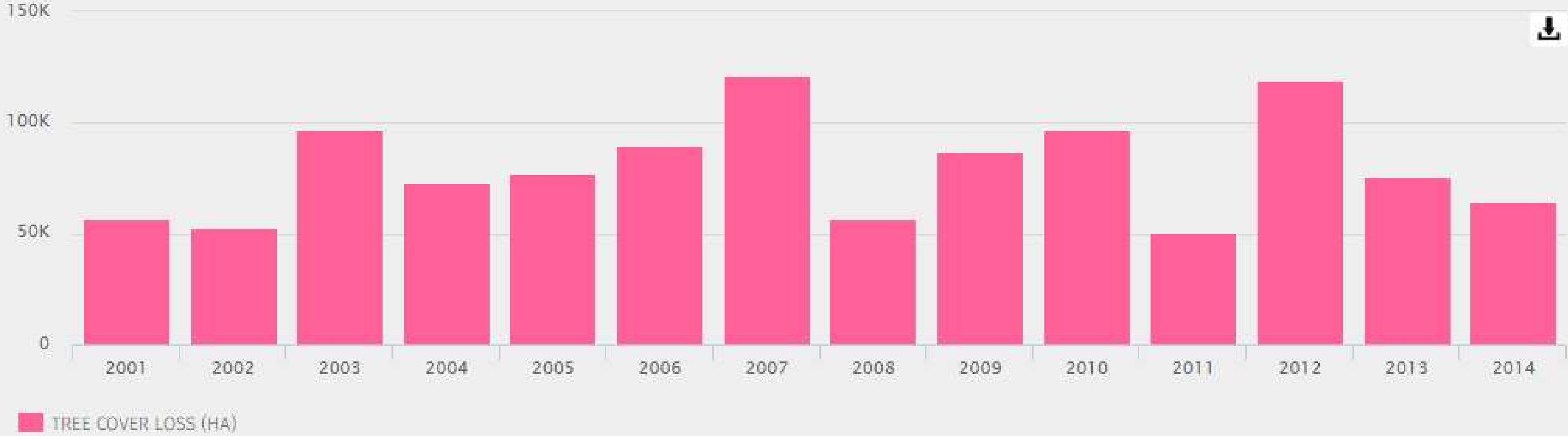
RISK SCORE: 5/5

This watershed experienced 1 MHa of tree cover loss from 2001 to 2014, accounting for 11.39% of total tree cover (2000), presenting a positive trend.

Recent forest loss risk was measured by the area of total forest loss from 2001 to 2014 as a share of total forest extent (year 2000). The threshold of canopy density for identifying forest and forest loss is set to (> 30) across the globe, which may include natural forest, plantations and other forms of vegetation depending on the region. This risk score is not applicable to arid areas and areas where total forest extent (year 2000) is less than 10% of watershed.

Recent forest loss estimates the potential of damaging impact from recent changes (2001 – 2014) in the extent of forest cover in a watershed. As forests are converted to other land uses or are unnaturally disturbed, their ability to regulate flow and purify water diminishes, putting communities at risk of flood, drought, higher cost of treatment, and greater incidence of drinking water contamination. In addition to the area of forest removed, the duration and magnitude of a watershed's response depends on various factors, including age and type of forest removed, climate, topography, and size of the watershed.





HISTORICAL FOREST LOSS

RISK SCORE: 4/5

This watershed was covered by 34 MHa of forest, accounting for 99.95% of watershed area. The total tree cover (2000) accounts for 28.30% of potential forest.

Historical forest loss risk is approximated by comparing total forest extent (year 2000) to potential forest coverage. The threshold of canopy density for identifying forest and forest loss is set to > 30 % across the globe. This risk score is not applicable to arid areas and areas where potential forest coverage is less than 10% of the watershed.

Historical forest loss measures the potential threat on a watershed's capacity to deliver ecosystem services as a result of forest cover change in the past (prior to 2000). Compared to recent forest loss, forest loss that took place decades ago may lead to different hydrological responses with greater uncertainty in a watershed. In addition to the extent of forest removed, other factors that contribute to a watershed's capacity to regulate flow and control water quality include age and type of forest removed, climate, and land management since forest removal.

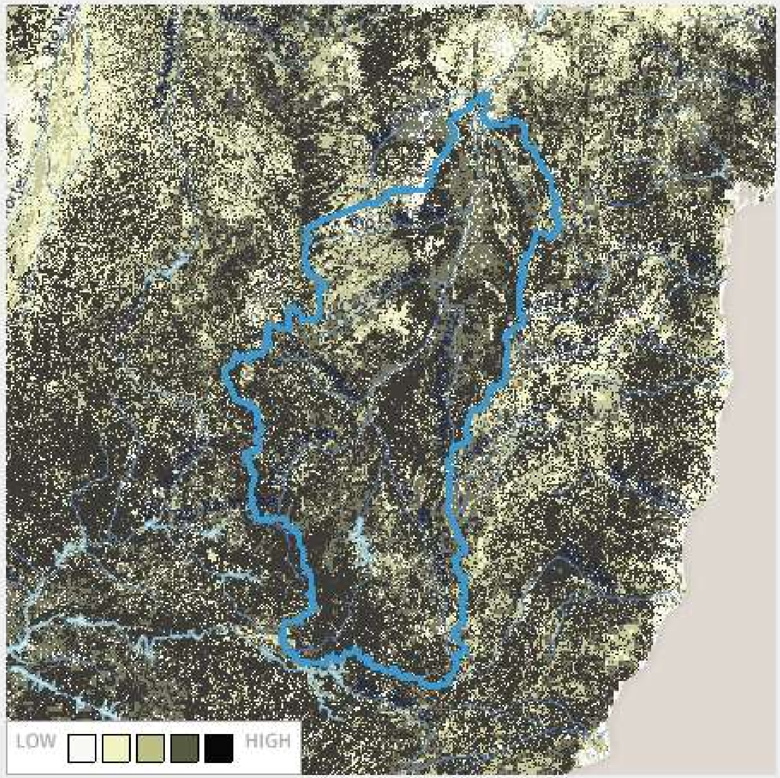
EROSION

RISK SCORE: 4/5

The overall erosion risk of this watershed is medium to high.

Erosion risk is derived from the Revised Universal Soil Loss Equation, adjusted to extend its applicability to a global scale. Factors include rainfall erosivity, slope steepness, soil erodibility, and land cover.

Erosion is a significant problem that affects both water quality and quantity. High erosion deteriorates water quality and reduces reservoir capacity, increasing cost of water treatment and capital expenses, and damaging safety of water supplies. High erosion risk is usually linked to erodible soil, intense rainfall, steep topography, and conversion of forest and other natural lands to pasture, cropland, and other human developments.



FIRE

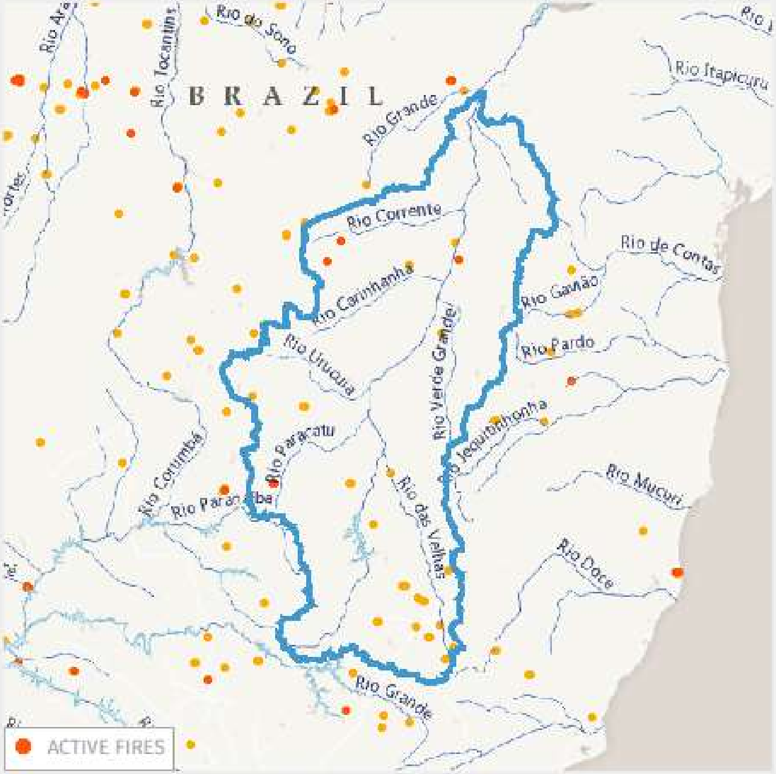
RISK SCORE: 5/5

There were 39 fire alerts over the past 24 hours. An average of 17,501 fires occurred annually for the past ten years.

Learn more about [Global Forest Watch Fires]

Fire risk is measured by average annual fire occurrence per unit area in a watershed in the most recent past ten years (January 1st, 2006 to December 31st, 2015).

Fires are a common form of disturbance in some forested watersheds. High intensity or large fires can result in significant increases in runoff, erosion, and tree mortality, all of which can negatively impact water quality. Although the effects are usually short-lived, long-term effects, magnitude, and persistence of downstream effects are uncertain.

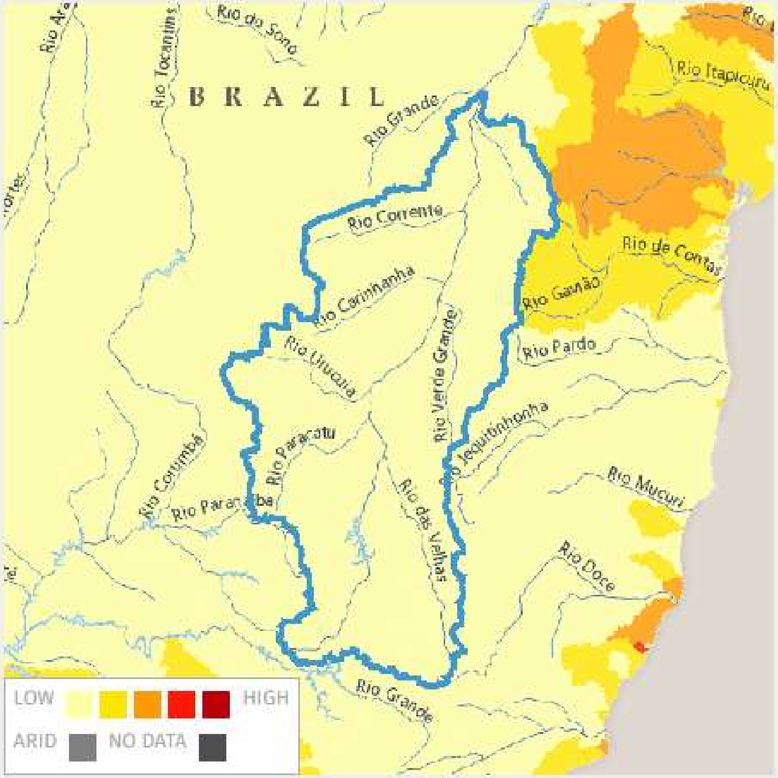


BASELINE WATER STRESS

Baseline water stress (BWS) measures the ratio of total water withdrawals to annual available renewable surface water supplies.

We use this data to set the context for landscape water-related risk for a given watershed. BWS serves as a good proxy for water-related challenges more broadly, given that areas of higher water stress will likely be subject to higher depletion of surface and groundwater resources and more competition amongst users, as well as the associated impacts on water quality and other ecosystem services. Watersheds with high baseline water stress may warrant urgent, appropriate action to respond to the watershed risks listed above.

Learn more about the [Global Forest Watch Aqueduct Project]



PLAN FOR ACTION

RECOMMENDED NATURAL INFRASTRUCTURE STRATEGIES

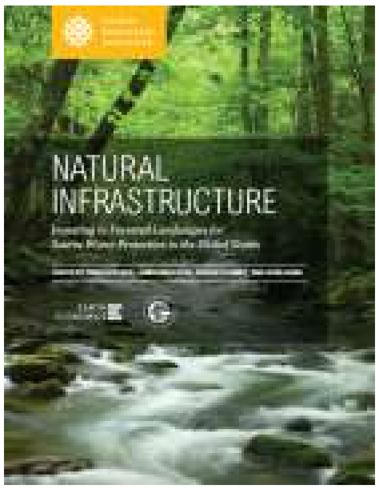
Risks scores of 4 or higher should be addressed by specific actions. Highlighted is the list of recommendations and case studies to mitigate high risks to this watershed.

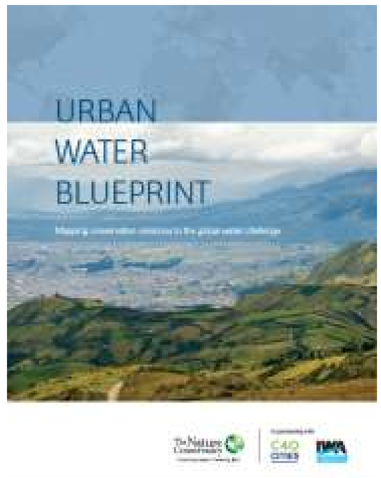
RISK	STRATEGY	DESCRIPTION	CASE STUDIES
Recent Tree Cover Loss	Ecosystem Protection	**Conservation zones**: Setting aside natural areas with high conservation value to preserve biodiversity and maintain forests, wetlands, and other open lands as natural infrastructure to regulate water flow and improve quality. **Sustainable forestry**: Engaging in best forestry practices to minimize negative environmental impacts and disturbance to forests to deliver critical watershed services such as water purification and flood mitigation. **Road network regulation**: Limiting road creation near vulnerable forests, which has been heavily linked to deforestation that diminishes forests' ability to regulate flow and purify water.	New York, NY, United States Portland, ME, United States Quito, Ecuador
Historical Tree Cover Loss	Landscape Restoration	**Reforestation**: Planting seedlings in burnt or deforested areas to stem the rate of erosion and restore the land. **Assisted natural regeneration**: Enhancing the establishment of secondary forest from degraded grassland and shrub vegetation by protecting and nurturing the mother trees and their wildlings inherently present in the area which may enhance aquifer recharge. **Agroforestry**: Managing forests together with crops and/or animal production systems in agricultural settings.	Beijing, China Multiple locations, India Rio de Janeiro, Brazil Multiple locations, Costa Rica Humbo, Ethiopia
Erosion	Erosion Control	**Vegetation buffering**: Planting or maintaining trees/ shrubs along the sides of roads and waterways to capture runoff and pollutants. **Slope erosion reduction**: Slowing the rate of erosion on steep sloped lands by creating various barriers to sediment movement. Examples include contour felling of trees, silt fences, and terracing. **Agricultural best management practices**: Reducing the amount of pesticides, fertilizers, animal waste, and other pollutants entering water resources, and conserving water supply. Examples include contour farming, cover crops, and terrace construction.	Eugene, OR, United States Lima, Peru Paris, France
Fire	Fire Management	**Forest fuel reduction**: Reducing wildfire severity and related sediment and ash pollution through controlled burns and mechanical treatment.	Denver, CO, United States Rio Grande, NM, United States Riau, Indonesia

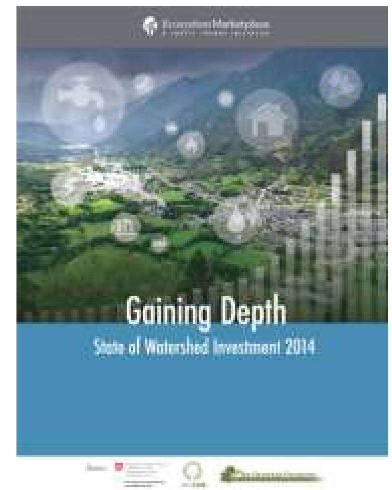
BEYOND THE NUMBERS

- Spatial Mapping Tools & Platforms
- Economics & Finance
- Guidance & Roadmaps
- Other WRI Projects

ROADMAPS & GUIDANCE – SHARING SUCCESS STORIES



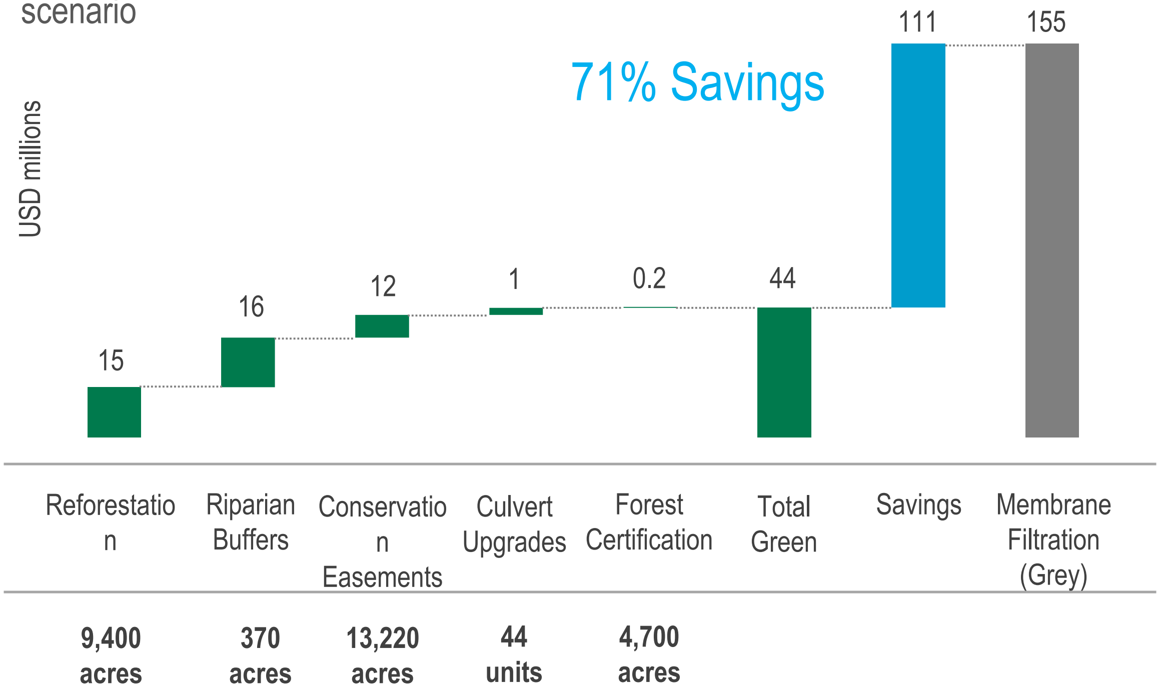




ROI CASE STUDY: PORTLAND, ME

Detailed financials of green gray infrastructure approaches for securing clean drinking water in Portland, ME

Present value of investments over 20 years, most optimistic scenario



Source: Talberth, J. et al. 2012. Insights from the Field: forest for Water. Washington, DC: Wld Resources Institute

FINANCE 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
Municipal bonds (revenue-backed)	X	X		Utility	High
Municipal bonds (general obligation)	X	X	X	Government	High
Rates surcharges	X	X	X	Utility	Med
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

SCALE UP THROUGH NETWORKS

GREEN UTILITY NETWORK

LATIN AMERICAN
WATER FUNDS
PARTNERSHIP

The Nature Conservancy
Protecting nature. Preserving life.

FUNDACIÓN FEMSA

IDB

100 RESILIENT CITIES
NETWORK MEMBER

100RESILIENTCITIES.ORG
PIONEERED BY THE ROCKEFELLER FOUNDATION

POLICY IMPLICATIONS

FOREST TRENDS

Viewpoints

A FOREST TRENDS BLOG

HOME

Who We Are | Our Initiatives | Events | Resources | Blog | Support Us

Search For Blogs

Peru Approves New Innovative Environmental Policies

Michael Jenkins, Gena Gammie and Jan Cassin | July 27, 2016

In the last week we have seen the announcement of several important steps forward for the people of Peru and the critical ecosystems that sustain their livelihoods and cultures. The Peruvian government has formally released: 1) the regulation of its groundbreaking national payments for ecosystem services law; 2) a separate regulation of the Sanitation Sector Reform Law that creates a process for water utilities to utilize payments for ecosystem services to secure their water supply through watershed conservation; 3) a national strategy for forest conservation in the context of climate change; and 4) guidance for biodiversity offsets under Peru's innovative no-net-loss rules. These important steps forward were complemented by Peru's formal ratification of the Paris Agreement this week.

Each of these achievements reflect years of hard work by our partners in the Peruvian government, civil society, and indigenous peoples, and major efforts from our different programs to tackle the day-to-day challenge of turning a vision into a reality.

About the Author

Michael Jenkins

Michael Jenkins is the founding President and CEO of Forest Trends which works for conserve forests and other ecosystems through the creation and wide adoption of a broad range of environmental finance, markets, and other payment and incentive mechanisms.

Water.GlobalForestWatch.org

WORLD RESOURCES INSTITUTE

GLOBAL FOREST WATCH WATER

BETA

Todd Gartner | tgartner@wri.org

THE SCHERMAN FOUNDATION