This presentation premiered at WaterSmart Innovations

watersmartinnovations.com

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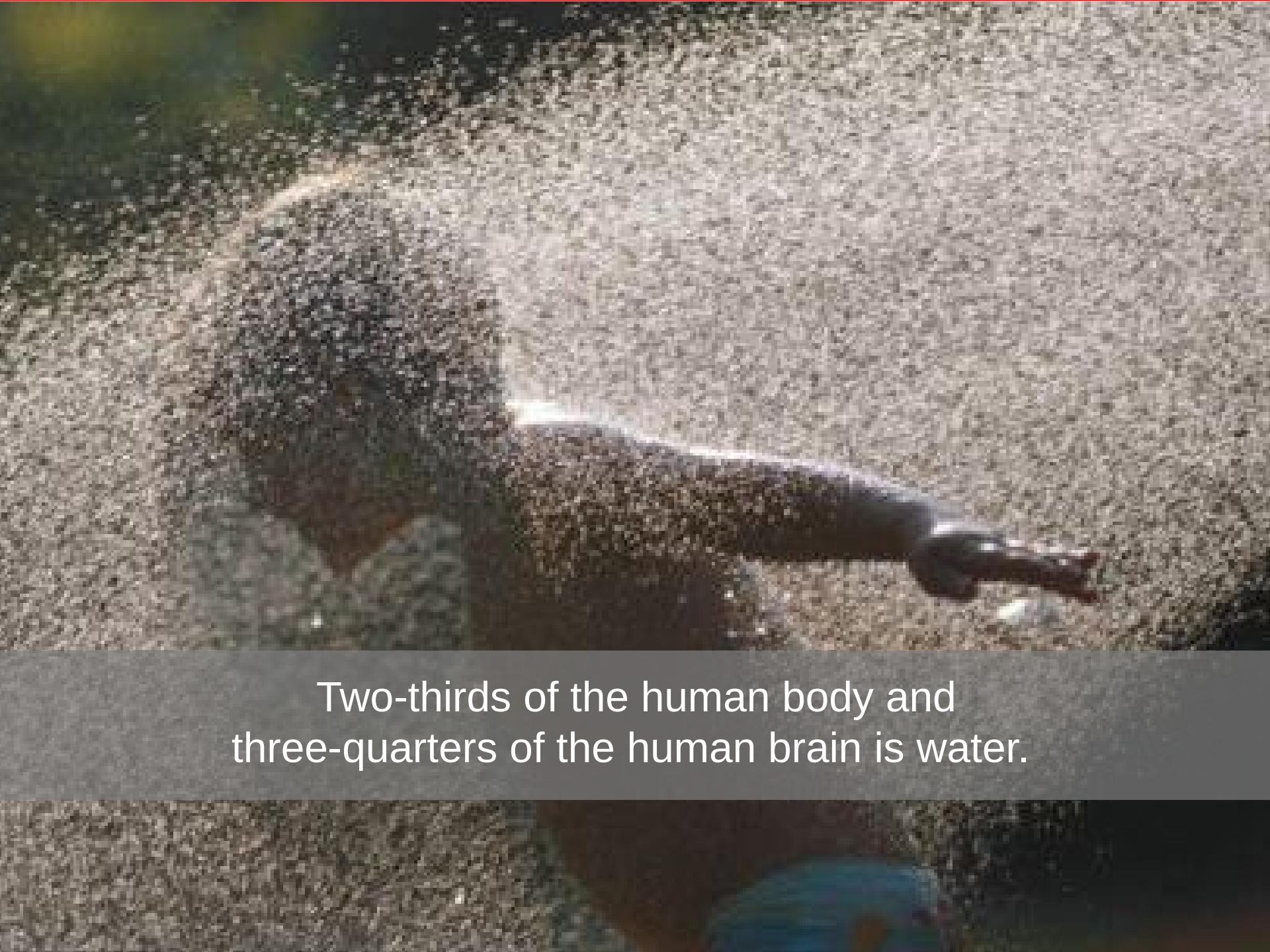
H_2Obligation

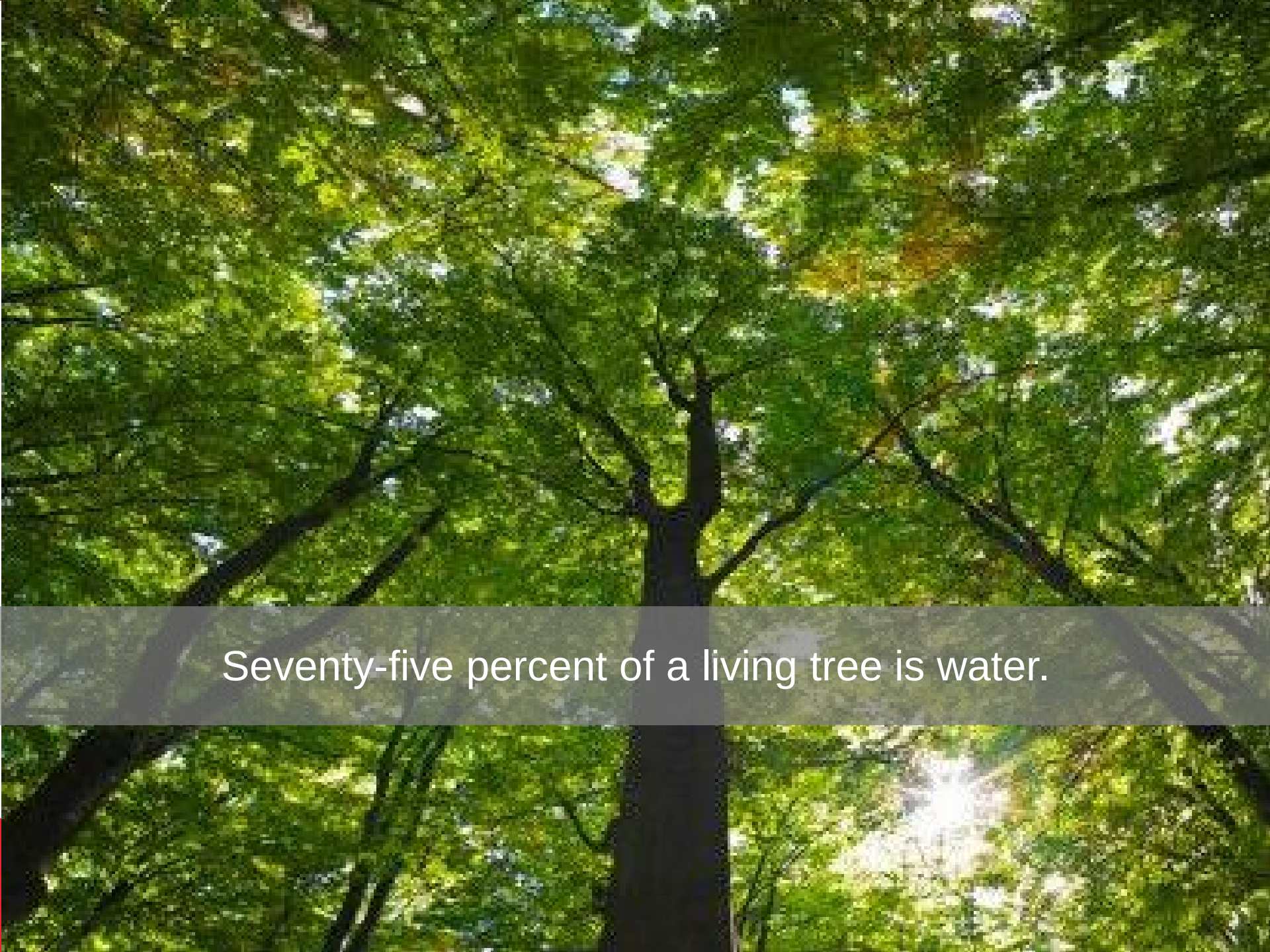
Creating a Sustainable Water Future

Scott Wolf, FAIA
The Miller Hull Partnership
Seattle, WA

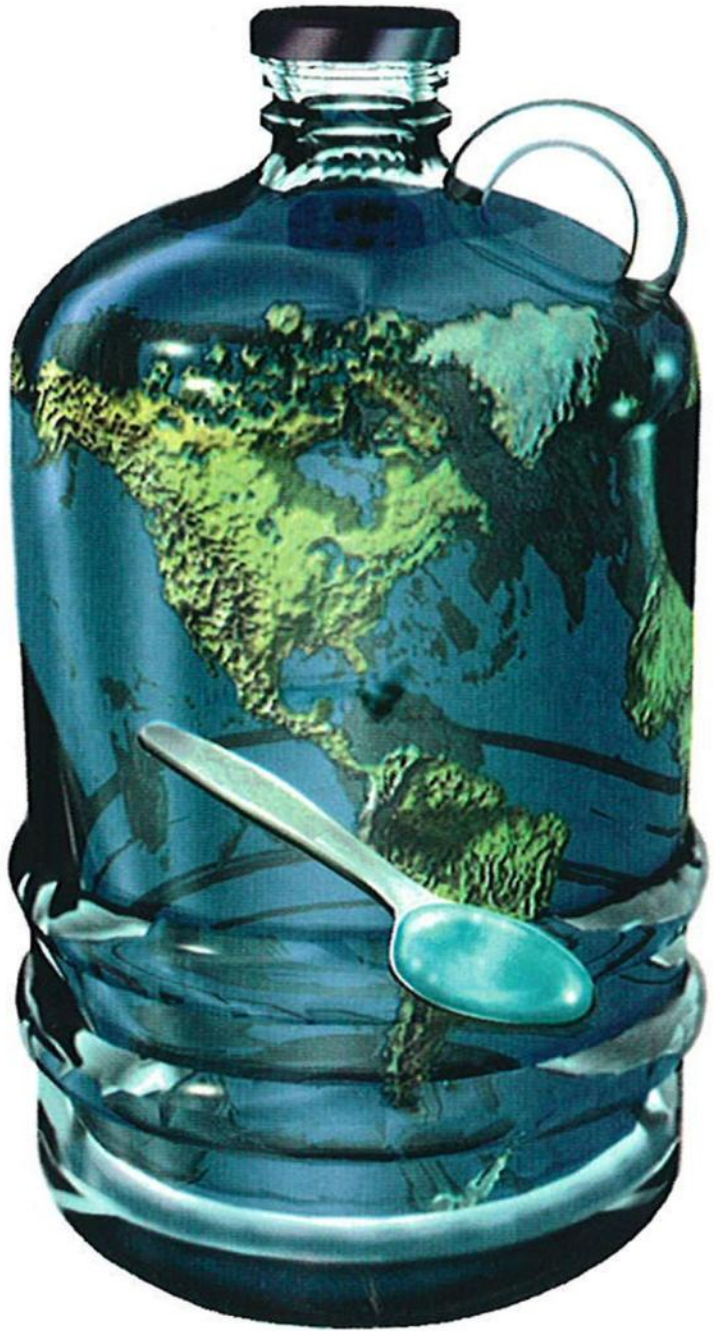
3 October 2012



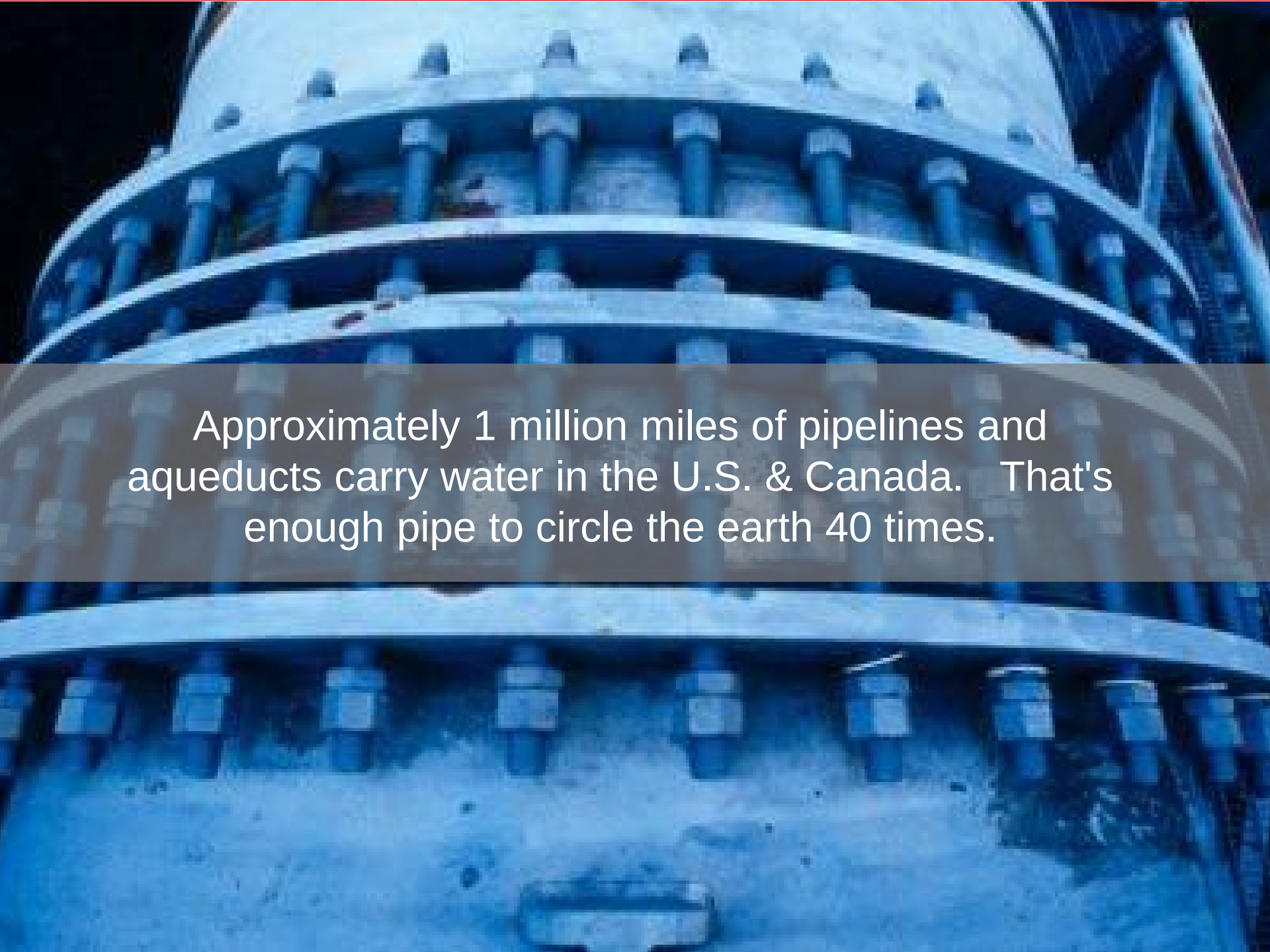
Two-thirds of the human body and
three-quarters of the human brain is water.


Seventy-five percent of a living tree is water.

2/3 of the surface of the earth is covered by water.



If all earth’s water fit in a gallon jug, available fresh water would equal just over a tablespoon – less than half of one percent of the total.

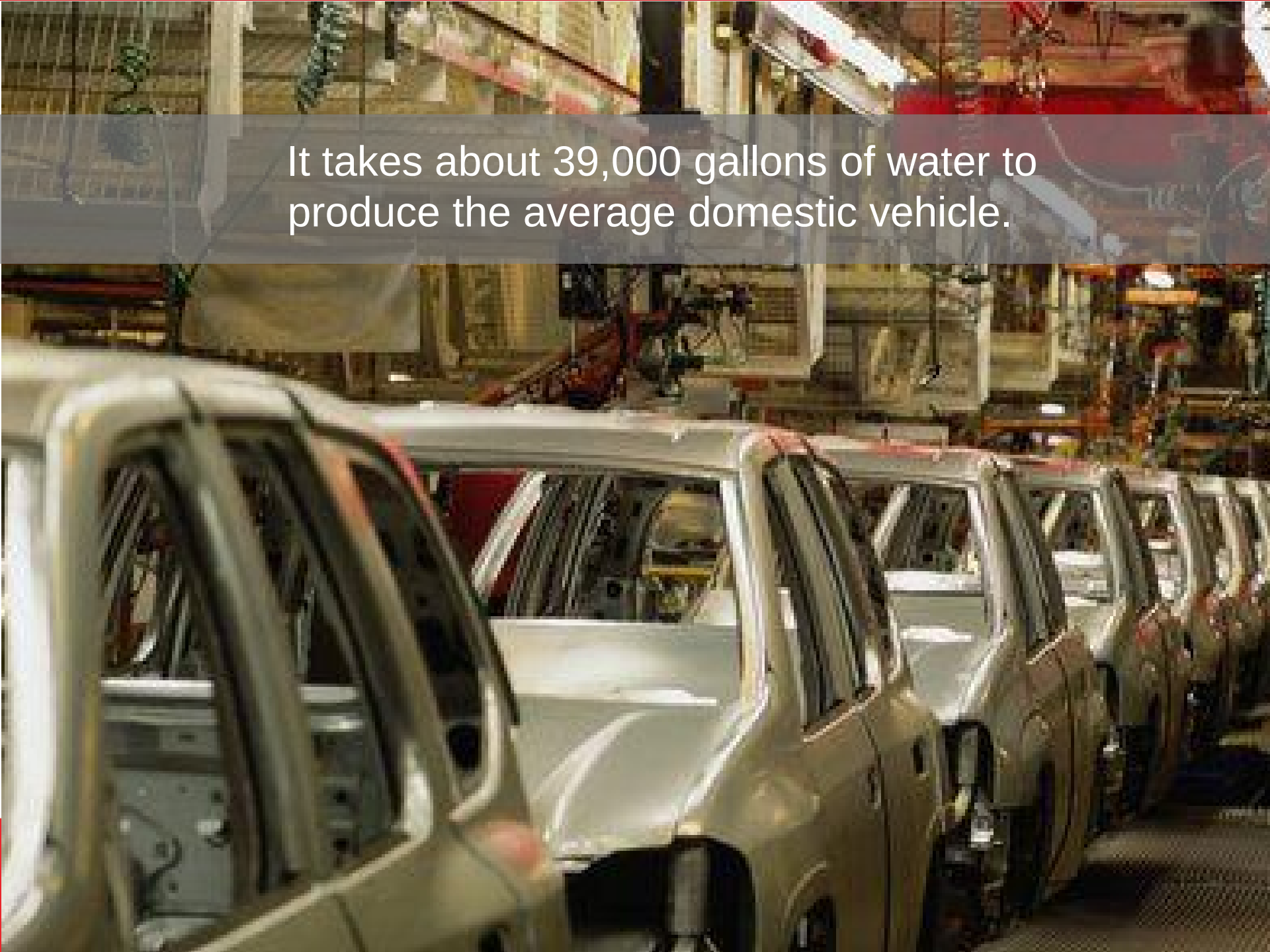


Approximately 1 million miles of pipelines and aqueducts carry water in the U.S. & Canada. That's enough pipe to circle the earth 40 times.

The 2009 ASCE Report Card on our nation's infrastructure gave water & wastewater systems a D- and estimated the five year funding requirements for necessary upgrades at $255 billion.

Leaking pipes in the U.S. waste 7 billion gallons of water every day. That would be enough to supply drinking water to every resident of California and still have some left over.

62,600 gallons of water are needed to produce one ton of steel.


It takes about 39,000 gallons of water to produce the average domestic vehicle.

A single car tire requires 518 gallons of water to manufacture.

It takes 197 gallons of water to produce a single gallon of gasoline.

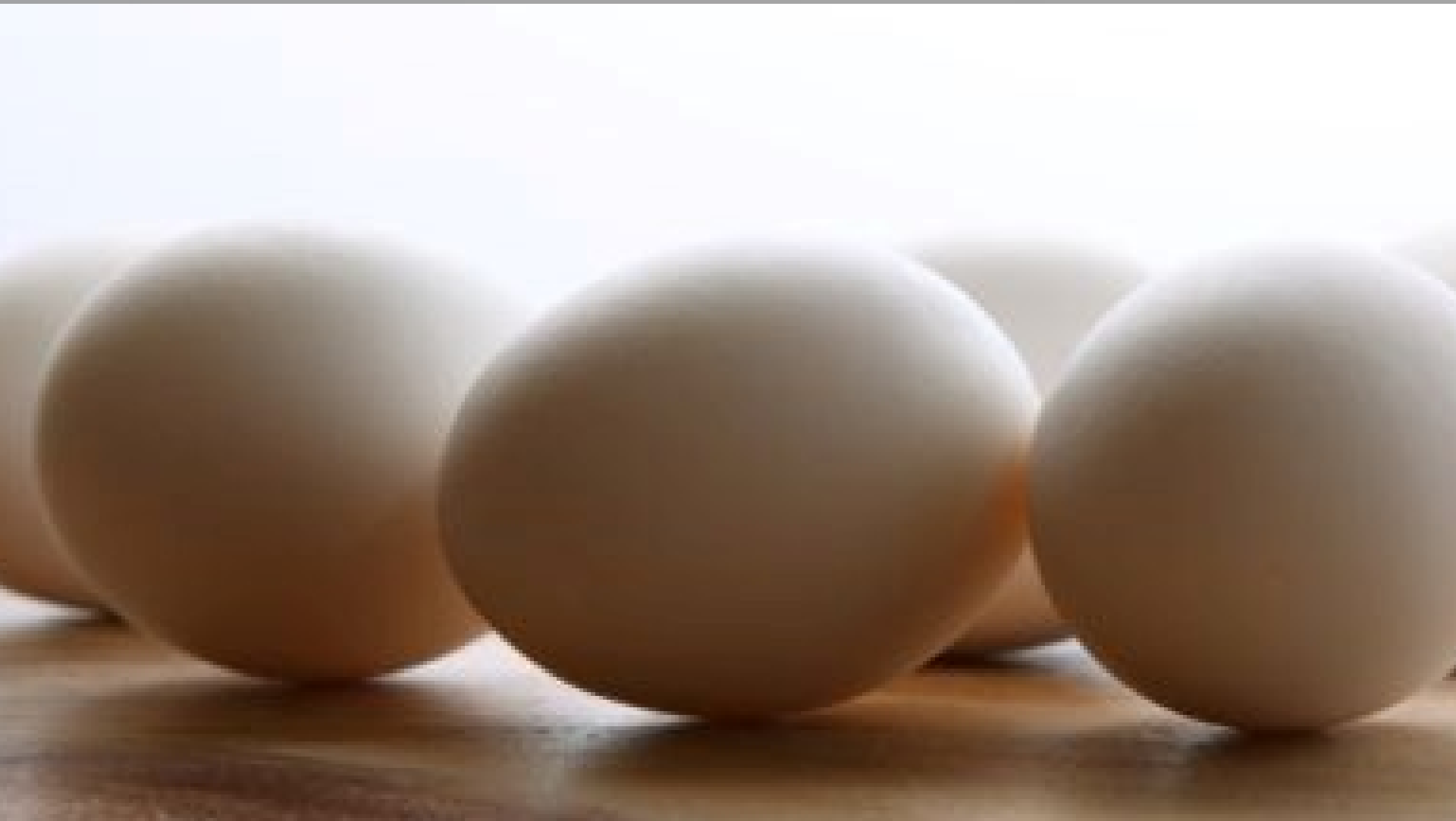

300 million gallons of water are needed to
produce a single day's supply of U.S. newsprint.

2 billion gallons of water are used each day to water golf courses in the U.S.

It takes about 3,000 gallons of water (the capacity of a tanker truck) to produce a single pair of denim jeans.


It takes almost 75 gallons of water to produce
a single cup of coffee.

It takes 120 gallons of water to produce a single egg.




It takes 750 gallons of water to produce a single fast food meal.
About 50 million fast food meals are eaten daily in the U.S.


Agriculture uses 70% of the world’s freshwater.


It takes 240,000 gallons of water to produce one ton of grain.


It takes over one million gallons of water to grow
enough food for an average family for a year.

Not everyone has connected the dots to see that a future of water shortages will be a future of food shortages.

At an average cost of 80 cents per pint, bottled water costs close to $6.50/gallon.

That's almost twice as expensive as a gallon of gasoline…

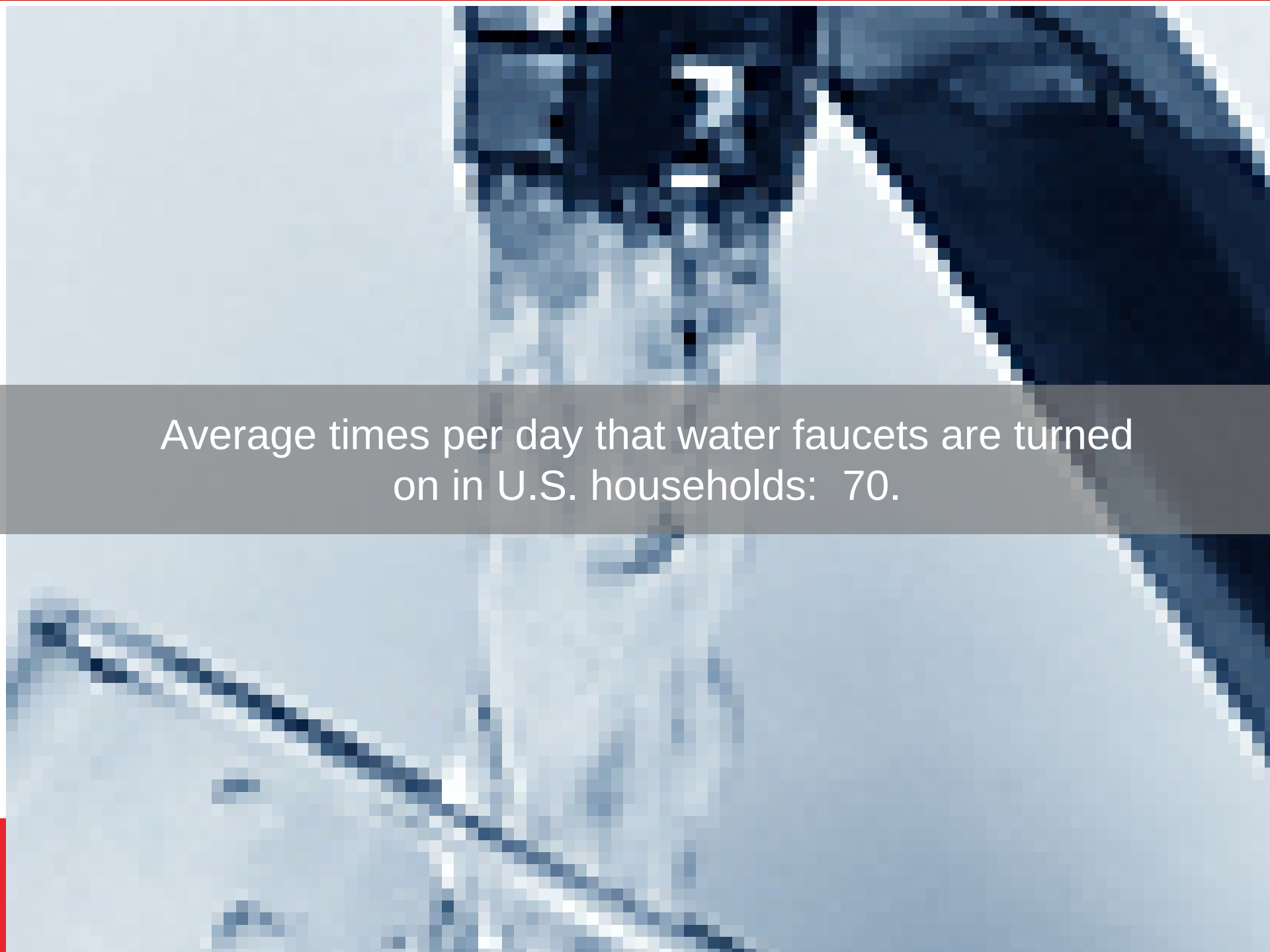
and about 2,400 times more expensive than tap water - a bargain at an average cost of only 1/3 cent/gallon.

Water is too cheap. The average American spends less than 1% of his or her total yearly expenses on water, wastewater, and water disposal services.

"Free" or subsidized water is bound to be wasted.

Why bother fixing the leaky faucet if that would cost more than you'd save?

You can refill an 8-oz glass of water approximately 15,000 times for the same cost as a six-pack of soda pop.


Average times per day that water faucets are turned on in U.S. households: 70.


Two-thirds of the water
used in an average home is
used in the bathroom.

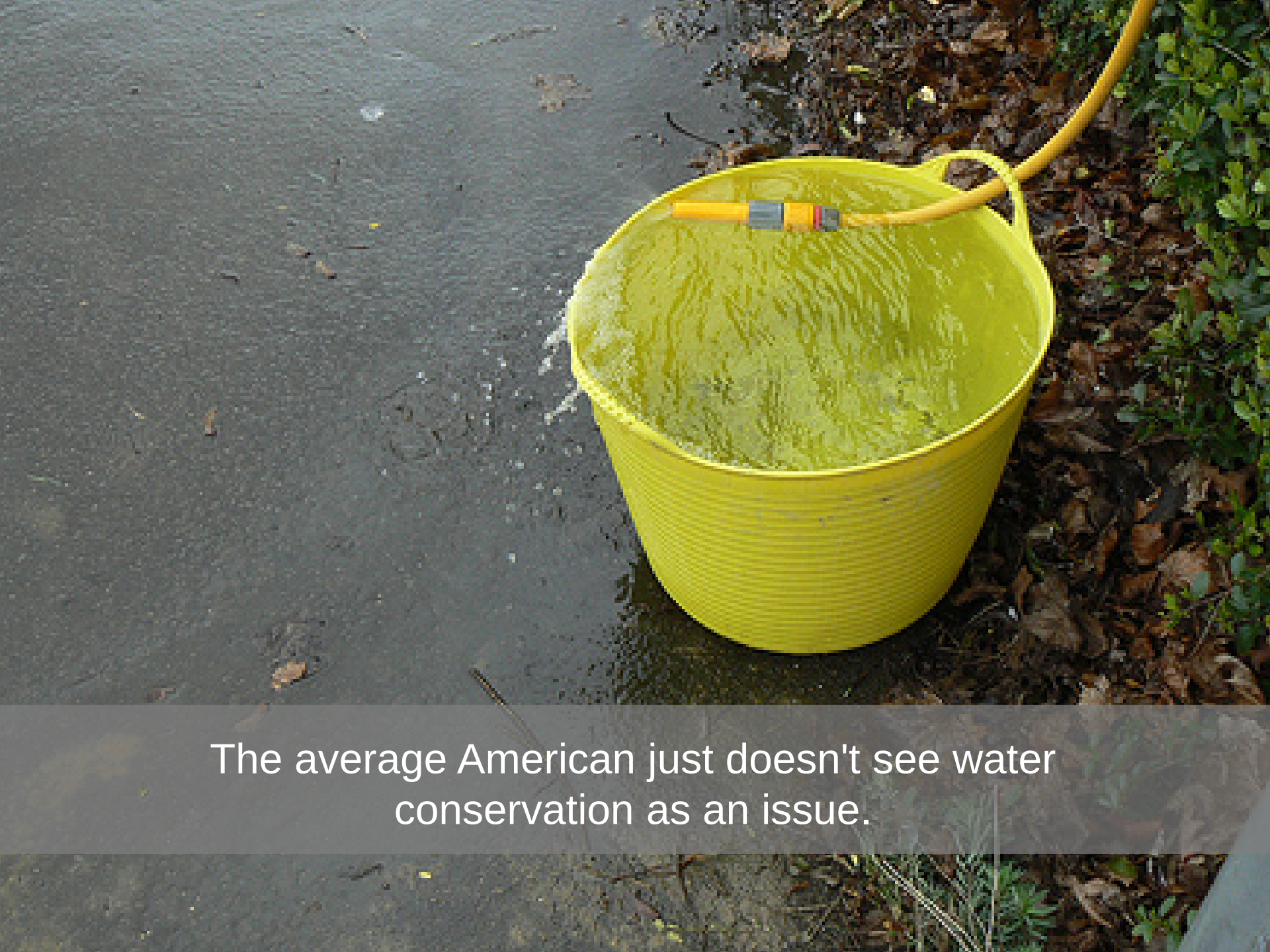

The average 10-minute shower uses 30 gallons of water.

Leaky toilets can waste up to 200 gallons of water each day.


You waste about 5 gallons of water if you leave
the water running while brushing your teeth.


Water efficient fixtures can cut household water use by 30%.

Every person requires a minimum of 250,000 gallons of water annually (40% of an Olympic-size swimming pool) for drinking, hygiene and growing food.



The average American just doesn't see water conservation as an issue.

Today, one in six people on the earth - or more than one billion people - lack access to an improved water supply.

That number is predicted to rise to between one-half and two-thirds by 2025.

The World Bank estimates that 300 million people live in areas of severe water shortages.


People who lack access to clean water get water from unclean surface ponds or dirty rivers often resulting in illness or death.


At least 1 billion people must walk three hours or more
to obtain drinking water.

The typical African family uses about 5 gallons of water at home each day.

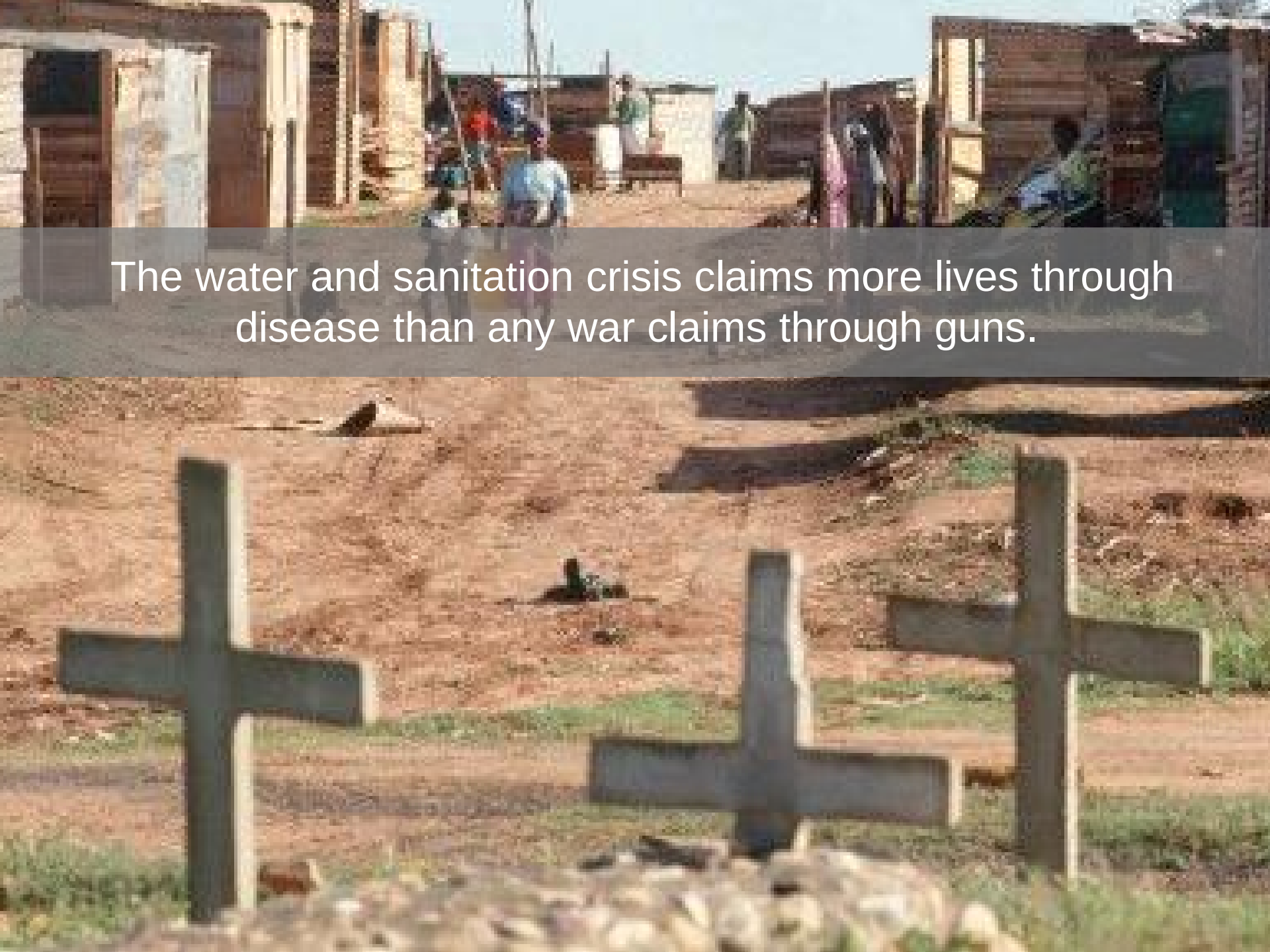
The typical American uses more than 100 gallons of water at home each day.

More than one billion people still do not have consistent access to freshwater.

More than two billion lack access to sanitation.

Ninety percent of all diseases are water-related.

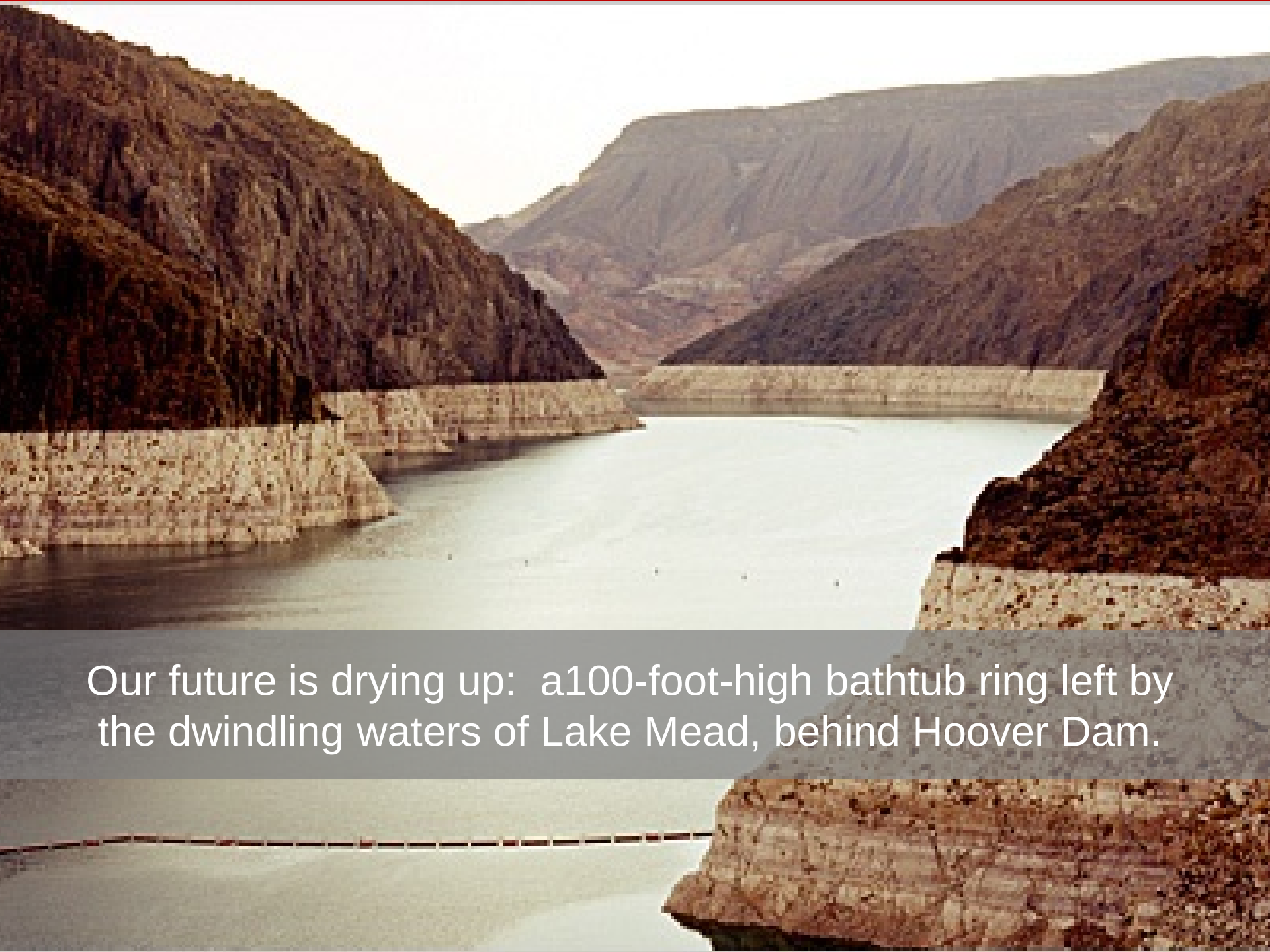
Every 15 seconds, a child dies from a water-related disease. For children under age five, water-related diseases are the leading cause of death.


The water and sanitation crisis claims more lives through disease than any war claims through guns.

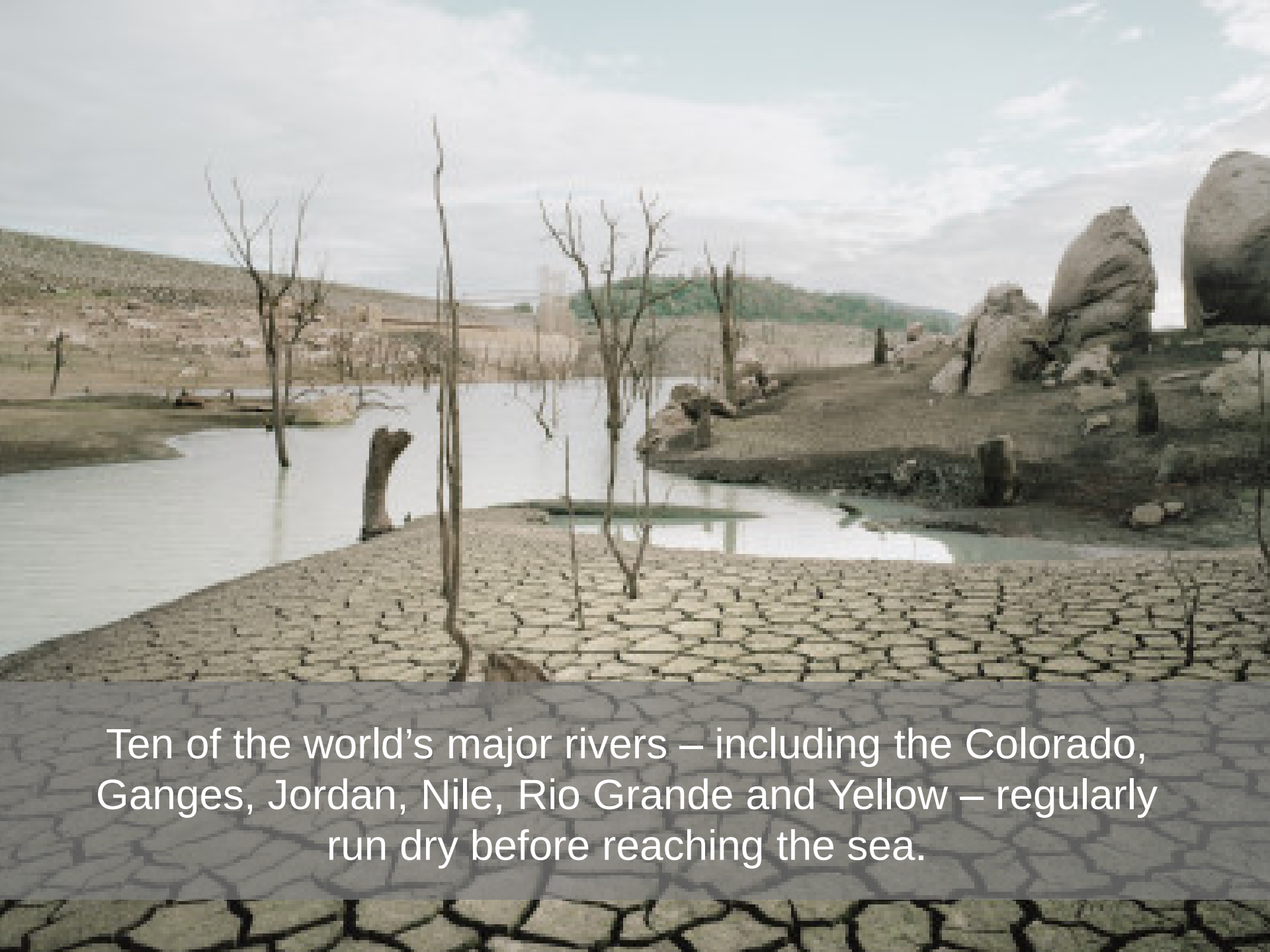
The common denominator in the health and development challenges faced by the poorest of the world's population – diseases like malaria, rising food prices and environmental degradation – is water.

No investment has greater overall impact upon national development and public health than the provision of safe drinking water and the proper disposal of human waste.


Every $1 spent on water and sanitation is estimated to result in $8 in health care costs averted.

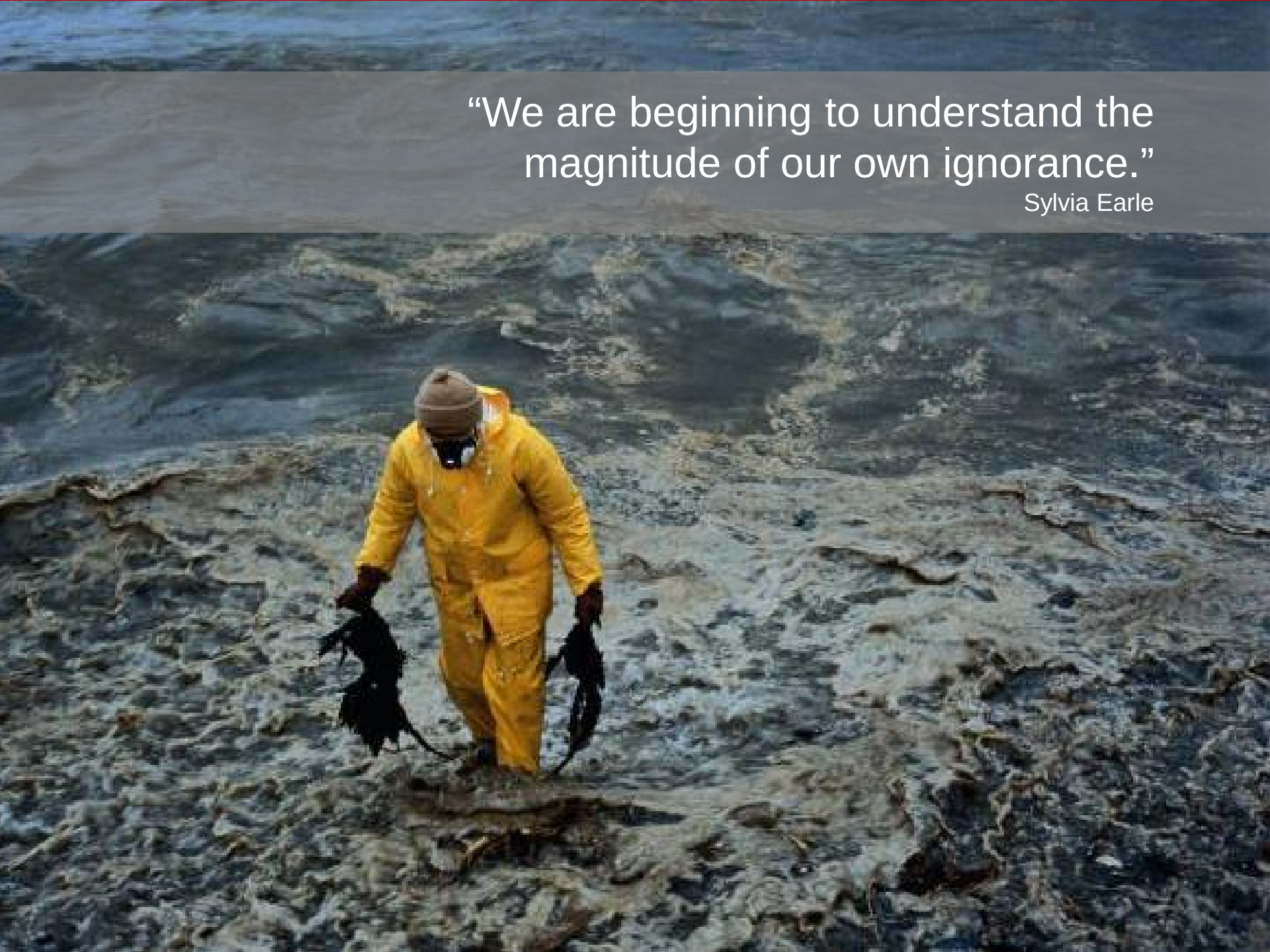


Our future is drying up: a100-foot-high bathtub ring left by the dwindling waters of Lake Mead, behind Hoover Dam.



Ten of the world’s major rivers – including the Colorado, Ganges, Jordan, Nile, Rio Grande and Yellow – regularly run dry before reaching the sea.

Pollution in the Mississippi River has resulted in a dead zone the size of New Jersey where it drains to the Gulf of Mexico.


“We are beginning to understand the magnitude of our own ignorance.”
Sylvia Earle

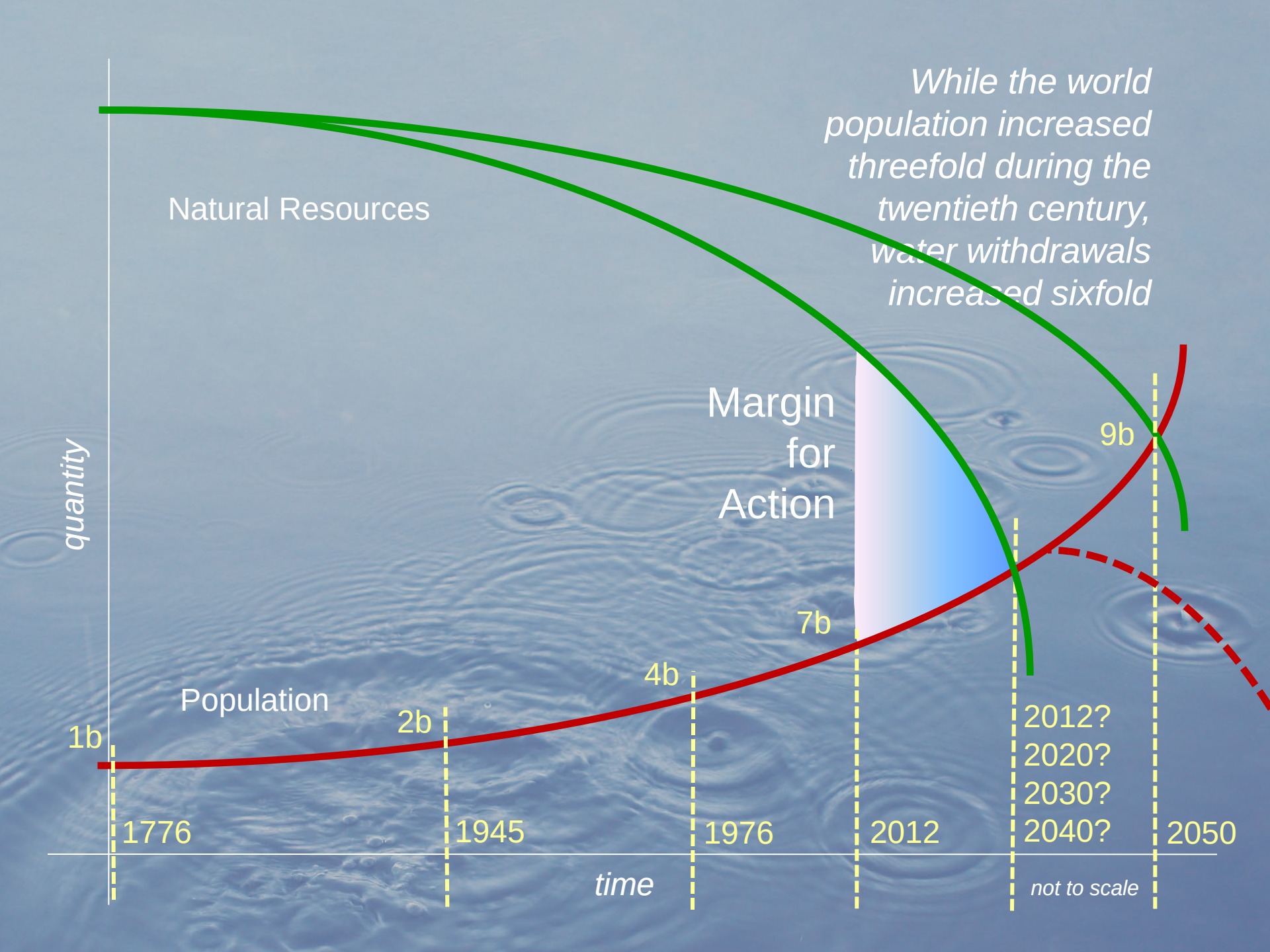

“The new red, white and blue is green.”
Thomas Friedman


The new green is blue.

Blue Gold

Water will be the 21st century's oil –
a much sought-after but dwindling natural resource.

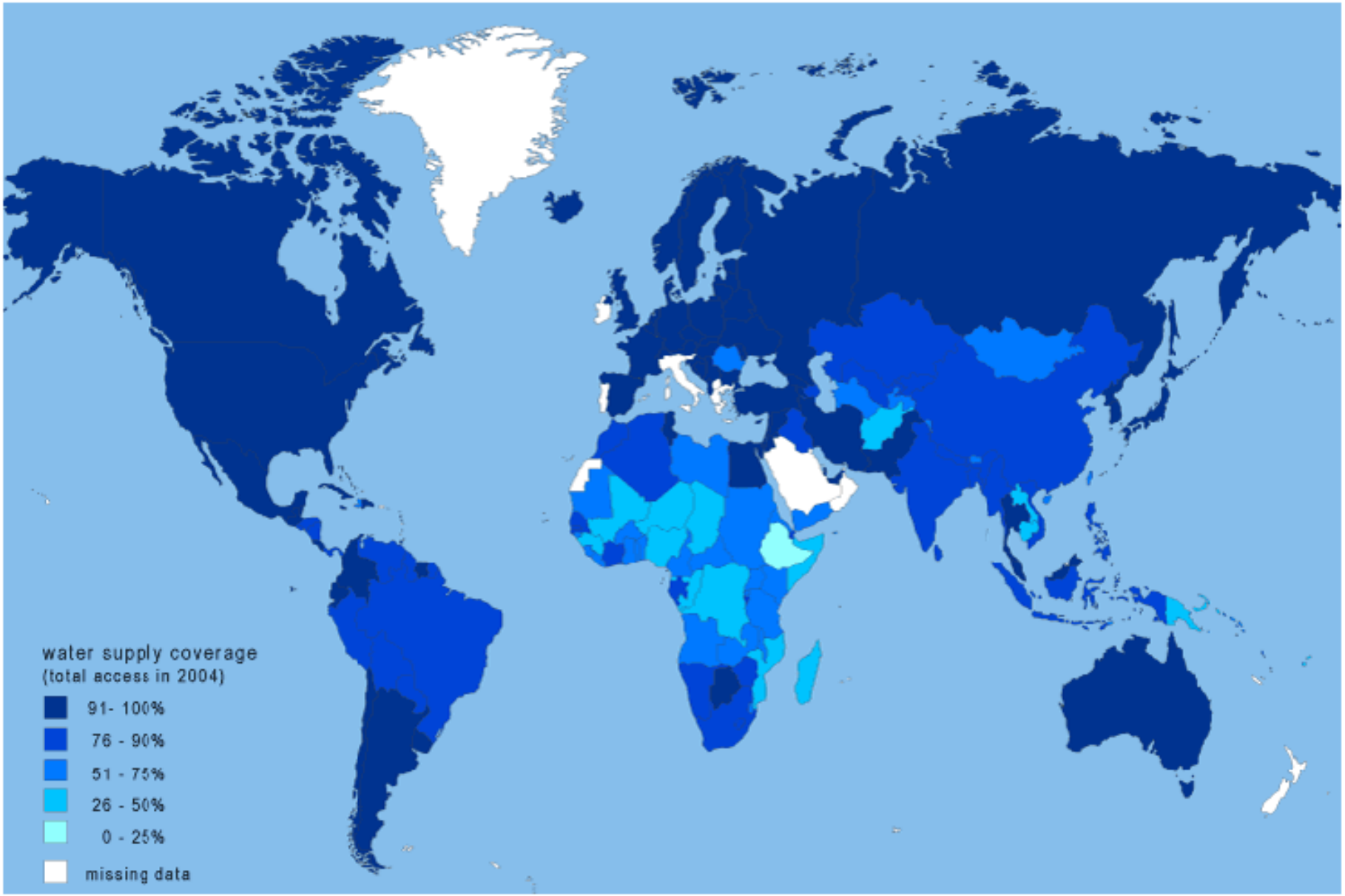
The biggest difference:
a world without oil is possible;
a world without water is not.


While the world population increased threefold during the twentieth century, water withdrawals increased sixfold
Natural Resources
Margin for Action
quantity
Population
1b
2b
4b
7b
9b
1776
1945
1976
2012
2012?
2020?
2030?
2040?
2050
time
not to scale

"When our earth's population, now exceeding 6.5 billion people and expected to reach 9.1 billion by the year 2050, is coupled with diminished freshwater supplies and land area, we are on a collision course with disaster."

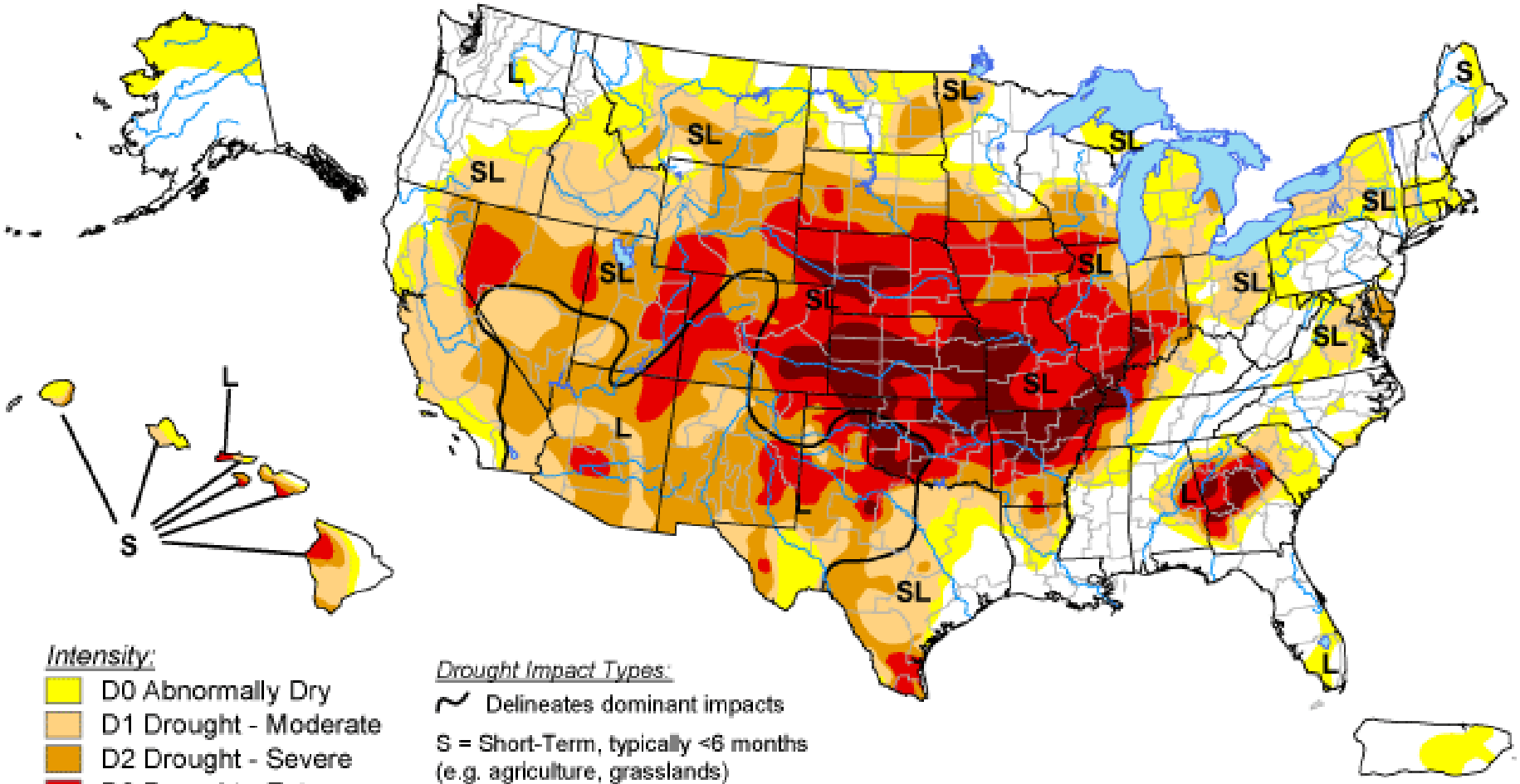
Larry Frevert, APWA President, in 2008

Percent Access to Improved Water Sources (2004)



U.S. Drought Monitor

August 21, 2012
Valid 7 a.m. EDT



Intensity:
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Drought Impact Types:

~ Delineates dominant impacts

S = Short-Term, typically <6 months (e.g. agriculture, grasslands)

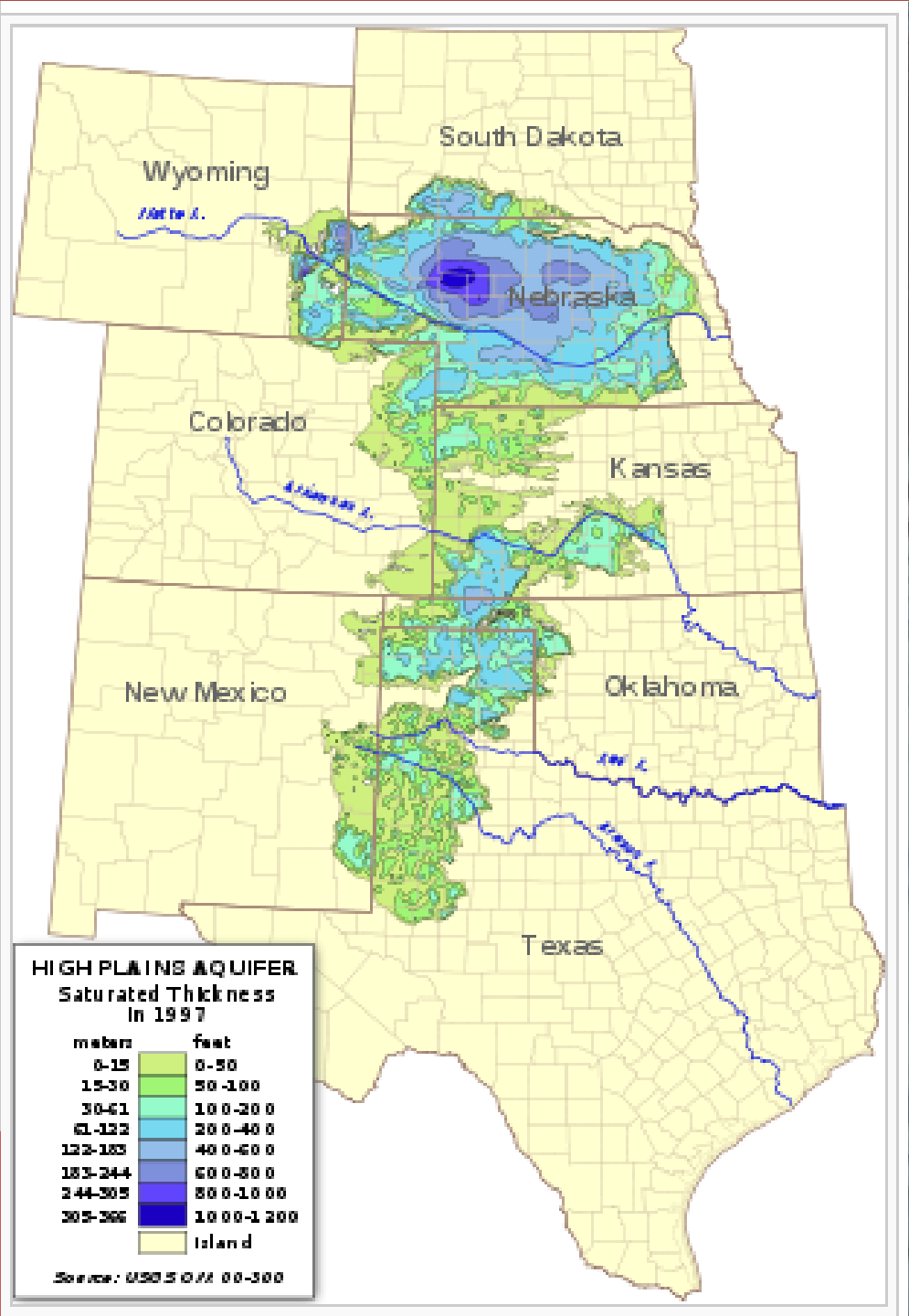
L = Long-Term, typically >6 months (e.g. hydrology, ecology)

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu/

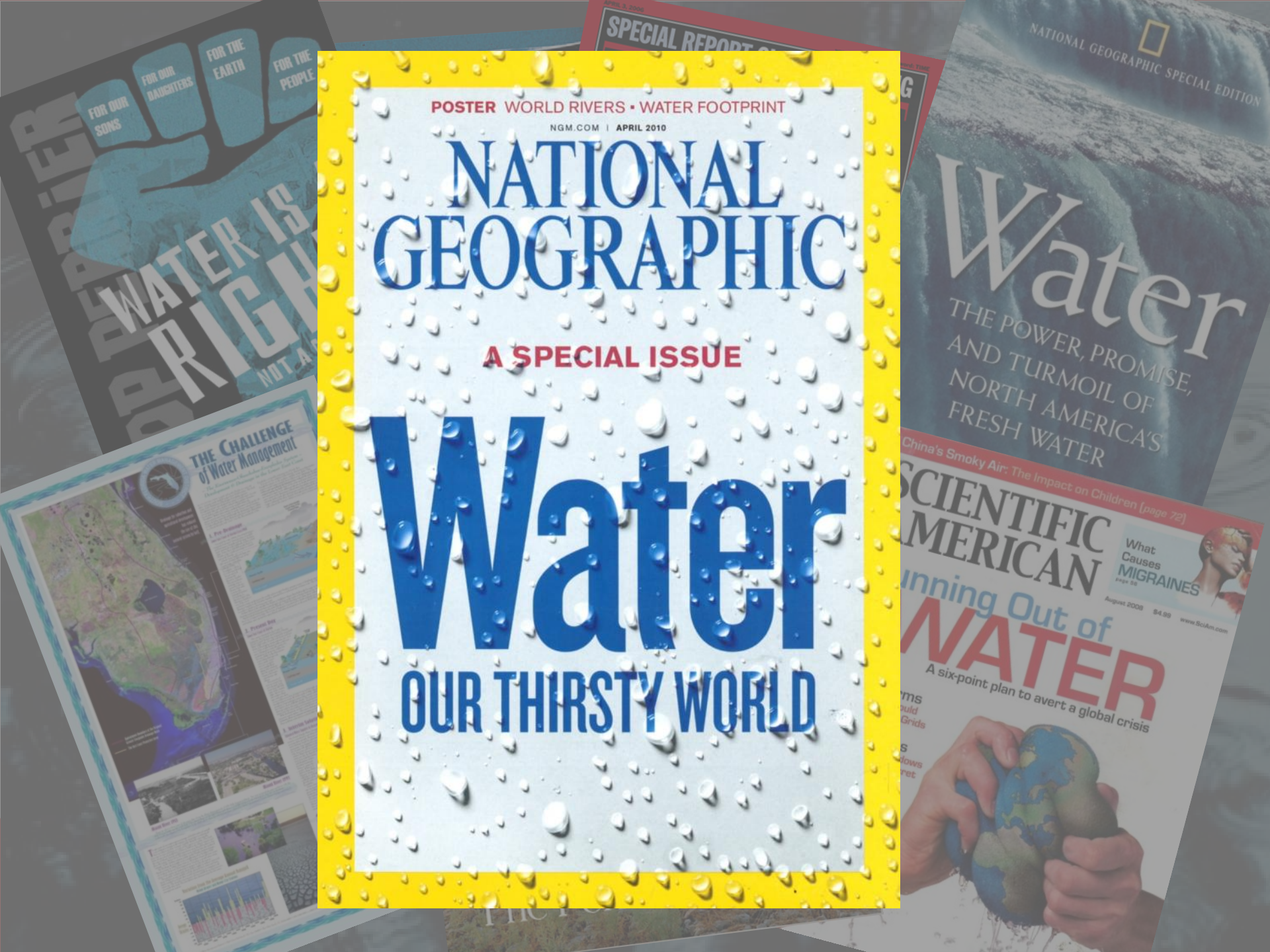
Released Thursday, August 23, 2012

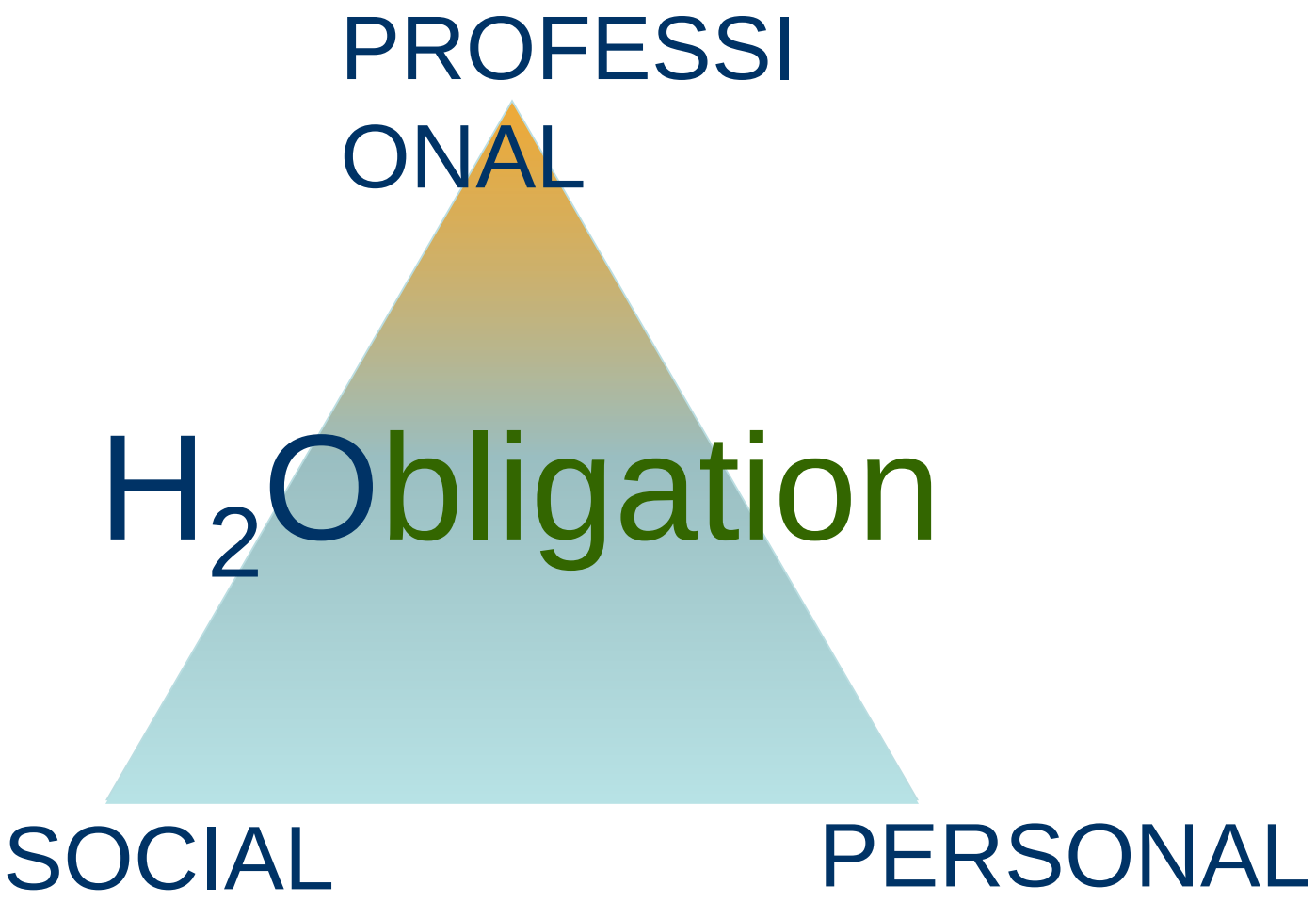
Author: Michael Brewer/Liz Love-Brotak, NOAA/NESDIS/NCDC



Since the end of WWII, water withdrawals from the Ogallala Aquifer have averaged 4-6 feet per year, while nature was putting back only ½ an inch. This overdraft equates to about 14 million acre-feet per year, or roughly the entire annual flow of the Colorado River.


WaterNews
DROUGHT 2008
SPECIAL EDITION
Farming with the sea
AMERICAN PUBLIC WORKS ASSOCIATION • FEBRUARY 2008 • www.apwa.net
APWA REPORTER
Water
the key to life
SUMMER 2007
WASHINGTON STATE
PUBLICworks
THE OFFICIAL PUBLICATION OF WASHINGTON PUBLIC WORKS PROFESSIONALS
Water
How public works
manages and preserves it
Good until
the Last Drop
A Practitioner's Guide
to Water Reuse
Seattle
Public
Utilities
Drinking Water Quality Report 2007
A Report to the
Community


POSTER WORLD RIVERS • WATER FOOTPRINT
NGM.COM | APRIL 2010
NATIONAL GEOGRAPHIC
A SPECIAL ISSUE
Water
OUR THIRSTY WORLD
FOR OUR SONS
FOR OUR DAUGHTERS
FOR THE EARTH
FOR THE PEOPLE
THE CHALLENGE of Water Management
NATIONAL GEOGRAPHIC SPECIAL EDITION
Water
THE POWER, PROMISE, AND TURMOIL OF NORTH AMERICA'S FRESH WATER
China's Smoky Air: The Impact on Children (page 72)
SCIENTIFIC AMERICAN
What Causes MIGRAINES
August 2008 $4.99 www.SciAm.com
Running Out of WATER
A six-point plan to avert a global crisis


PROFESSI
ONAL
H2Obligation
SOCIAL
PERSONAL

Bureau of Environmental Services
Administration & Water Quality Lab
Portland, OR

Tillamook Forest Center

Tillamook, OR


LOTT Clean Water Alliance
Regional Services Center
Olympia, WA

EAST BAY CIVIC PLAZA . OLYMPIA, WA


sand play/climbing structure


mountain form/water source


garden


water course


fence


water and sand play sculpture


sand box with seating wall


troughs between water and sand


reclaimed wood steps


butterfly garden


wood and concrete benches


ipe deck walkway


flagstone path and water course


beach


planting at water edge


decomposed granite


oyster shells in concrete bands


interpretive markers

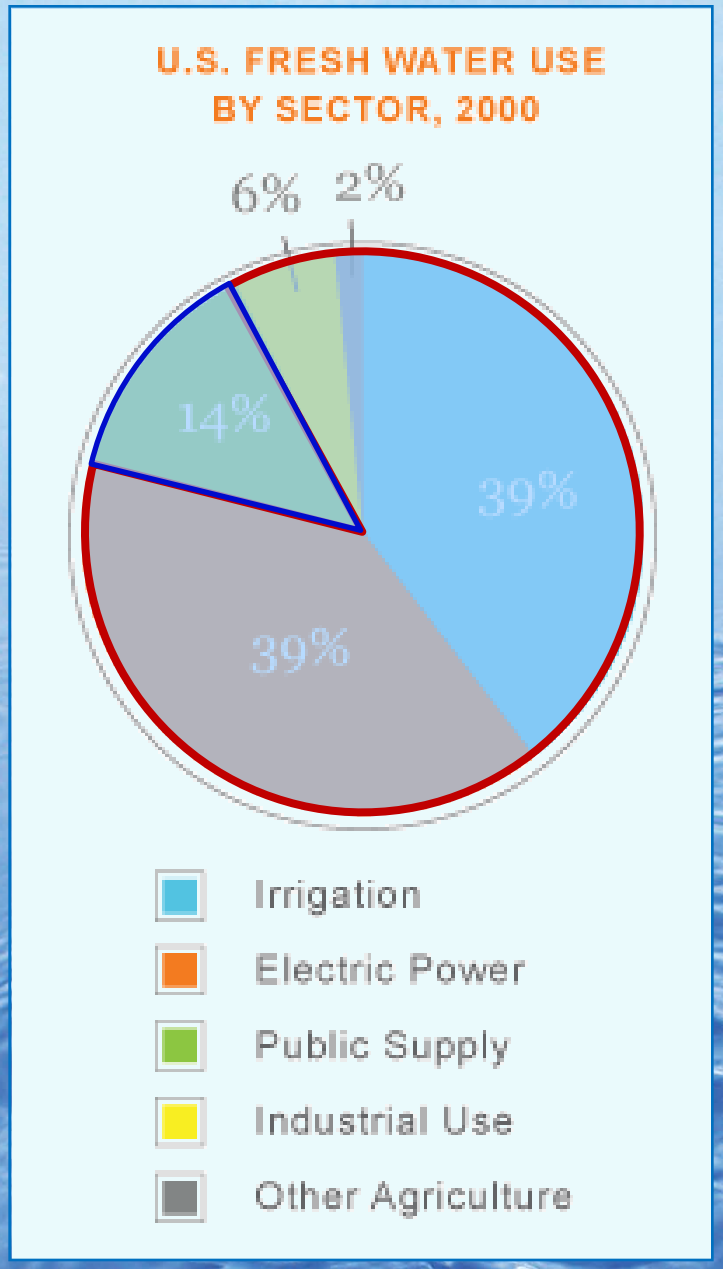

planted mounds

Thinking Beyond the Property Lines

LOTT's Reclaimed Water Program

Benefits of Reclaimed Water

Currently, the majority of all water used in the U.S. is potable water.



Reclaimed water can be used to meet a significant portion of the demand.

Potable water can be reserved for those uses that truly require it.

1 gallon of wastewater diverted saves between $20 and $22 of capital costs that would have been required to build additional treatment capacity.

CASE STUDY 0618-001

THE BUSINESS CASE FOR RECLAIMED WATER

The LOTT Clean Water Alliance is a regional wastewater treatment agency in the Pacific Northwest serving 85,000 customers. In 2006, through the implementation of sand filter and advanced membrane bioreactor system technologies, LOTT began treating wastewater to Class A Reclaimed Water standards. This water is distributed to the local community for a variety of common non-potable uses including irrigation, industrial processes, manufacturing uses and toilet flushing. Using reclaimed water in lieu of potable water provides a number of benefits including:

- wastewater management – i.e. reducing effluent flows and water quality impacts,
- water supply management- i.e. reducing stresses on limited water supply sources, and
- environmental enhancement -i.e. wetlands restoration, stream flow augmentation and groundwater recharge.

In 2010, LOTT constructed a new Regional Services Center, which has achieved LEED Platinum status from the USGBC. The project includes a WET (Water Education Technology) Center containing a classroom and a series of interactive interpretive exhibits. The goal of the WET Center is threefold: to educate customers about the wastewater treatment services that LOTT provides, to illustrate the cultural importance of water in the Pacific Northwest, and to inspire visitors to recognize importance of protecting our natural water resources.

The WET Center has been an overwhelming success in its first year of operation. Visitor counts have exceeded the original projections and the educational programs & exhibits are appealing to people of all ages. LOTT's commitment to reclaimed water and their $2m investment in the WET Center have already paid handsome dividends and raised the bar for other wastewater treatment agencies.

BHAG: Class A Reclaimed Water is one treatment step from becoming potable water. As the global water crisis grows, closing the water loop by transforming wastewater to potable water on community and regional scales will be a key factor in water resource sustainability.

LOTT CLEAN WATER ALLIANCE REGIONAL SERVICES CENTER • OLYMPIA, WA • YEAR COMPLETED: 2010

Much of our nation's water and wastewater infrastructure is invisible to those who depend upon it everyday

We simply expect these essential services to be there when we need them, and as a result, tend to take them for granted

This project is about ***making the invisible visible*** *through design and education*

It is about demonstrating a more sustainable future by promoting "the right water for the right use"

It is primarily about inspiring people to care for one of our most precious natural resources: water

0618-001: RECLAIMED WATER | 0618-002: ENERGY CONSERVATION | 0618-003: WET CENTER | 0618-004: URBAN REVITALIZATION | 0618-005: PARTNERING

FINANCIAL CAPITAL

Financial benefits accrue both to the customer and to LOTT. The customer saves an immediate 30% on the cost of reclaimed water relative to potable water. For LOTT, with every gallon of wastewater conserved, $20-22 of capital costs are averted by not having to build additional treatment plant capacity.

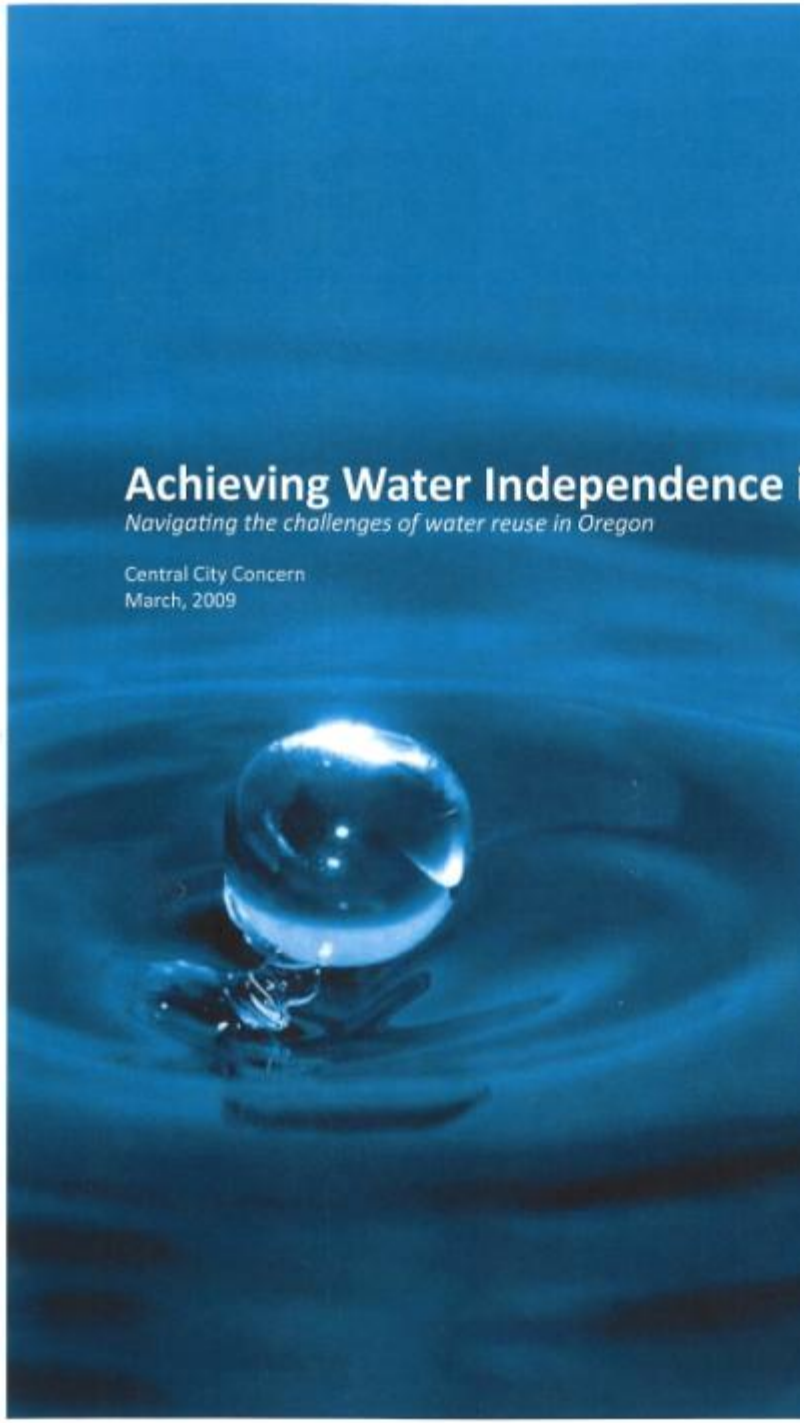
150,000 EST. GALLONS SAVED ANNUALLY DUE TO EDUCATION FROM WET CENTER

1 LESS FLUSH PER PERSON SERVED PER DAY

x **$20** PER GALLON REQ'D TO BUILD ADDITIONAL PLANT CAPACITY

= **$3M** CAPITAL COSTS AVERTED > **$2M** INVESTED IN WET CENTER

IMAGINE SAVING YOUR CUSTOMERS MONEY AT THE SAME TIME YOU ARE EARNING A 50% ROI.



Achieving Water Independence In Buildings

www.cascadiagbc.org/ibc/resources/water/oregon

Sponsor Organization

Central City Concern

Water Team (project team)

Central City Concern
www.centralcityconcern.org
Ben Gates, Richard Harris

SERA Architects
www.serapdx.com
Clark Brockman, Lisa Petterson, Joe Pinzone

Interface Engineering
www.leice.com
Jon Gray

Gerding Edlen Development
www.gerdingedlen.com
Dennis Wilde

Project Sponsors

The Bullitt Foundation
www.bullitt.org
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www.cascadiagbc.org
Portland Development Commission
www.pdc.us

In-kind Sponsors

Central City Concern
Gerding Edlen Development
SERA Architects
Interface Engineering
Rose Architectural Fellowship
www.rosefellowship.org

Water connects all life. Yet we dis-integrate water into silos.

credit: Steve Moddemeyer, Collins Woerman

PFD WATER USE & HARVESTING ANALYSIS

credit: Interface Engineering & Central City Concern

WATER COLLECTED = 580,737 GAL/YEAR

WATER USAGE = 4,916,915 GAL/YEAR

NET = - 4,336,178 GAL/YEAR

STRATEGIES:

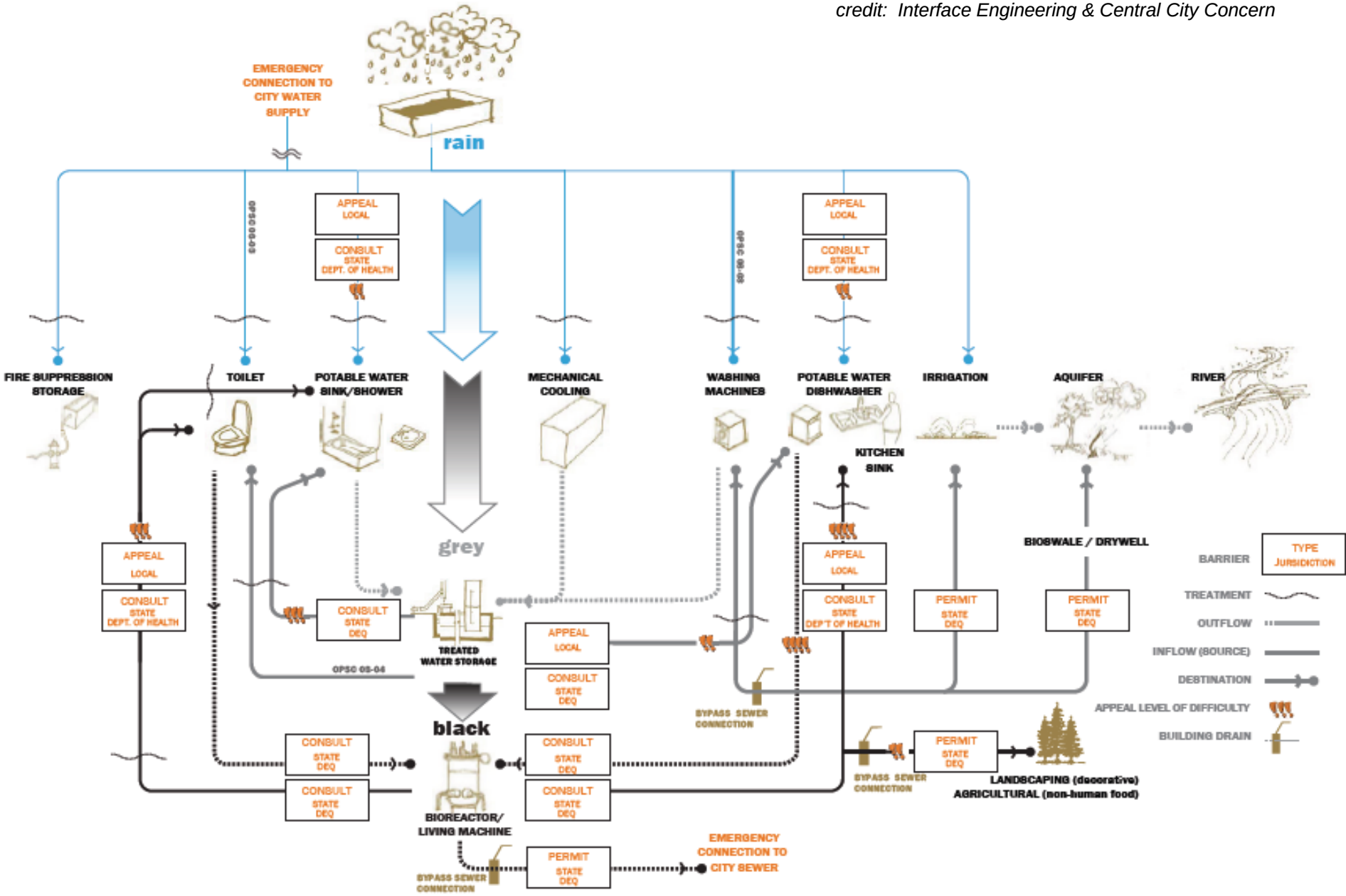
GREY WATER = 4,028,016 GAL/YEAR

BLACK WATER = 377,547 GAL/YEAR

PROVIDED BY SERA ARCHITECTS

OREGON ROADMAP

credit: Interface Engineering & Central City Concern



PATHWAYS TO REGULATORY CHANGE

impact: one building

1) Site-Specific Alternate Method (Building Appeal)

impact: city- or county-wide

2) Local Amendment

impact: statewide

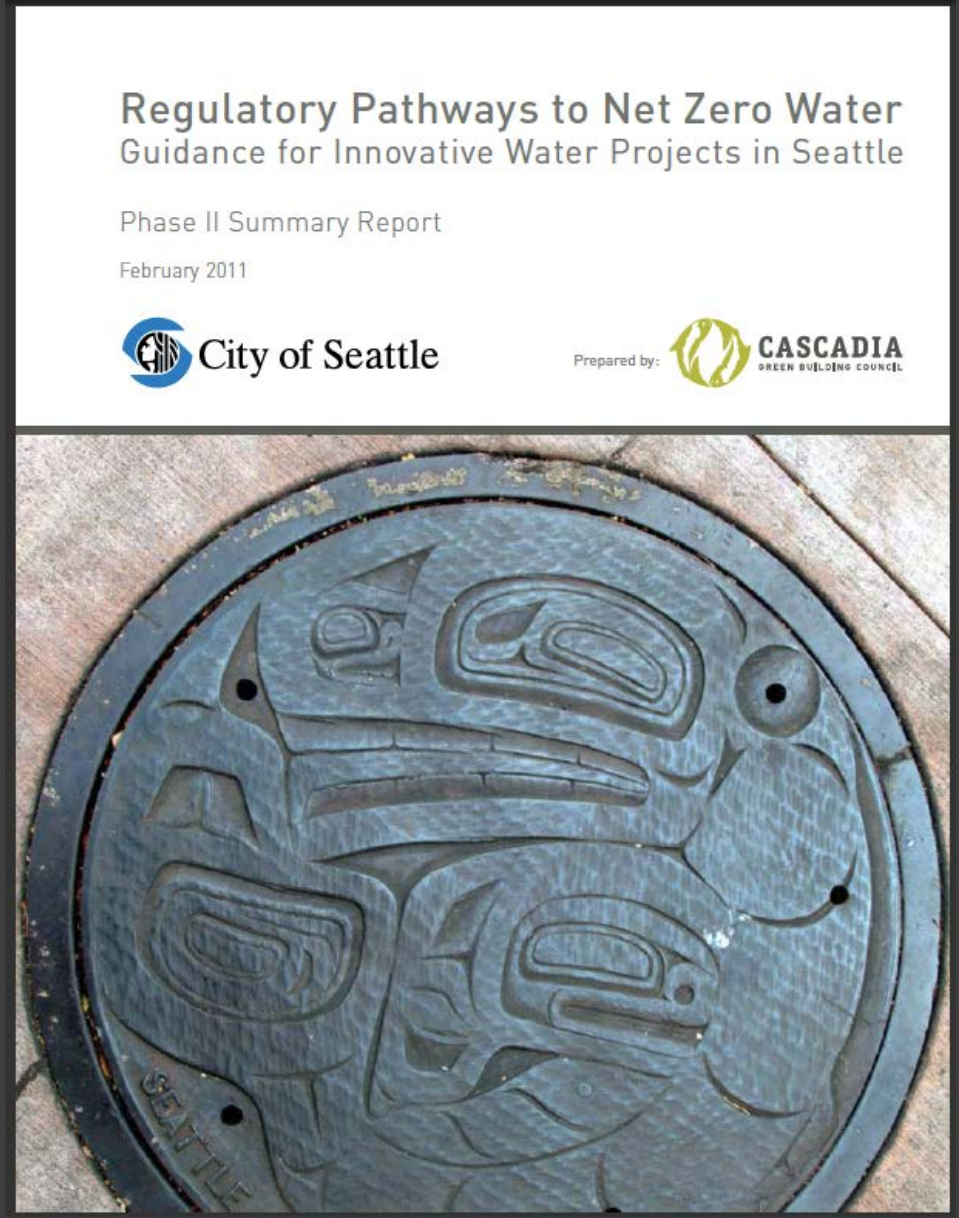
3) Statewide Alternate Method

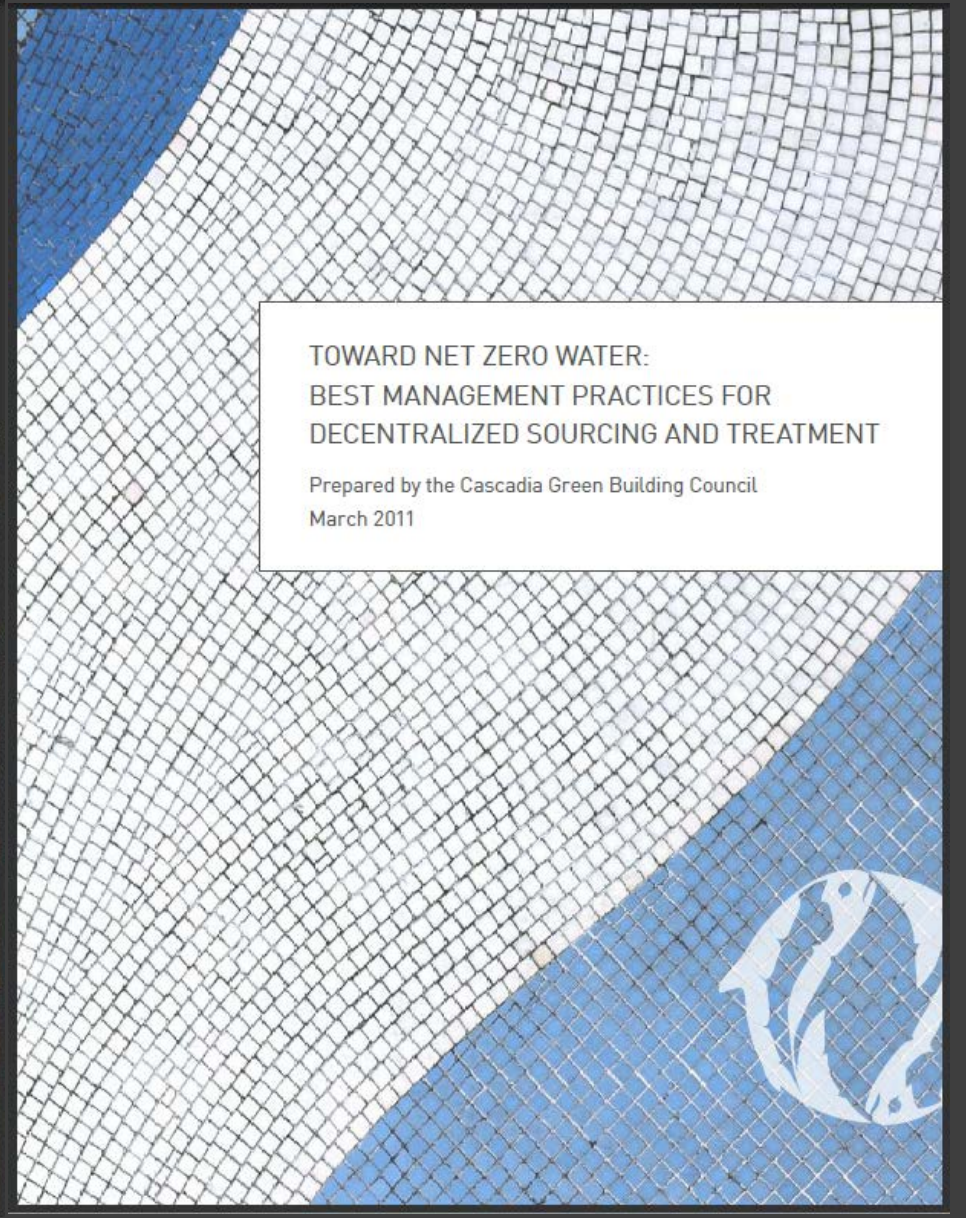
impact: statewide or national

4) Building Code Modification

5) Passage of Legislation

credit: Interface Engineering & Central City Concern





for these reports and other related info, go to:

www.cascadiagbc.org/resources/

LIVING BUILDING CHALLENGE™ 2.0

A Visionary Path to a Restorative Future

INTERNATIONAL LIVING BUILDING INSTITUTE™

November 2009

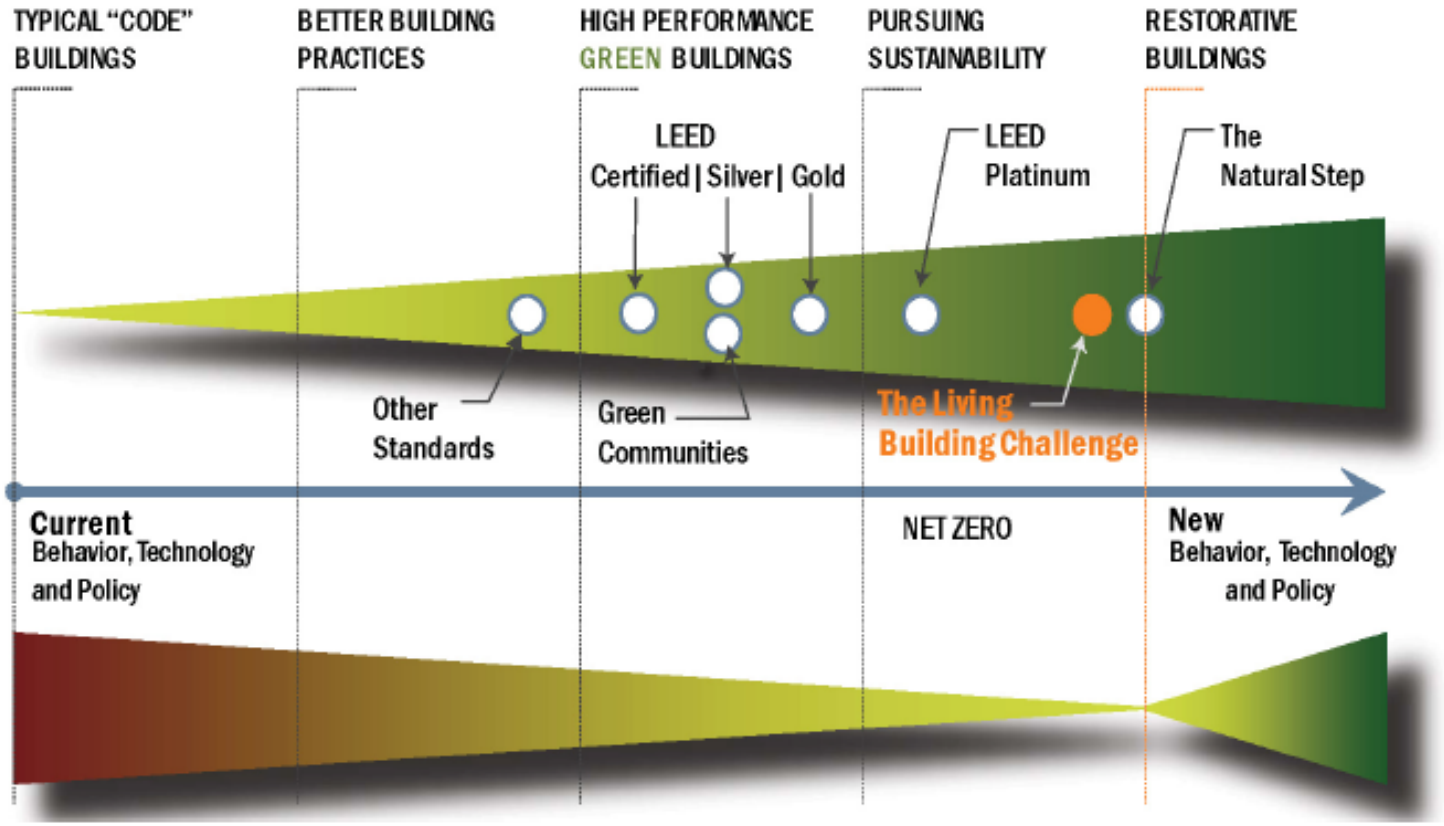
LIVING BUILDING CHALLENGE ADOPTED

credit: Interface Engineering & Central City Concern

LBC is the the most rigorous green-building benchmark available today

» goal is to be water & energy independent

» that means buckets of water & money saved



LIVING BUILDING CHALLENGE

credit: Interface Engineering & Central City Concern

05

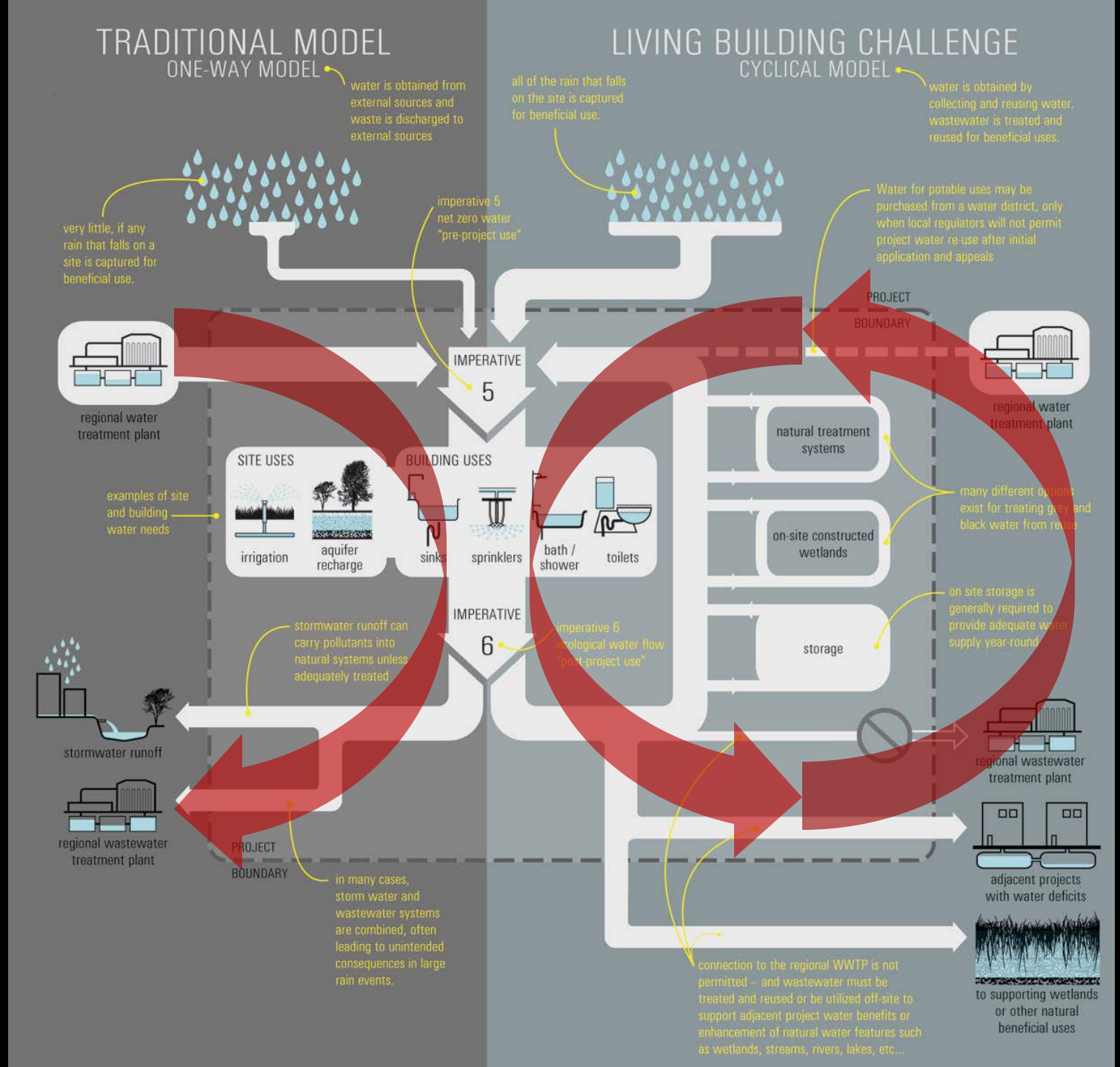
NET ZERO WATER

100% occupants' water use must come from captured precipitation or closed loop water systems that account for downstream ecosystem impacts and that are appropriately purified without the use of chemicals.

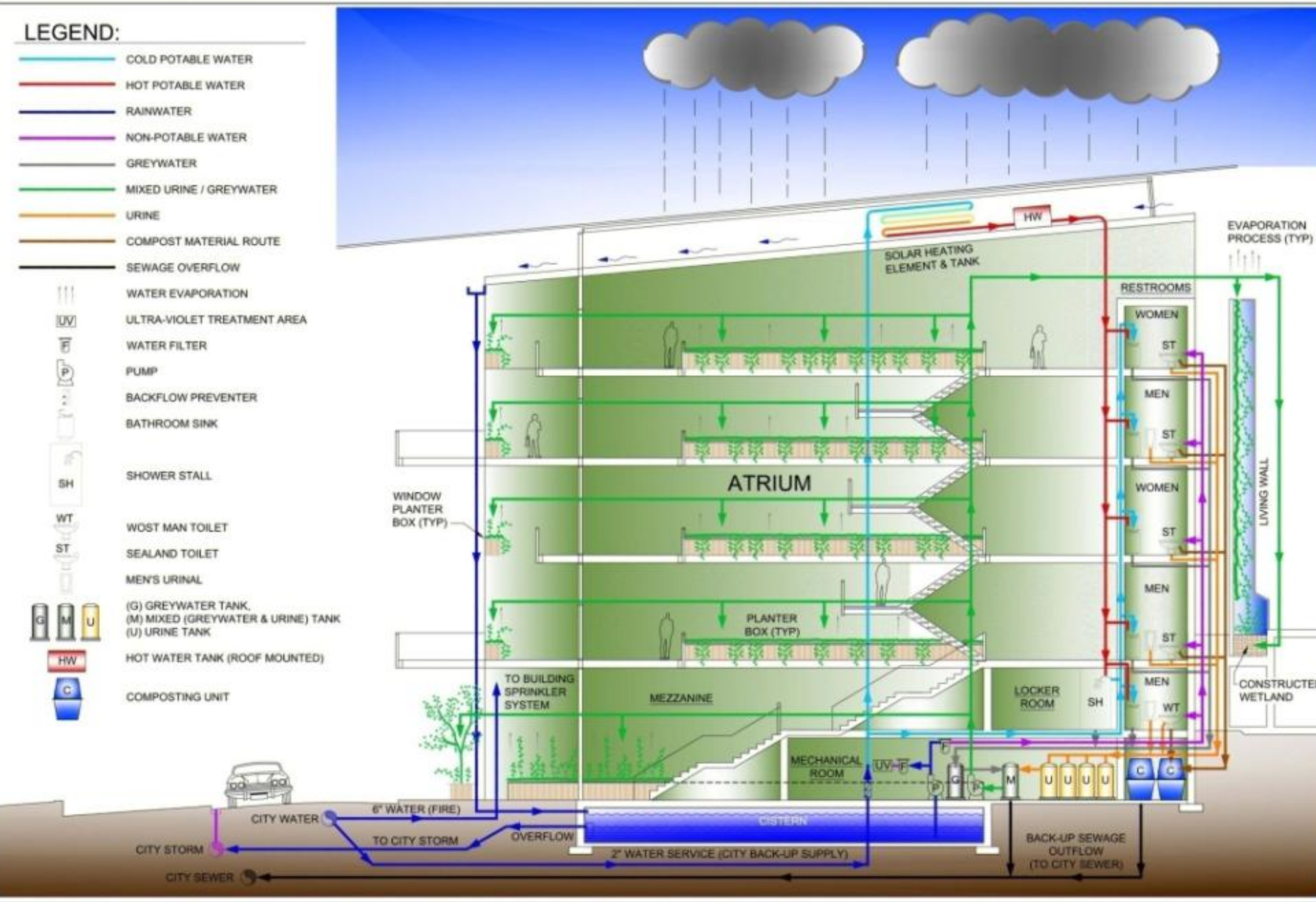
06

ECOLOGICAL WATER FLOW

100% storm water and building water discharge must be managed onsite to feed the project's internal water demands or released onto adjacent sites for management through acceptable natural time-scale surface flow, groundwater recharge, agricultural use or adjacent building needs.


TRADITIONAL MODEL
ONE-WAY MODEL
water is obtained from external sources and waste is discharged to external sources
very little, if any rain that falls on a site is captured for beneficial use.
regional water treatment plant
stormwater runoff
regional wastewater treatment plant
PROJECT BOUNDARY
in many cases, storm water and wastewater systems are combined, often leading to unintended consequences in large rain events.
LIVING BUILDING CHALLENGE
CYCLICAL MODEL
water is obtained by collecting and reusing water. wastewater is treated and reused for beneficial uses.
all of the rain that falls on the site is captured for beneficial use.
imperative 5
net zero water
"pre-project use"
Water for potable uses may be purchased from a water district, only when local regulators will not permit project water re-use after initial application and appeals
PROJECT BOUNDARY
regional water treatment plant
IMPERATIVE 5
SITE USES
BUILDING USES
examples of site and building water needs
irrigation
aquifer recharge
sinks
sprinklers
bath / shower
toilets
natural treatment systems
on-site constructed wetlands
many different options exist for treating grey and black water from reuse
storage
on site storage is generally required to provide adequate water supply year-round
IMPERATIVE 6
stormwater runoff can carry pollutants into natural systems unless adequately treated
imperative 6
ecological water flow
"post-project use"
regional wastewater treatment plant
adjacent projects with water deficits
to supporting wetlands or other natural beneficial uses
connection to the regional WWTP is not permitted – and wastewater must be treated and reused or be utilized off-site to support adjacent project water benefits or enhancement of natural water features such as wetlands, streams, rivers, lakes, etc...


The Bullitt Foundation Center
Seattle, WA


LEGEND:
COLD POTABLE WATER
HOT POTABLE WATER
RAINWATER
NON-POTABLE WATER
GREYWATER
MIXED URINE / GREYWATER
URINE
COMPOST MATERIAL ROUTE
SEWAGE OVERFLOW
WATER EVAPORATION
ULTRA-VIOLET TREATMENT AREA
WATER FILTER
PUMP
BACKFLOW PREVENTER
BATHROOM SINK
SH
SHOWER STALL
WT
WOST MAN TOILET
ST
SEALAND TOILET
MEN'S URINAL
G
M
U
(G) GREYWATER TANK,
(M) MIXED (GREYWATER & URINE) TANK
(U) URINE TANK
HW
HOT WATER TANK (ROOF MOUNTED)
C
COMPOSTING UNIT
HW
SOLAR HEATING ELEMENT & TANK
EVAPORATION PROCESS (TYP)
RESTROOMS
WOMEN
ST
MEN
ST
WOMEN
ST
MEN
ST
MEN
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PLANTER BOX (TYP)
LIVING WALL
TO BUILDING SPRINKLER SYSTEM
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LOCKER ROOM
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CONSTRUCTED WETLAND
MECHANICAL ROOM
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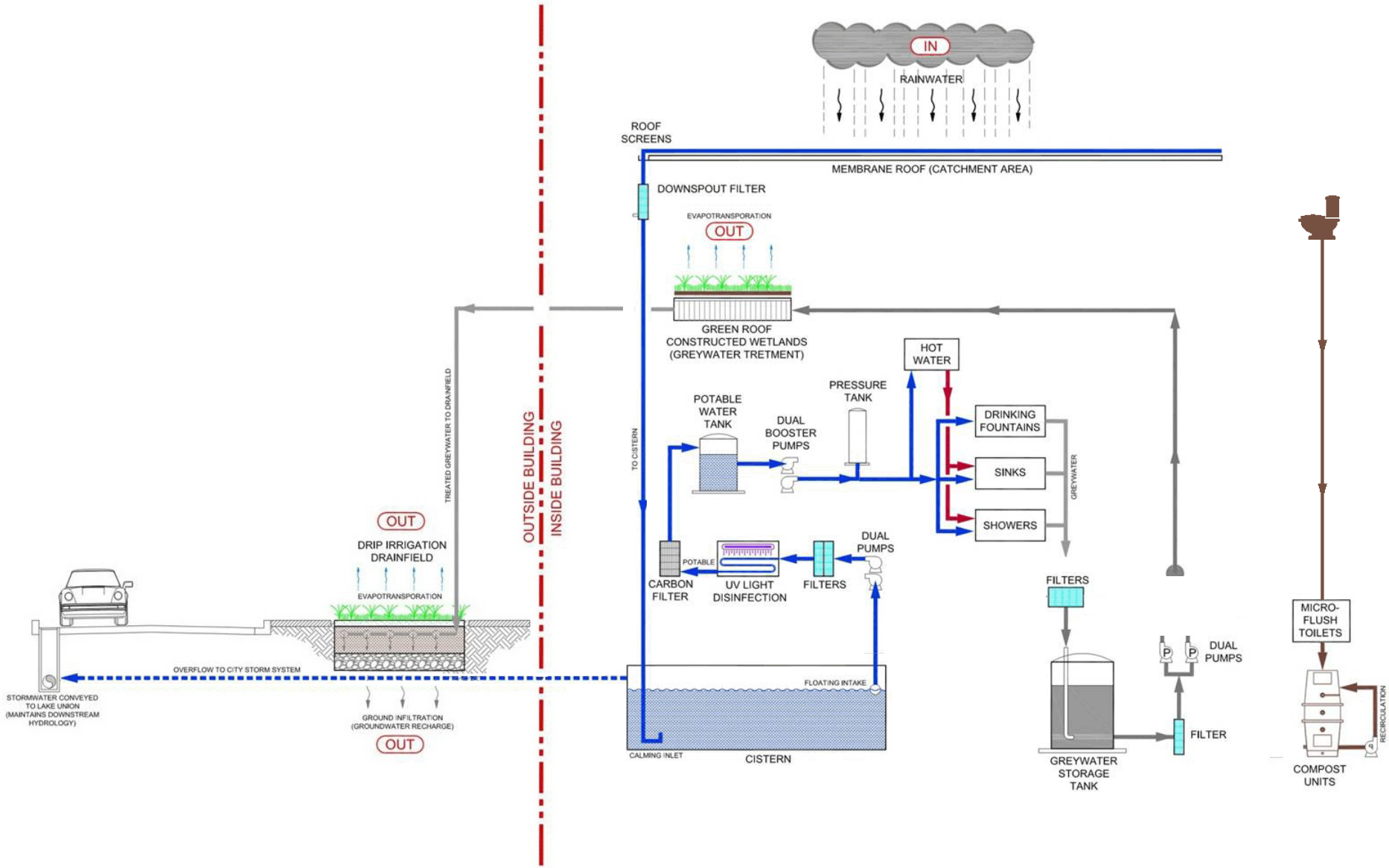
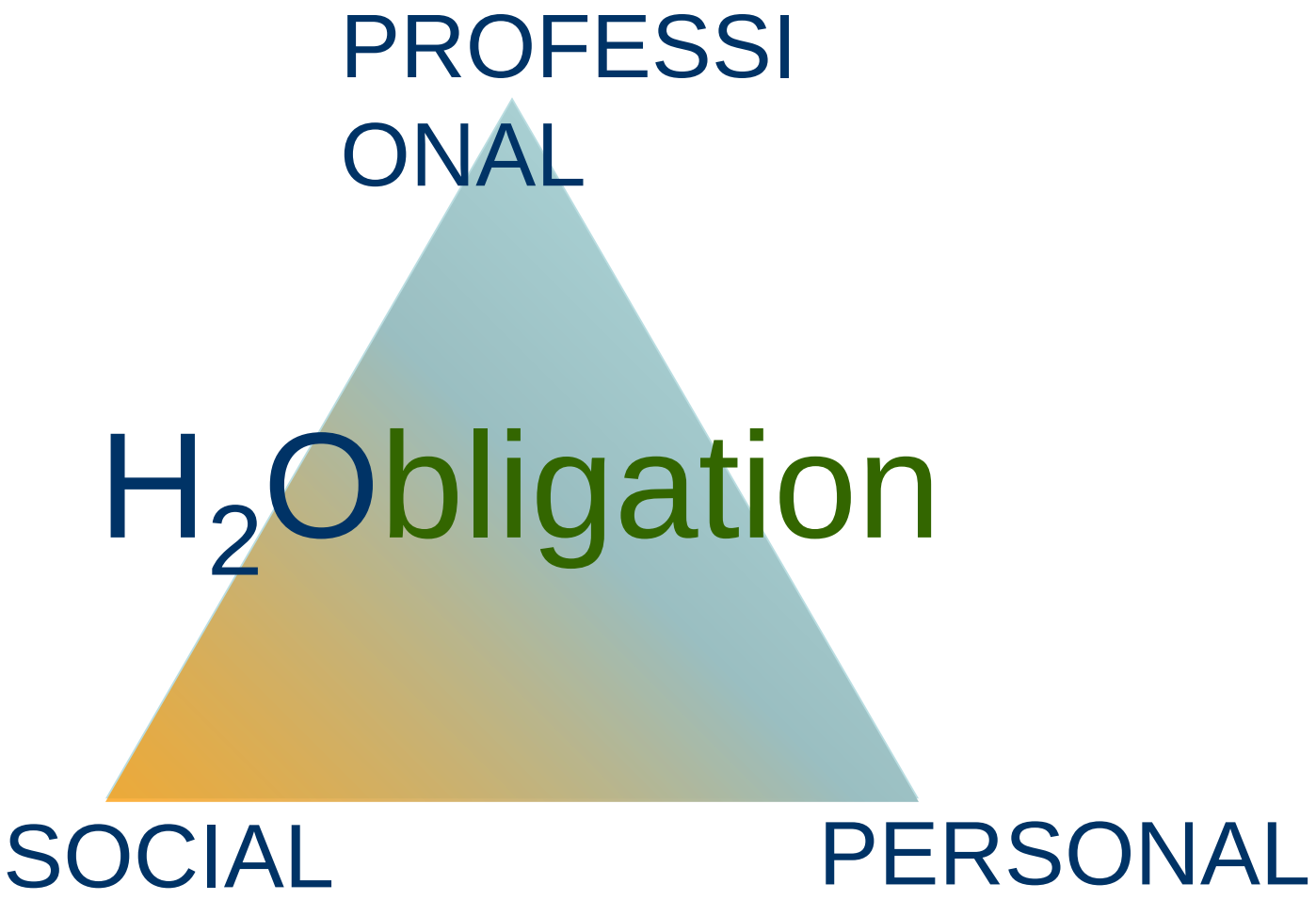
CITY WATER
6" WATER (FIRE)
CISTERN
CITY STORM
TO CITY STORM
OVERFLOW
2" WATER SERVICE (CITY BACK-UP SUPPLY)
BACK-UP SEWAGE OUTFLOW (TO CITY SEWER)
CITY SEWER



Courtesy: 2020 Engineering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Columbia LAND TRUST

News

Columbia Land Trust Seeking Stewardship Lead

Jan 04, 2010

Forestry and Conservation for Mt. St. Helens

Feb 27, 2009

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Updates By Email

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Privacy Policy

Welcome to Columbia Land Trust

Columbia Land Trust works to permanently conserve the natural resources of the Columbia River region. We conserve, restore, and manage signature landscapes, vital habitats, and working farms and forests in Oregon and Washington from east of the Cascade Mountains to the Pacific Ocean. These lands are at risk from overdevelopment, unsustainable practices, and other threats. By working positively with landowners and local communities we can sustain the unique qualities of the Pacific Northwest for our children and future generations.

Featured Projects

Forestry and Conservation for Mt. St. Helens

Columbia Land Trust and Pope Resources find solutions to keep 20,000 acres of working forestland

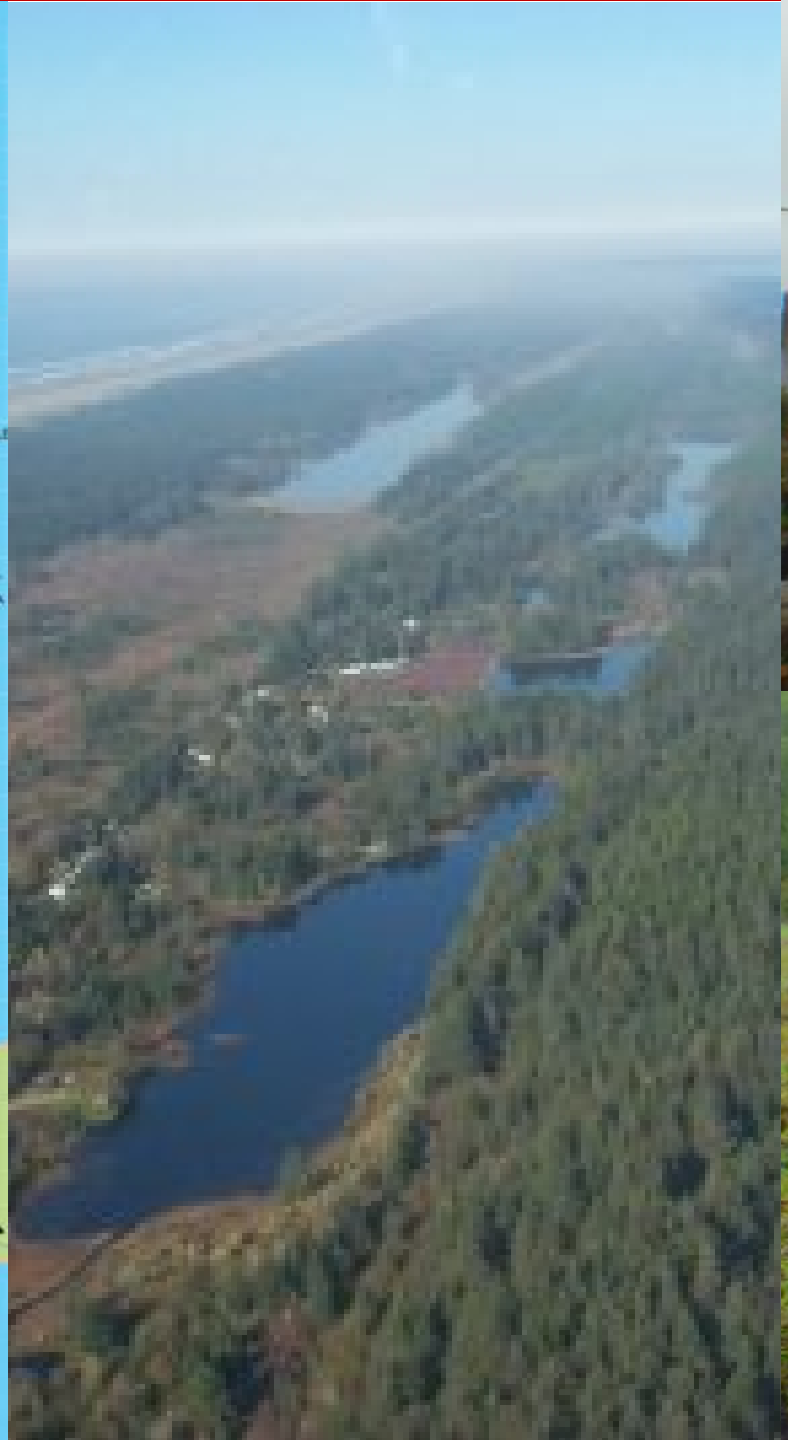
Glenn's Corner

Blog posts from our Executive Director and invited guests

Rythms

In town, on weekend mornings I now hear the familiar accelerating pulse of


N
SURFSIDE ESTATES
OYSTERVILLE
NAHCOTTA
OCEAN PARK
KLIPSAN BEACH
LONG BEACH
SEAVIEW
To Fort Columbia
ILWACO



water 1st INTERNATIONAL

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- Get Involved
- About Water 1st
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  - 2008 Financial Reports
  - Using your Donations Efficiently
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Access to safe water is a basic human right.

About Water 1st INTERNATIONAL

Water 1st International's Mission

Water 1st's mission is to serve families in the poorest communities in the world as they implement community-managed projects that integrate water supply, sanitation, and health education.

We envision a world free of extreme poverty. Providing people with safe water systems, latrines, and hygiene education is the 1st step to ending the cycle of poverty and death.

More than one billion people still do not have consistent access to freshwater.

More than two billion lack access to sanitation.

THEY WOULD STAND UP PAST THE MOON.


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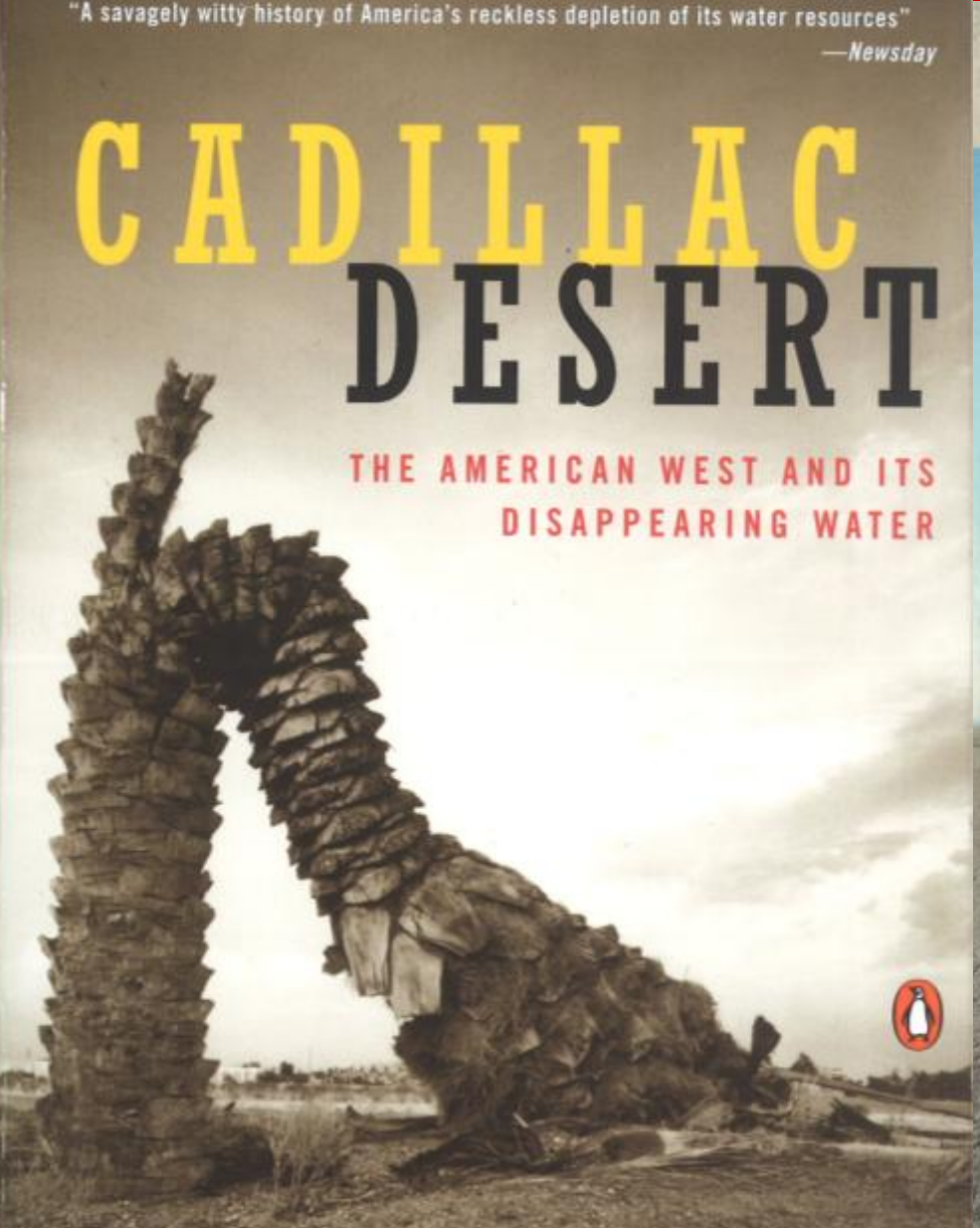
"A savagely witty history of America's reckless depletion of its water resources"
—*Newsday*

CADILLAC DESERT

THE AMERICAN WEST AND ITS DISAPPEARING WATER



MARC REISNER

AUTHOR OF *A DANGEROUS PLACE*

When the Rivers Run Dry

WATER—THE DEFINING CRISIS OF THE TWENTY-FIRST CENTURY

Fred Pearce

"An enriching and farsighted work."
Jai Singh, *San Francisco Chronicle*

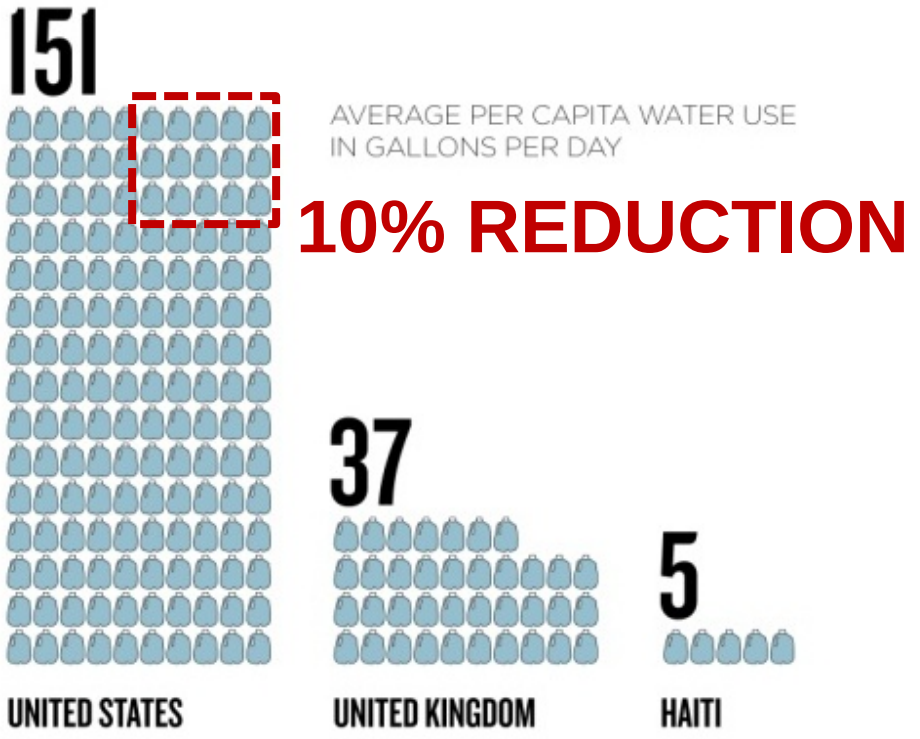
Americans buy over 35 billion liters of bottled water annually. In the U.S.,1500 plastic water bottles get thrown away every second.

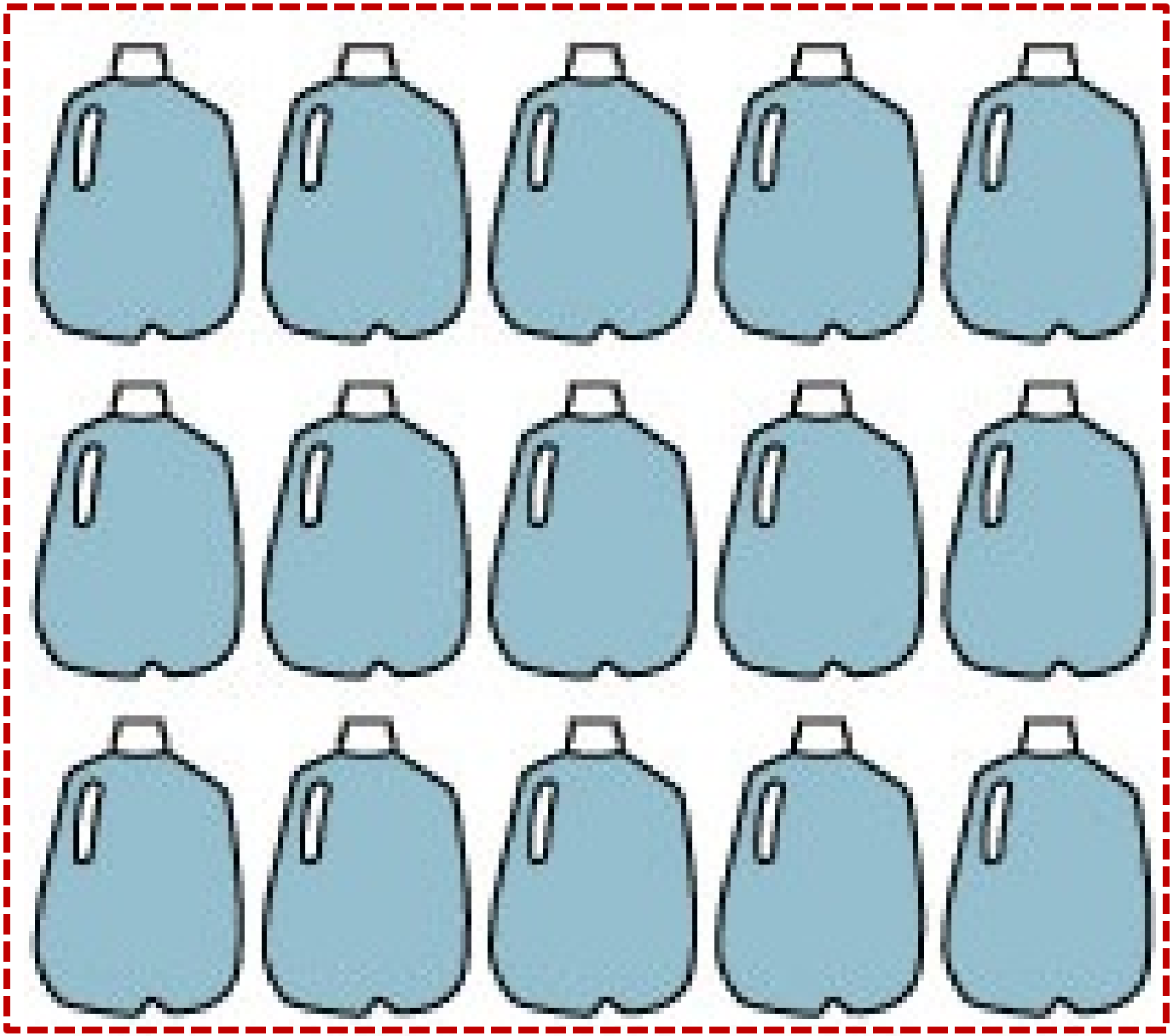
where does
it come from?

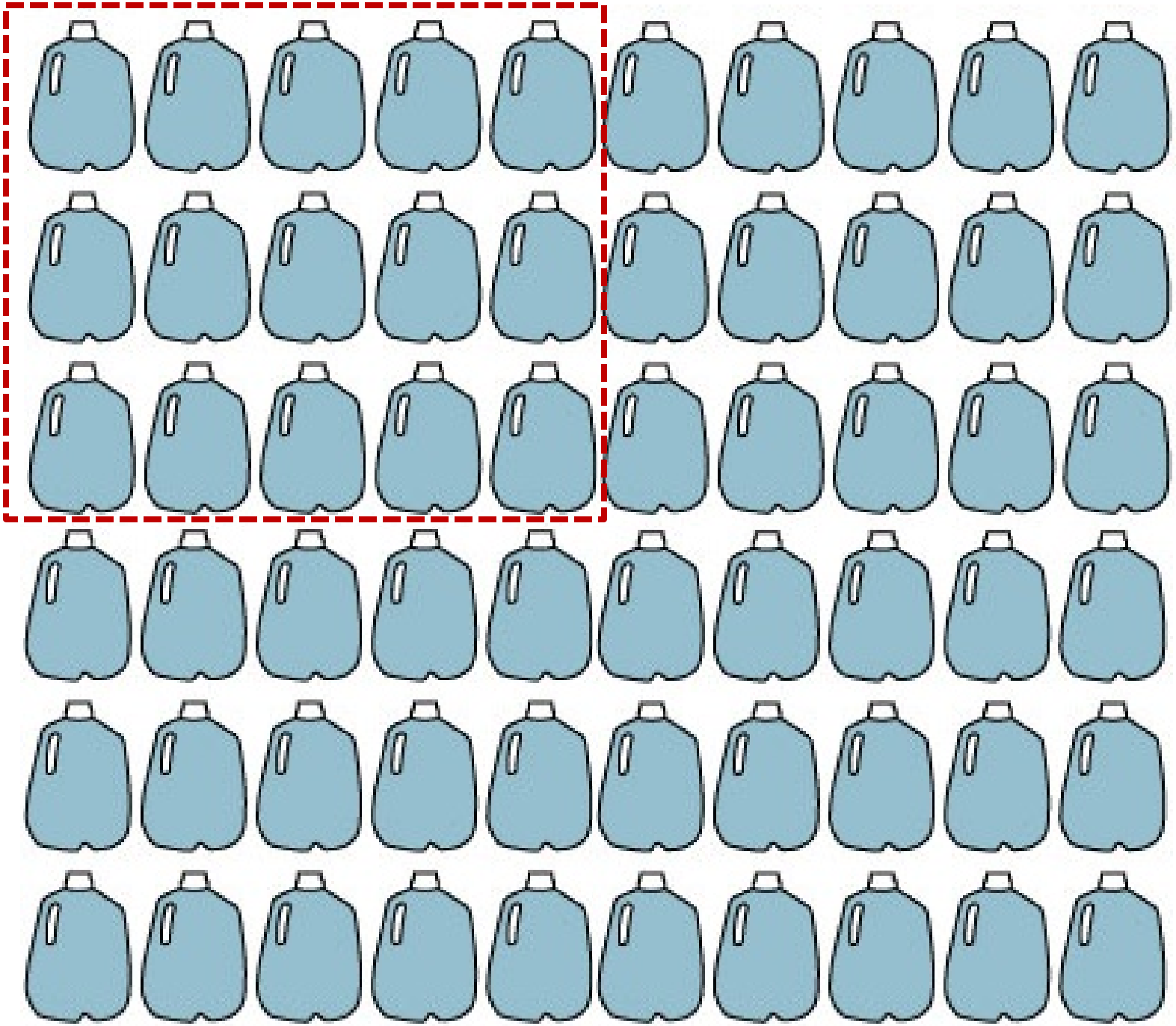
where does it go?

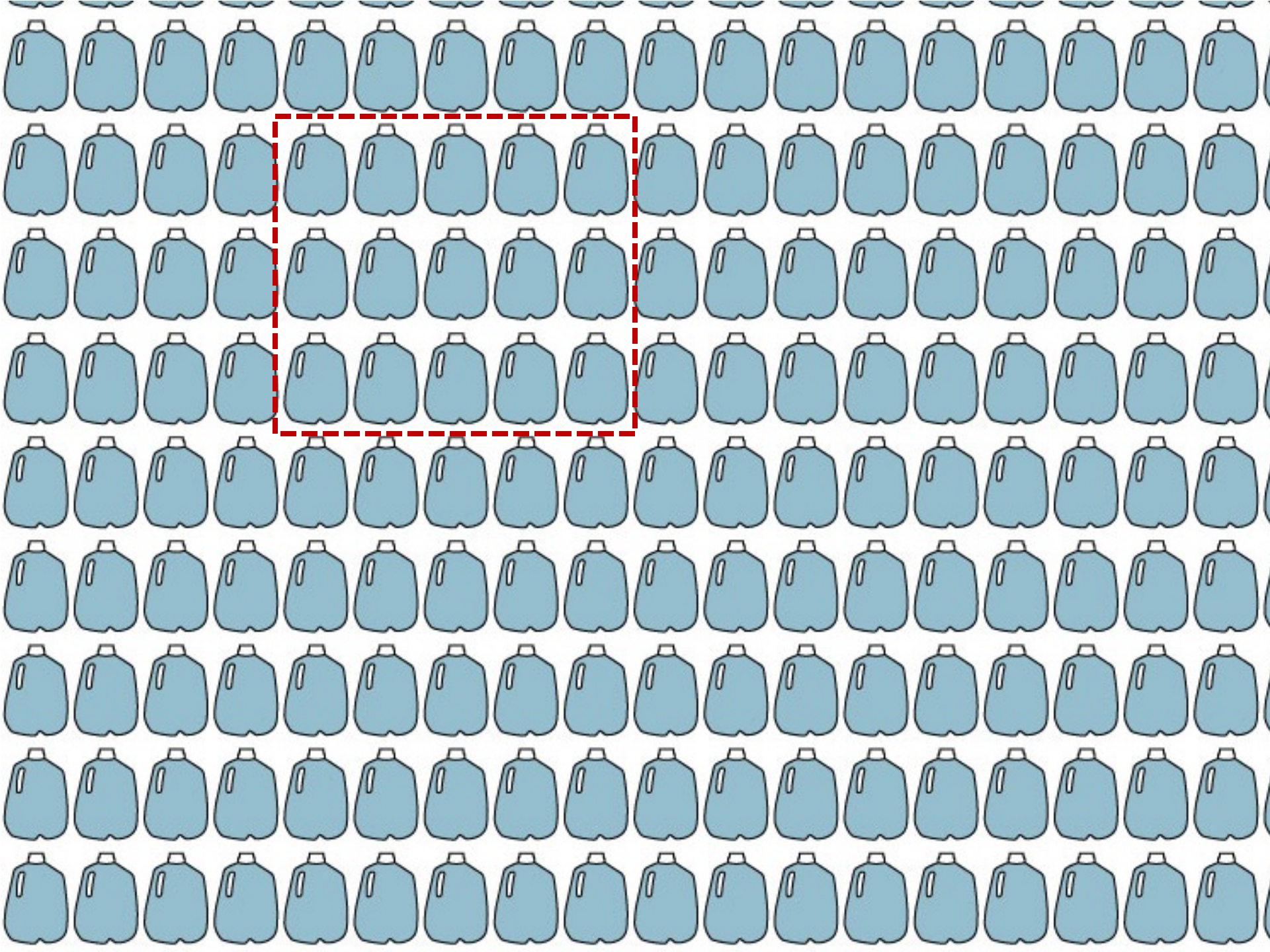
HOW MUCH WATER DO YOU USE EVERY DAY?

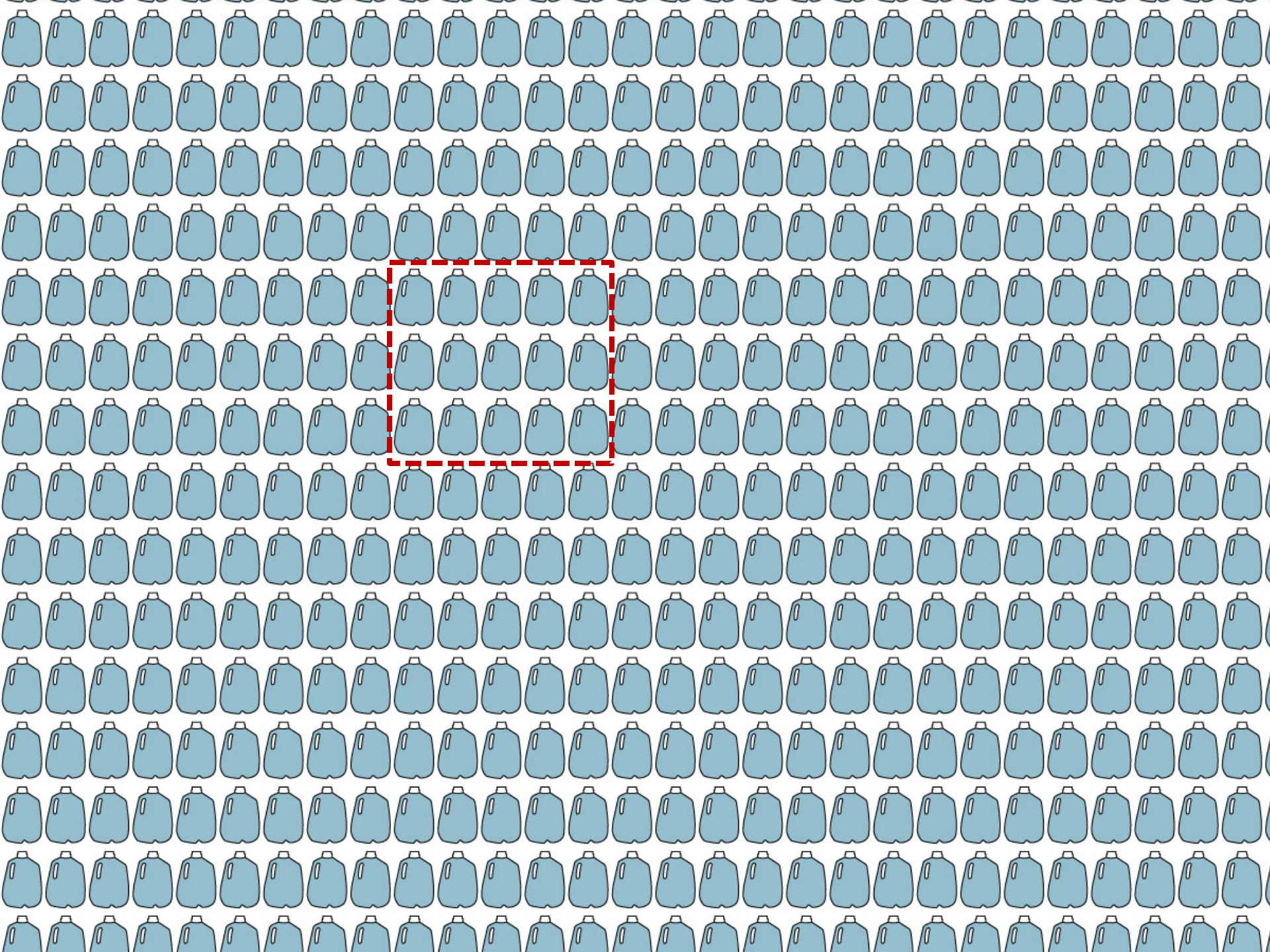
Americans use more water than any other country on the planet. Because water is readily available and virtually free in our society, there appears to be little incentive to conserve. With a broader global perspective, however, the ease with which we could all use water more responsibly becomes painfully obvious.

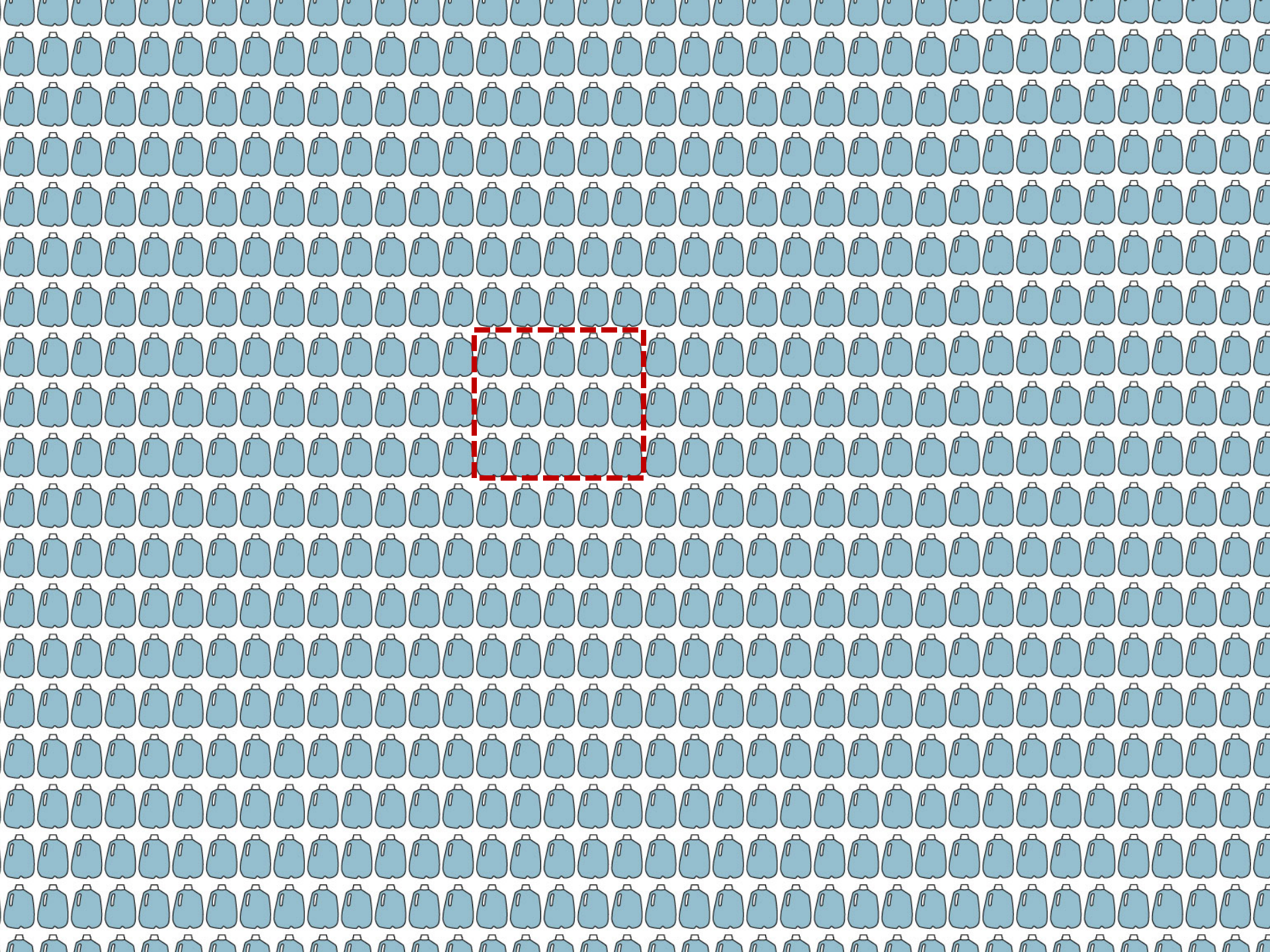


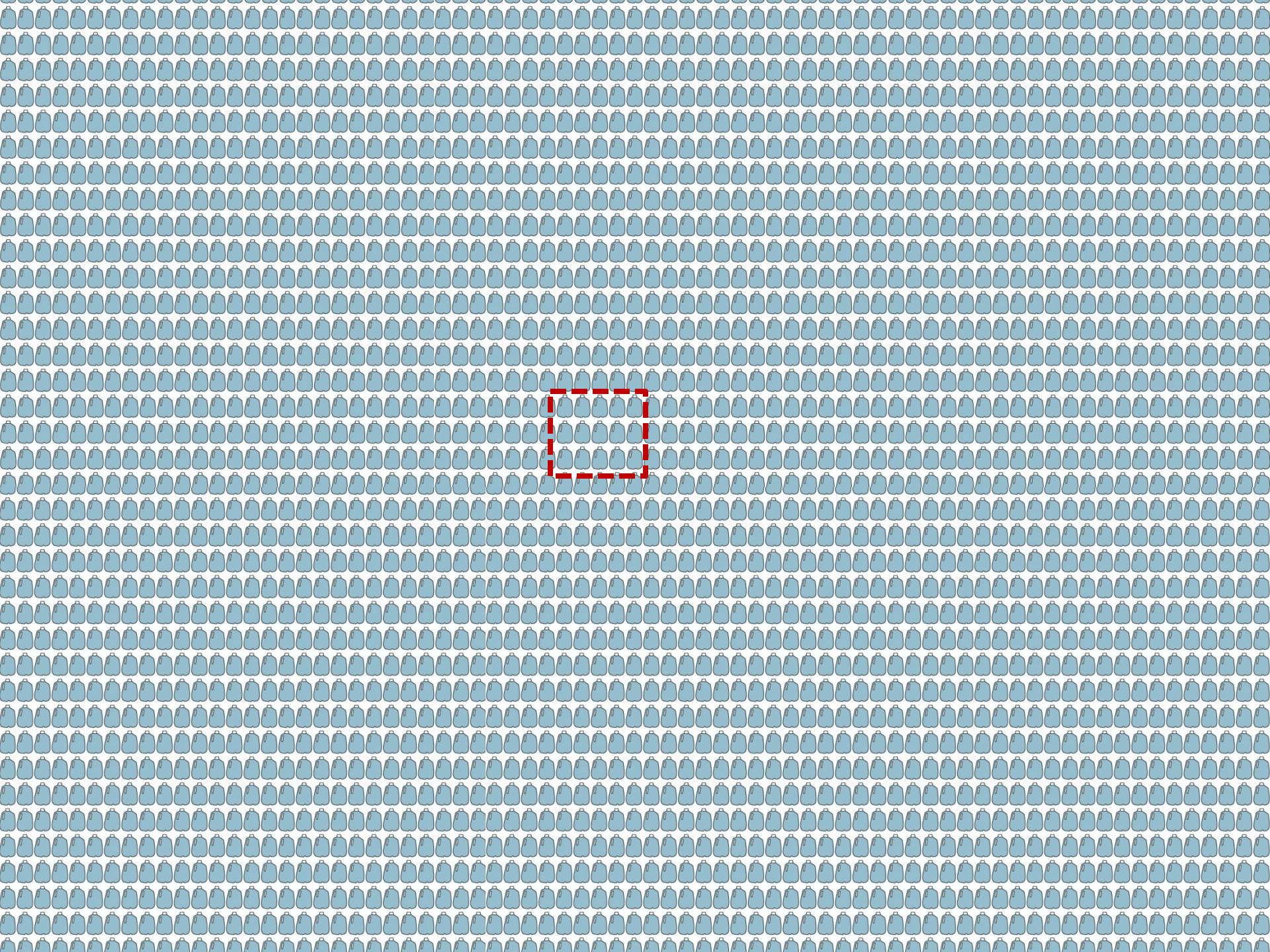


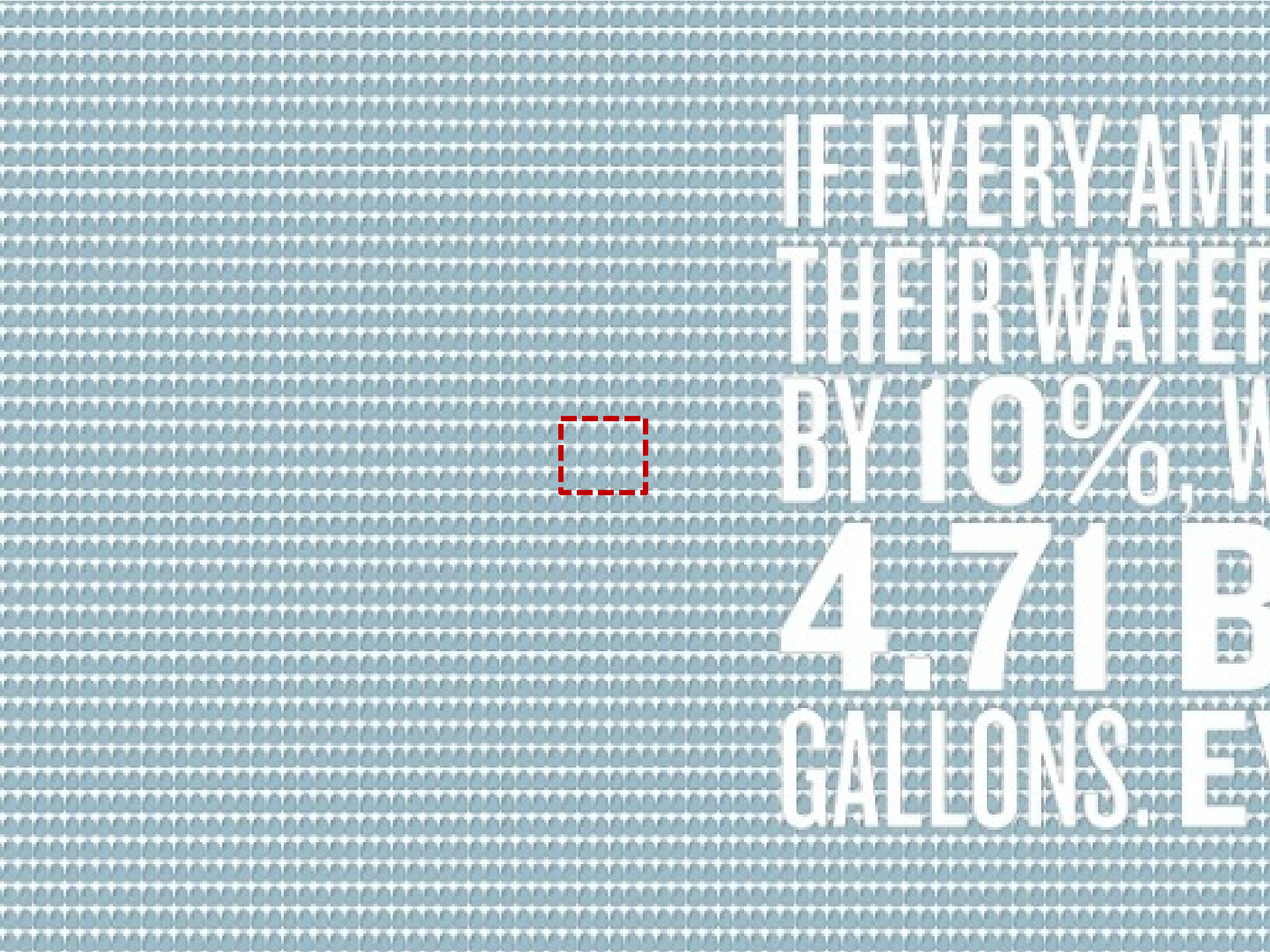








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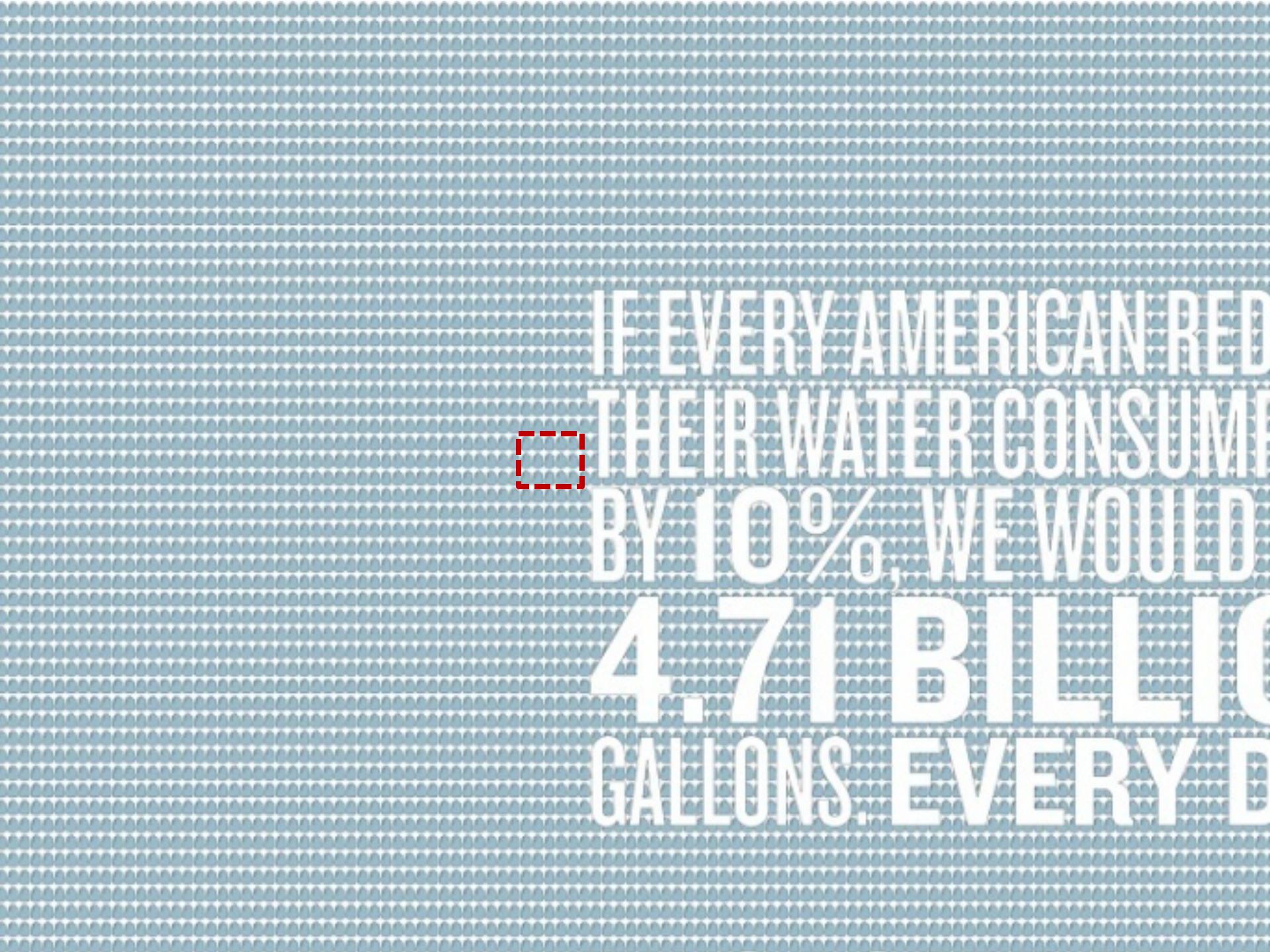
IF EVERY AMERICAN RED
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BY 10%, WE WOULD
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GALLONS. EVERY D

IF EVERY AMERICAN REDUCED THEIR WATER CONSUMPTION BY 10%, WE WOULD SAVE

4.71 BILLION

GALLONS. **EVERY DAY.**

THIS BOARD DEPICTS

3024

IF EVERY AMERICAN REDUCED THEIR WATER CONSUMPTION BY 10%, WE WOULD SAVE

4.71 BILLION

GALLONS. EVERY DAY.

THIS BOARD DEPICTS

30240

GALLONS OF WATER

IT WOULD TAKE

IF EVERY AMERICAN REDUCED THEIR WATER CONSUMPTION BY 10% WE WOULD SAVE

4.71 BILLION

GALLONS EVERY DAY.

THIS BOARD DEPICTS

30240

GALLONS OF WATER

IT WOULD TAKE

15754

BOARDS TO REPRESENT 4.71 BILLION GALLONS

IMAGINE HOW FAR WE COULD MOVE THE NEEDLE IF WE ALL USED 10% LESS

SEATTLE

OLYMPIA

Encourage New Perspectives

“The significant problems we face cannot be solved with the same level of thinking we used when we created them.”

Albert Einstein


Changing Behaviors
…..the right water for the right use

watersmart INNOVATIONS 2012

H_2Obligation

Creating a Sustainable Water Future

Scott Wolf, FAIA
The Miller Hull Partnership
Seattle, WA

swolf@millerhull.com
www.millerhull.com