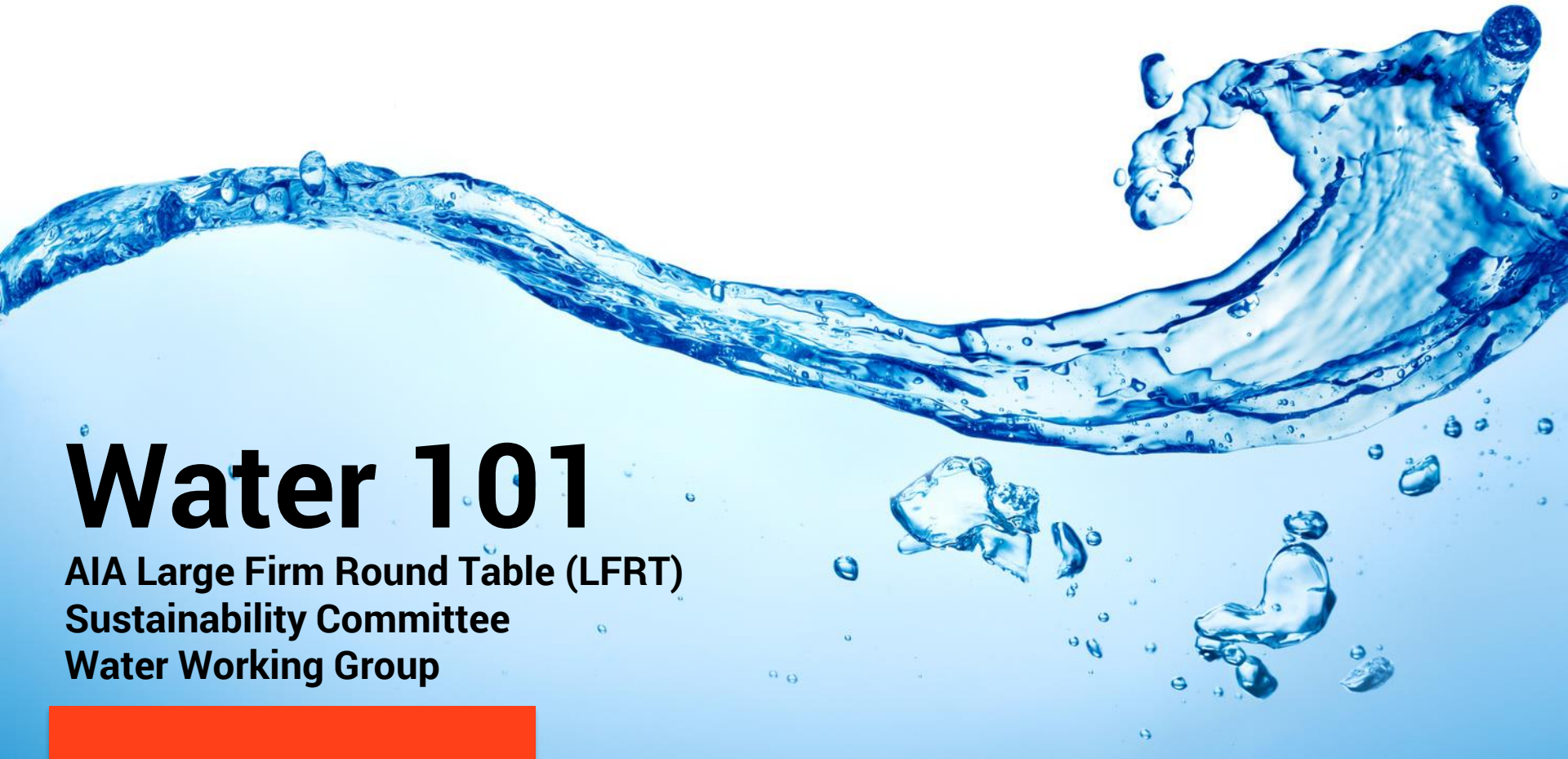
September 21, 2017



Water 101

AIA Large Firm Round Table (LFRT)
Sustainability Committee
Water Working Group

2017 INITIATIVE

AWARENESS

In collaboration with the AIA, the **Large Firm Round Table** (**LFRT**) is a peer group of large firms to whose CEOs meet twice annually. There are also subgroups for legal, finance, sustainability, IT and HR.

Membership

- Over 50 member firms.
- At least 150 employees.
- With at least 50 Registered Architects (AIA Members)

CONTENTS

Depth of awareness within LFRT constituency

Depth of awareness outside LFRT constituency

Regional water challenges and opportunities

LFRT CEO and legal groups; LFRT sustainability committee; LFRT water working group

this group is geared to communicate with multiple audiences, some of whom have a general knowledgebase, some of whom are knowledgeable, some of whom are specialists in water.

LFRT firms; firm leadership; clients; public

a secondary interest of the group is to appeal to a broader group beyond our initial stakeholders - to the firm, to the clients, and to the broader community.

The haves and the have-nots

we're framing this discussion based on a key distinction - recognizing that some regions have too much water, some regions have too little water, and some have both challenges at different times of year.

PURPOSE – Context

PURPOSE

WATER 101

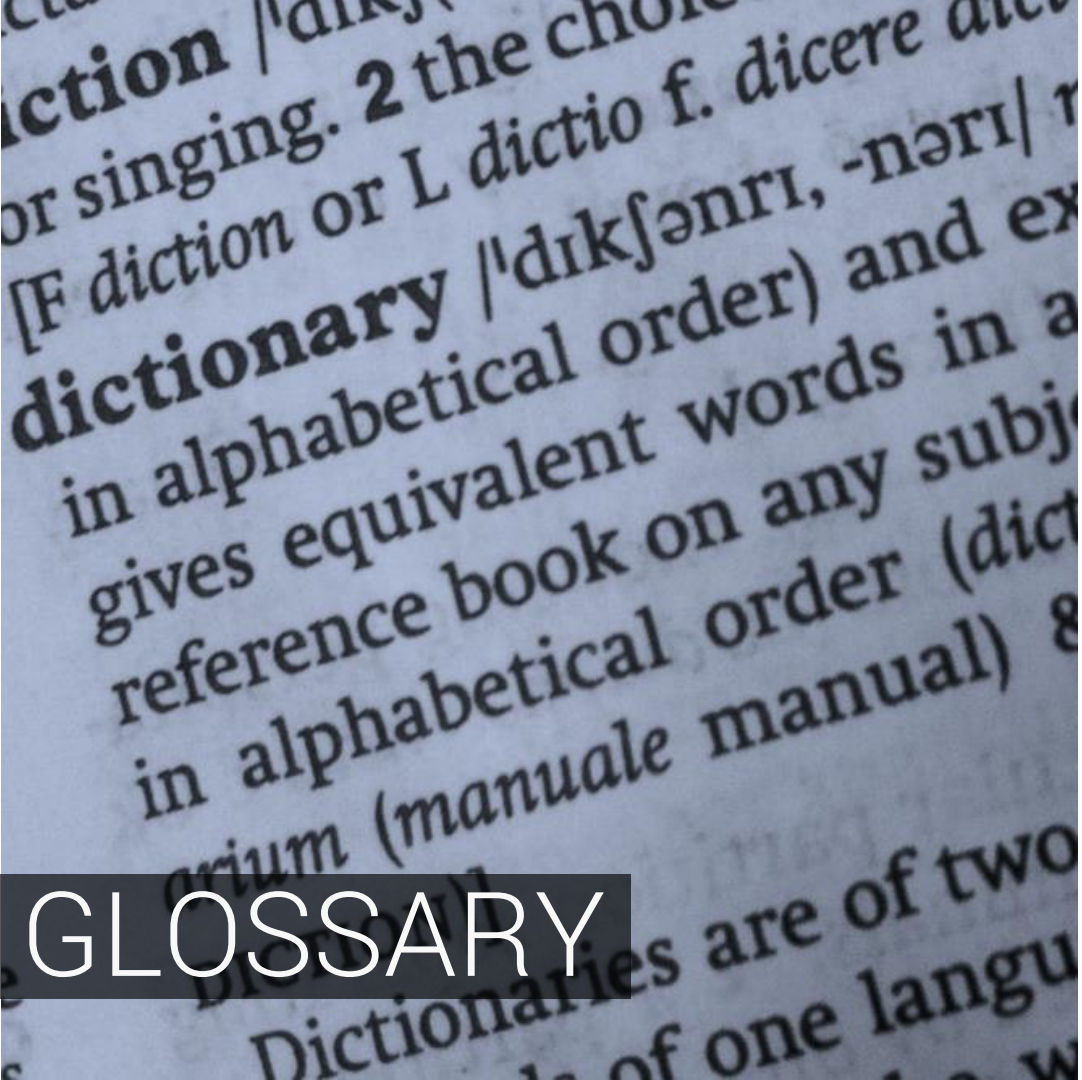
is an introductory list of questions we should be asking ourselves about water in our projects.

Its Purpose

is to understand how water impacts our clients, and how we can affect water.

Target Audience

is our project teams.



GLOSSARY

Graywater

Untreated wastewater that has not been contaminated by any toilet discharge, has not been affected by infectious, contaminated, or unhealthy bodily wastes, and that does not present a threat from contamination by unhealthful processing, manufacturing, or operating wastes. [1] Lavatory, shower, washing machine wastewater is considered graywater.

Blackwater

Sanitary wastewater that contains fecal matter or urine, or other contaminants. Toilet, urinal waste water is blackwater. Many municipalities consider kitchen wastewater from sinks and dishwashers to be blackwater, others do not.

Potable Water

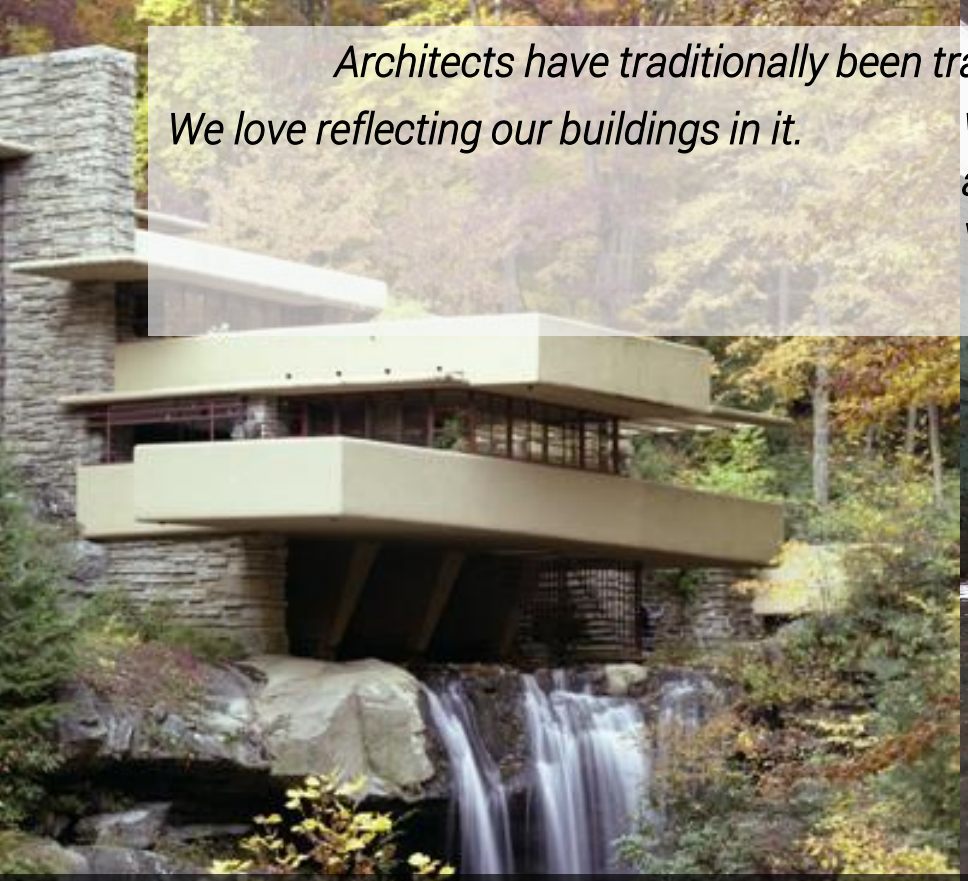
Water that meets federal and state water quality standards for water delivered to utility customers. [1] Generally, water safe for human consumption.

https://www.wbdg.org/design-objectives/sustainable/protect-conserve-water
https://www.splashlink.com/Glossary.aspx#G
[1] http://www.allianceforwaterefficiency.org/Glossary.aspx

Architects have traditionally been trained to have a love-hate relationship with water.

We love reflecting our buildings in it.

We hate hearing that our roofs leak and that floods and condensation ruin our materials, assemblies and views.



BIG PICTURE – Love/Hate

Source: Fallingwater.org

Source: nbcnews.com

Most of us take water for granted, almost as much as gravity itself – it is always there!

But what happens when it suddenly stops flowing?

No drinking water?

No sewer conveyance water in our bathrooms?

No food preparation water in our kitchens?

Compromised ability to maintain healthy environments?

Compromised fire service?

Compromised air conditioning?

Compromised landscapes and food production and habitats?

BIG PICTURE – Resilience

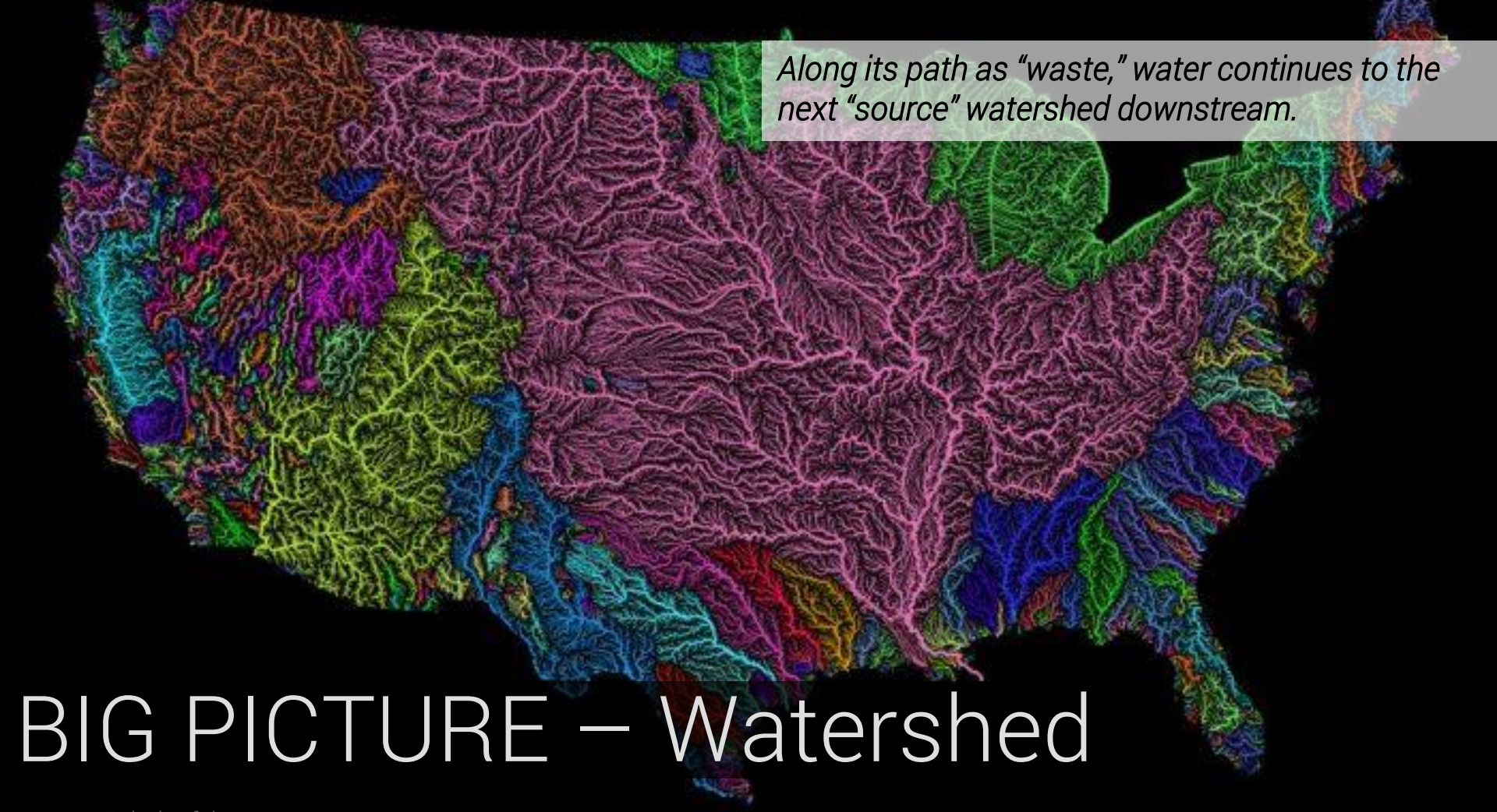
Source: Care2.com

The water that flows through our sites and buildings comes from various sources (i.e., atmosphere, surface, ground, utility, containers, and via our bodies….) and provides links to all scales of community.

In more and more communities, these links are becoming more tenuous, and some flows are beginning to turn off.

BIG PICTURE – Various Sources

Source: Huffington Post



Along its path as “waste,” water continues to the next “source” watershed downstream.

BIG PICTURE — Watershed

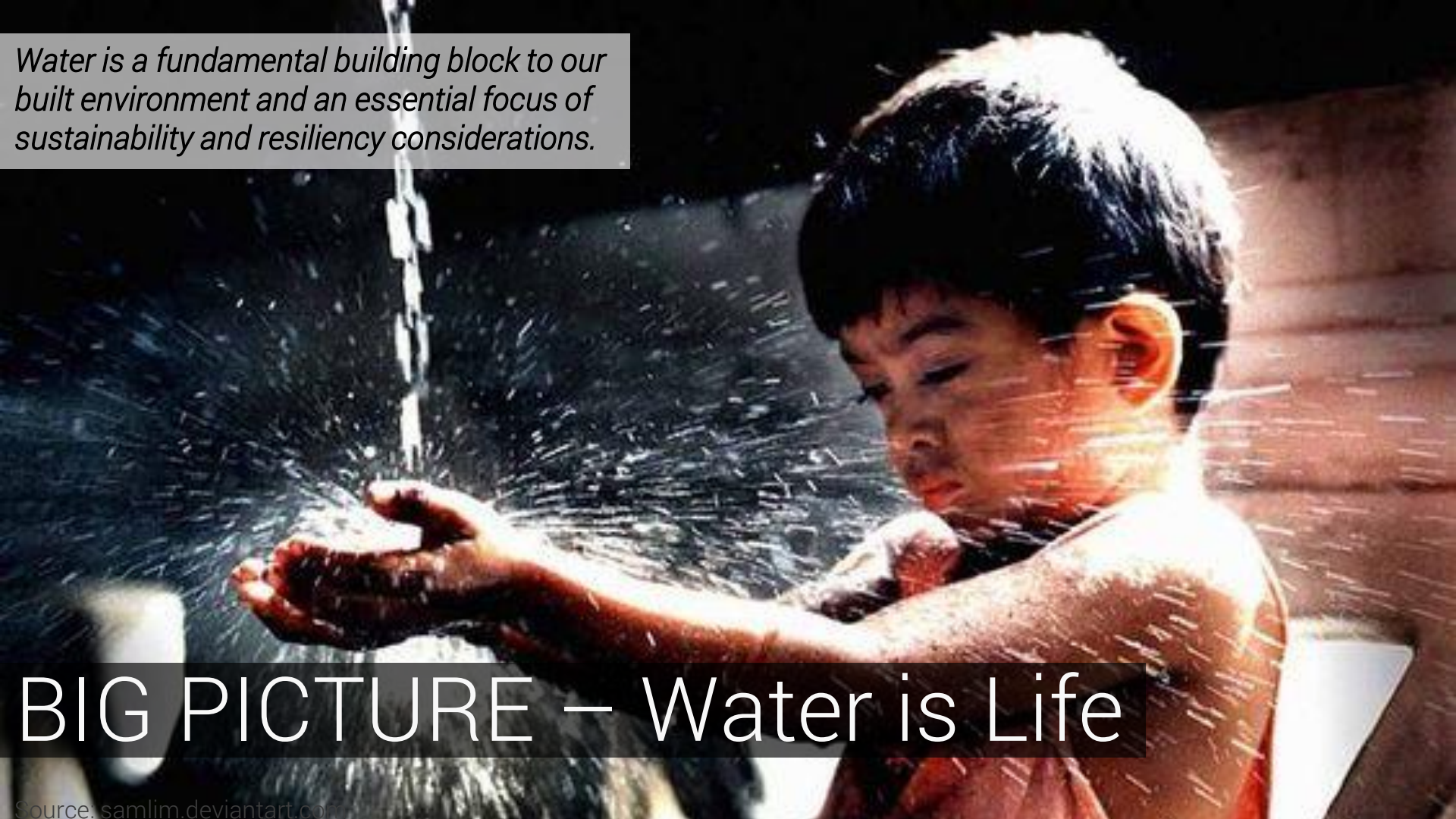
Source: Fejetlenfej

Increasingly, water is understood as a resource to protect and conserve and use for multiple purposes while "on site."

BIG PICTURE – On-Site Usage

Source: Kieran Timberlake

Water is a fundamental building block to our built environment and an essential focus of sustainability and resiliency considerations.



BIG PICTURE — Water is Life

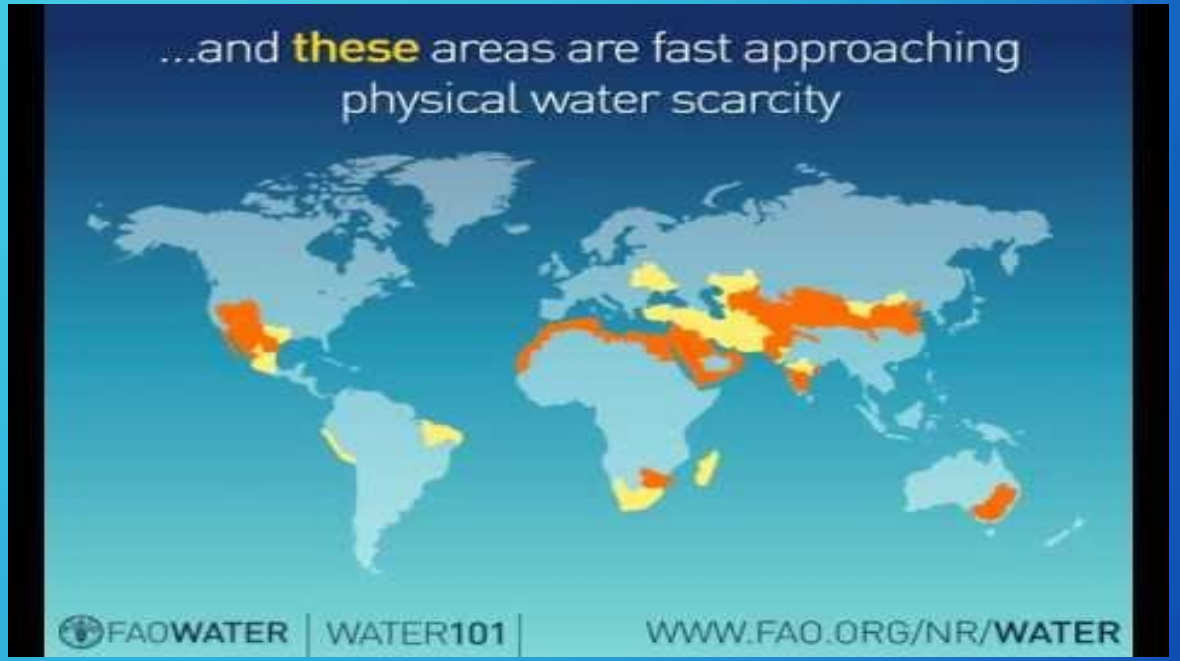
Source: samlim.deviantart.com

FAO Video: Water 101 - Global Water Scarcity Trends:

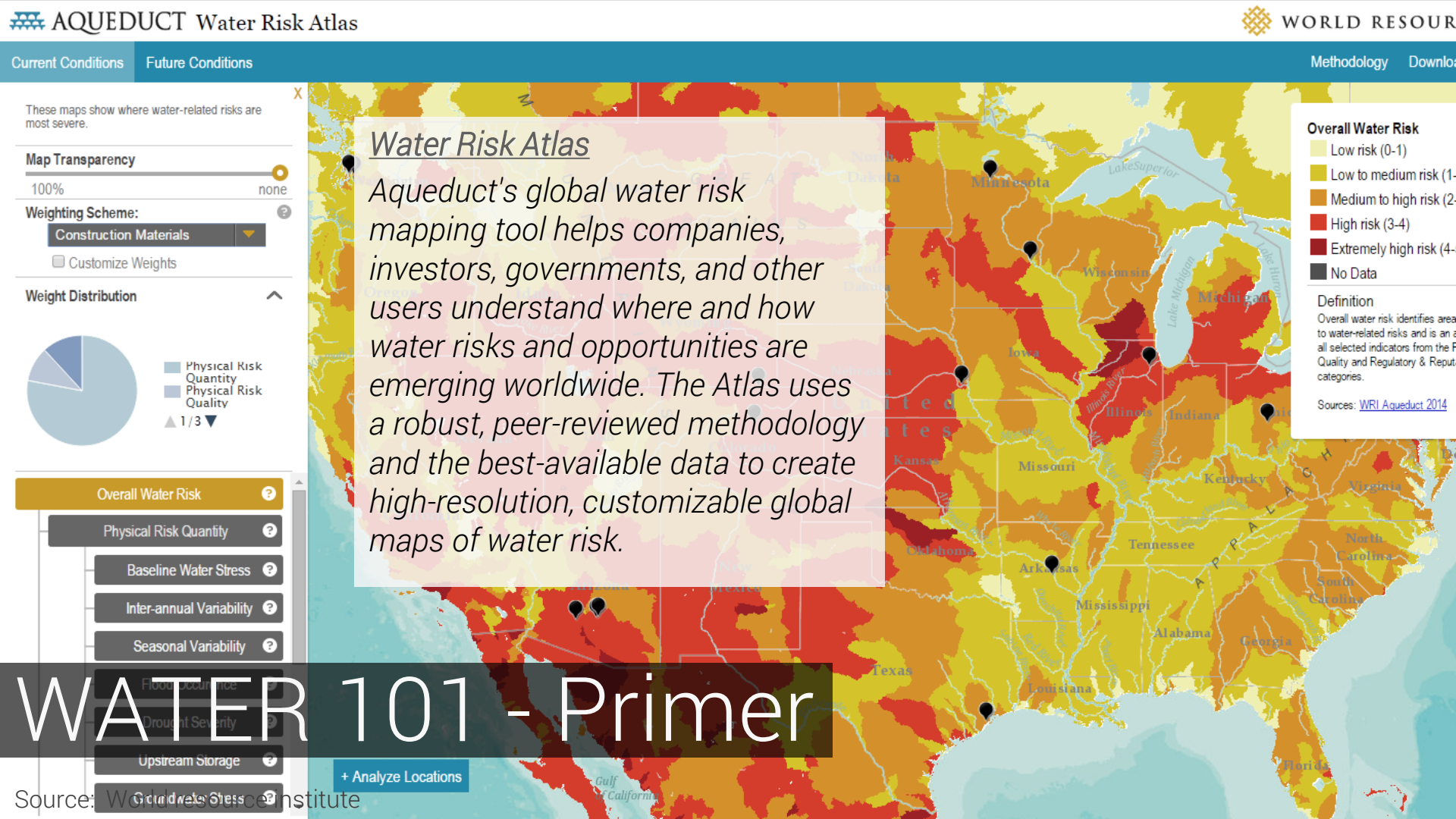
By 2025, 1.8 billion people will experience absolute water scarcity, and 2/3 of the world will be living under water-stressed conditions.

Scarcity can take two forms: there is an important distinction drawn in this discussion between Physical Water Scarcity and Economic Water Scarcity.

By 2030, almost half the world will live under conditions of high water stress.



WATER 101 - Primer



WATER 101 - Primer

Source: World Resources Institute

Our goal is for there to be

CLEAN WATER

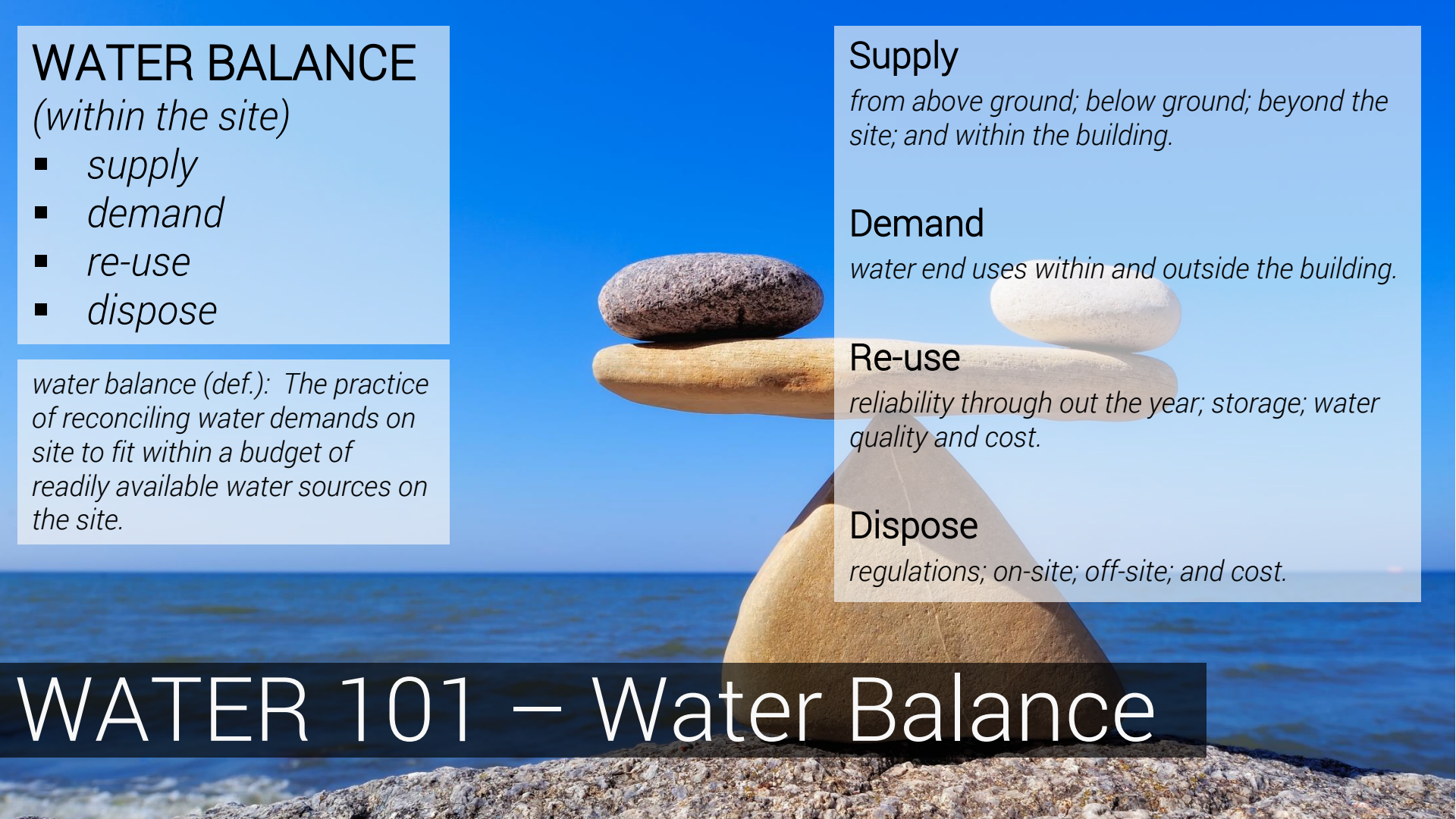
&

AMPLE WATER

WATER 101 - Primer

Source: ixpower.com

Source: shutterstock.com



WATER BALANCE
(within the site)

- *supply*
- *demand*
- *re-use*
- *dispose*

water balance (def.): The practice of reconciling water demands on site to fit within a budget of readily available water sources on the site.

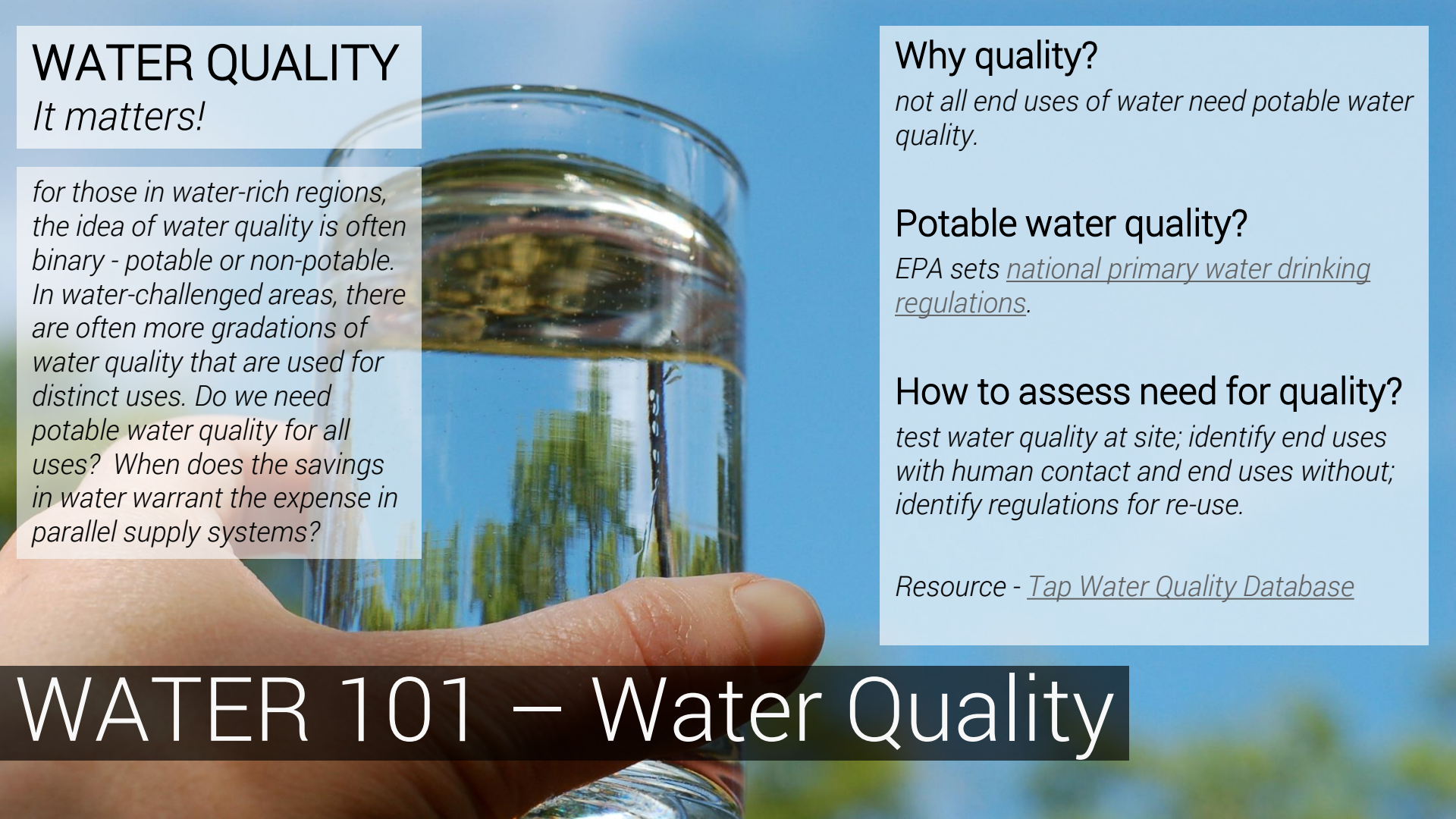
Supply
from above ground; below ground; beyond the site; and within the building.

Demand
water end uses within and outside the building.

Re-use
reliability through out the year; storage; water quality and cost.

Dispose
regulations; on-site; off-site; and cost.

WATER 101 – Water Balance



WATER QUALITY

It matters!

for those in water-rich regions, the idea of water quality is often binary - potable or non-potable. In water-challenged areas, there are often more gradations of water quality that are used for distinct uses. Do we need potable water quality for all uses? When does the savings in water warrant the expense in parallel supply systems?

Why quality?

not all end uses of water need potable water quality.

Potable water quality?

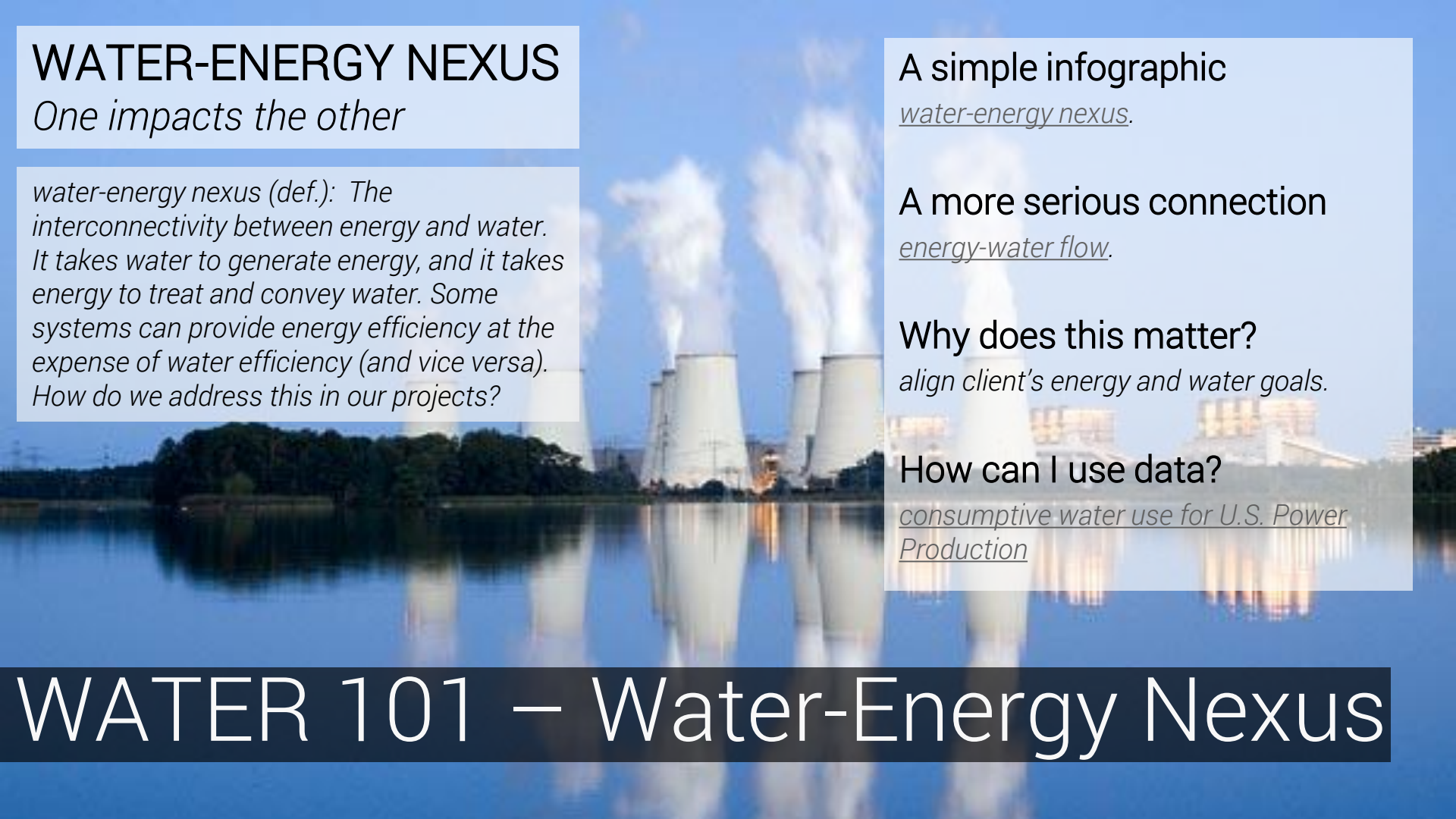
EPA sets national primary water drinking regulations.

How to assess need for quality?

test water quality at site; identify end uses with human contact and end uses without; identify regulations for re-use.

Resource - Tap Water Quality Database

WATER 101 – Water Quality



WATER-ENERGY NEXUS

One impacts the other

water-energy nexus (def.): The interconnectivity between energy and water. It takes water to generate energy, and it takes energy to treat and convey water. Some systems can provide energy efficiency at the expense of water efficiency (and vice versa). How do we address this in our projects?

A simple infographic

water-energy nexus.

A more serious connection

energy-water flow.

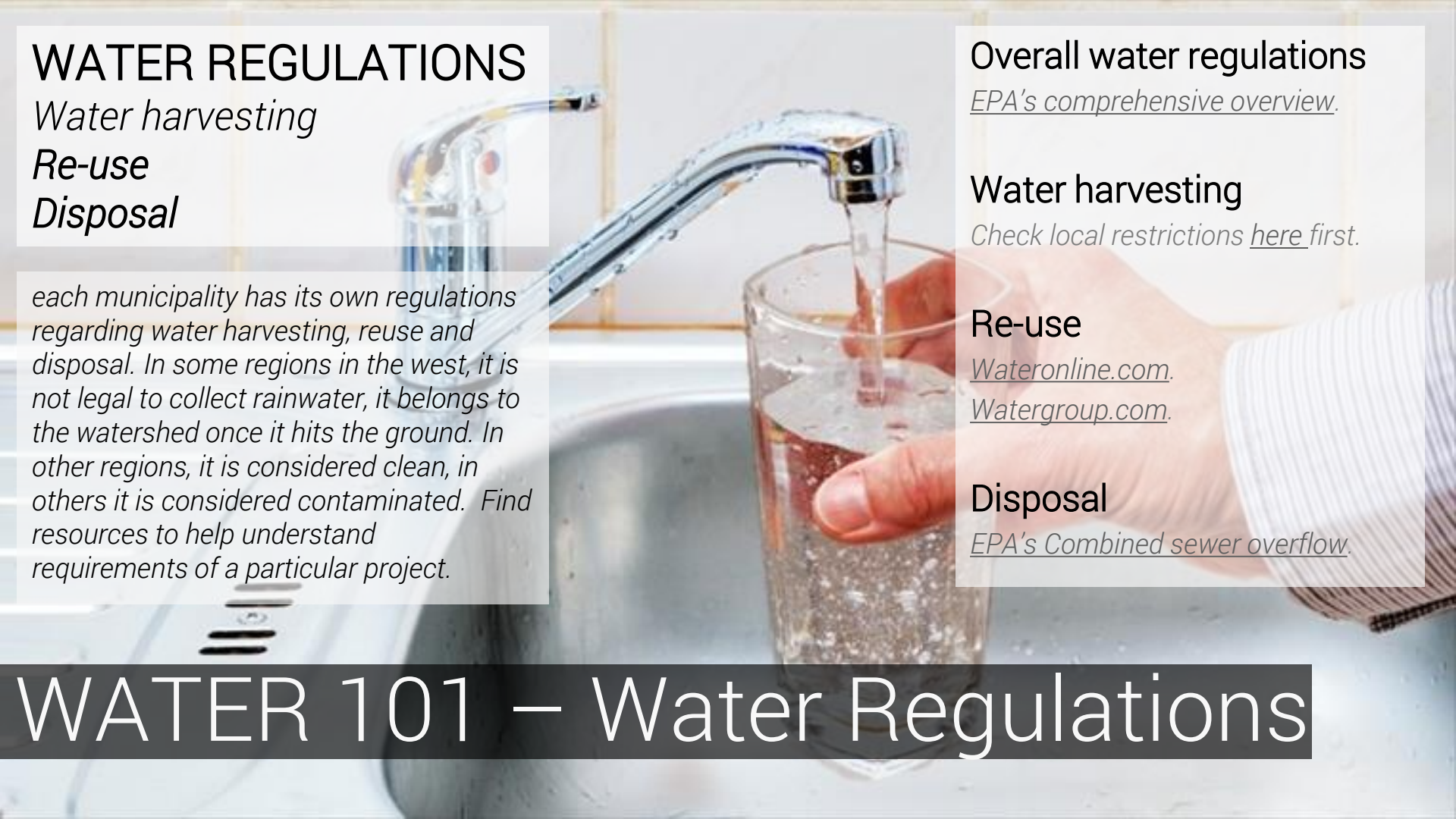
Why does this matter?

align client's energy and water goals.

How can I use data?

consumptive water use for U.S. Power Production

WATER 101 – Water-Energy Nexus



WATER REGULATIONS

Water harvesting

Re-use

Disposal

each municipality has its own regulations regarding water harvesting, reuse and disposal. In some regions in the west, it is not legal to collect rainwater, it belongs to the watershed once it hits the ground. In other regions, it is considered clean, in others it is considered contaminated. Find resources to help understand requirements of a particular project.

Overall water regulations

EPA's comprehensive overview.

Water harvesting

Check local restrictions here first.

Re-use

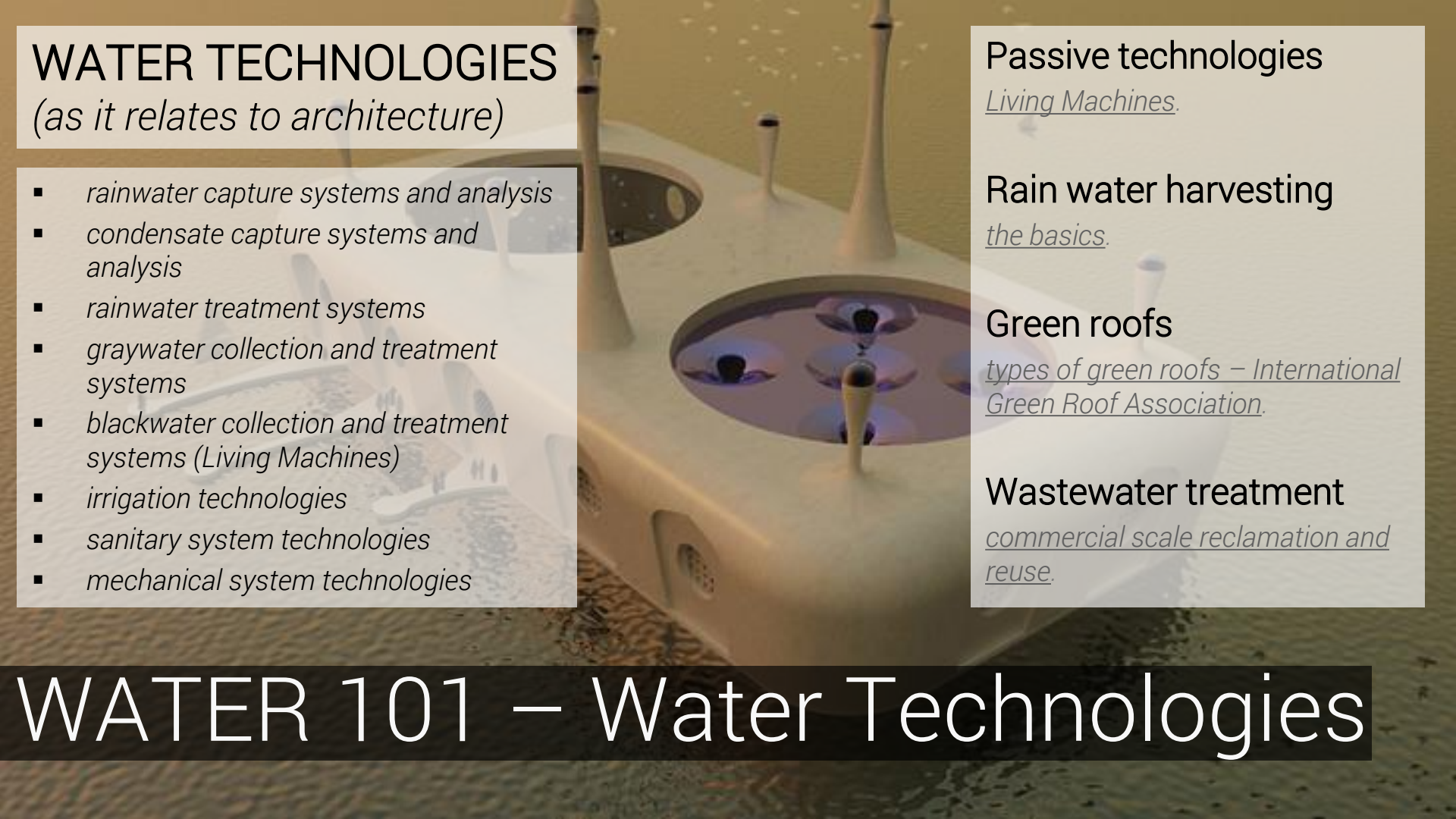
Wateronline.com.

Watergroup.com.

Disposal

EPA's Combined sewer overflow.

WATER 101 – Water Regulations



WATER TECHNOLOGIES
(as it relates to architecture)

- *rainwater capture systems and analysis*
- *condensate capture systems and analysis*
- *rainwater treatment systems*
- *graywater collection and treatment systems*
- *blackwater collection and treatment systems (Living Machines)*
- *irrigation technologies*
- *sanitary system technologies*
- *mechanical system technologies*

Passive technologies
Living Machines.

Rain water harvesting
the basics.

Green roofs
types of green roofs – International Green Roof Association.

Wastewater treatment
commercial scale reclamation and reuse.

WATER 101 – Water Technologies

WATER 101 - Case Studies

AIA Committee on the Environment

The Dixon Water Foundation Josey Pavilion

rainwater harvesting; above ground cisterns; constructed wetlands, passive treatment; graywater reuse – 100% potable water reduction

1315 Peach Street

rainwater harvesting; below ground cisterns; graywater reuse; active treatment – 77% potable water reduction

Omega Center for Sustainable Living

engineered biological wastewater treatment; rainwater harvesting; graywater reuse – 100% potable water reduction

Living Building Challenge

Morris & Gwendolyn Cafritz Foundation Environmental Center

eliminate black water; regulatory challenges; graywater reuse for irrigation

Phipps Center for Sustainable Landscapes

extensive water harvesting; graywater reuse; black water treatment

Bullitt Center

eliminate black water; regulatory challenges; graywater reuse for irrigation

Resources & Links

Water Risk Analysis - Aqueduct Water Risk Analysis: (http://www.wri.org/applications/maps/aqueduct-atlas/#x=8.00&y=0.25&...)

Peter Gleick - The World's Water (Pacific Institute): http://worldwater.org/

Estimated Use of Water in the United States: http://pubs.usgs.gov/circ/2004/circ1268/

Water Cycle - Freshwater storage, from USGS Water Science Basics: http://water.usgs.gov/edu/watercyclefreshstorage.htm

Natural Resources Conservation Service: http://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/

Earth Observatory: Data and Images: http://earthobservatory.nasa.gov/GlobalMaps/

Water Atlas Archive: http://pubs.usgs.gov/ha/ha730/gwa.html

Public Water Use: https://water.usgs.gov/edu/wups.html

Total Water Use: https://water.usgs.gov/watuse/wuto.html

Water Usage - Visualization: https://owi.usgs.gov/vizlab/water-use/

Changes in Water Use Categorization: https://water.usgs.gov/watuse/WU-Category-Changes.html

World Water Week: 10 Shocking Facts About the Global Water Crisis

Performance testing for standard and high performance toilets.

Credits

LFRT Sustainability Committee

Water Sub-group

Co-Chairs: Prem Sundharam, DLR Group; Jonathan Weiss, Jacobs.

Members:

Rives Taylor, Gensler

Lauren Seydewitz, Gresham Smith and Partners

Rand Ekman, HKS

Julie Hiromoto, HKS

Patrick Thibaudeau, HGA

Michelle Oishi, CBT Architects

Nicole Dosso, SOM

Michele Neptune, HLW

Stefan Knust, Ennead Architects

Ethan Harden, Stantec

Steve Vukelich, Gould Evans

Pablo La Roche, Callison RTKL

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