The Horinko Group's 2017 Summit
in partnership with
The Mannie Jackson Center for the Humanities Foundation

The Future of Transboundary Water Management – Cooperation, Informed Decision-Making, and Empowering Local Actors

October 12, 2017

Summit Partners

מכון הערבה
Arava Institute
معهد وادي عربة

The National Great Rivers Research & Education Center

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water resources action project
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Panel One: Water Diplomacy and Cooperation in the Middle East – Big Data and the Road Ahead

9:30 – 10:45am

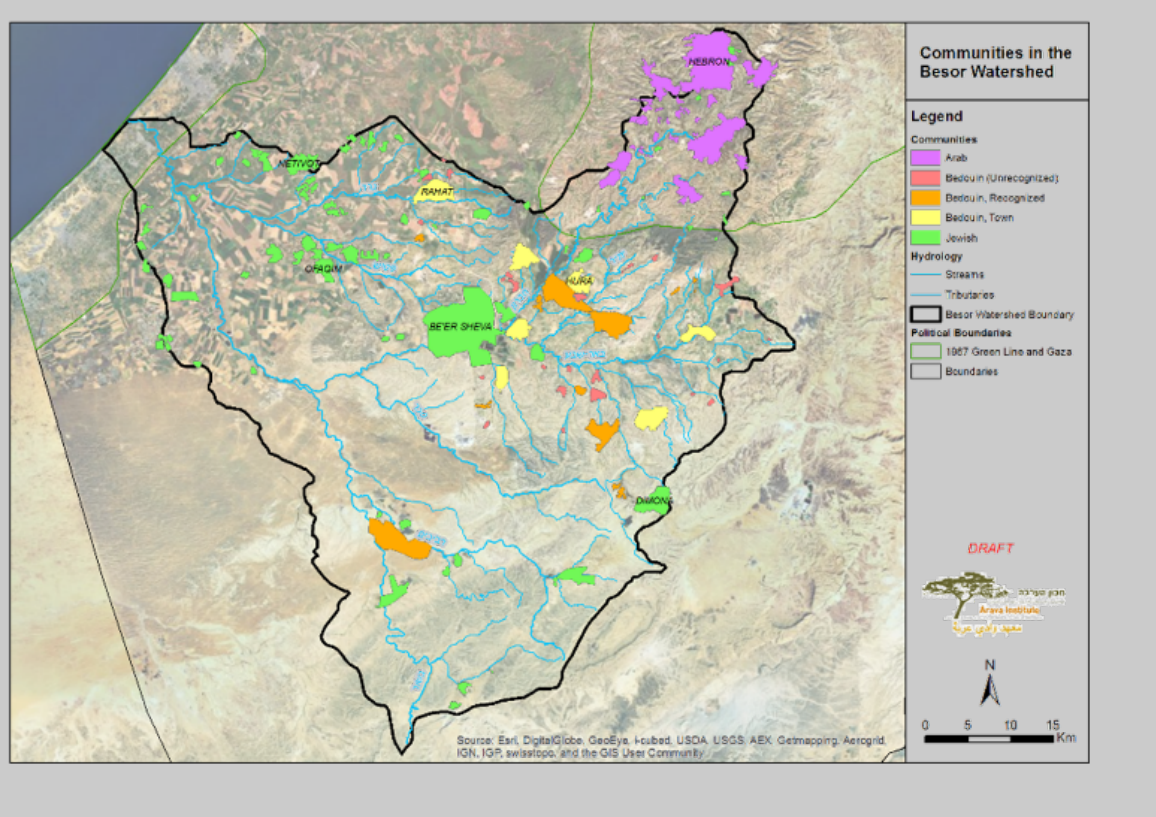
Dr. Clive Lipchin (Moderator)
Director, Center for Transboundary Water Management, Arava Institute for Environmental Studies

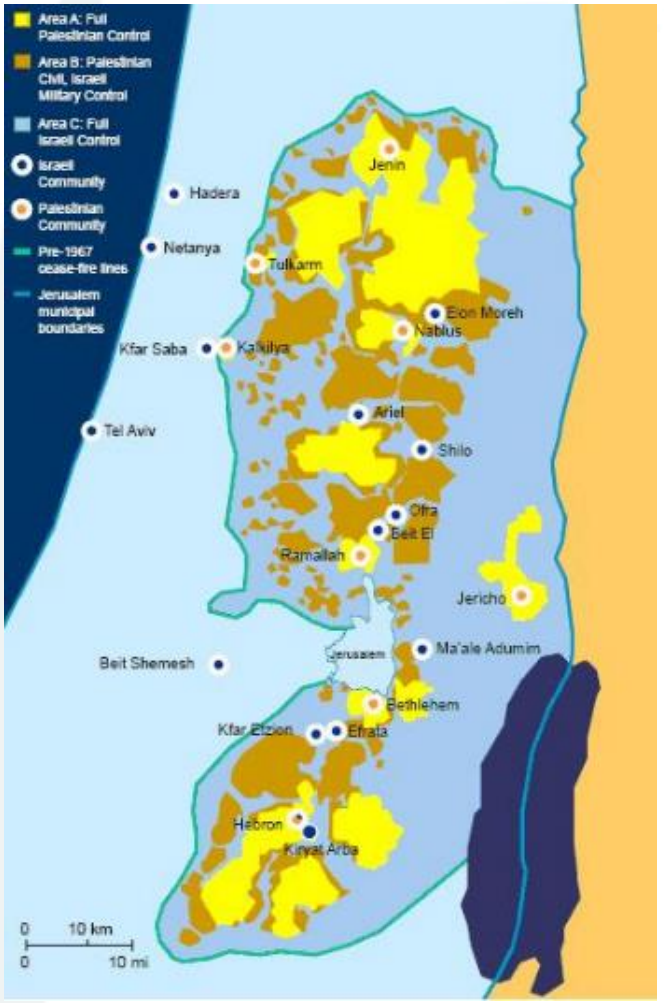
Dr. Shaddad Attili
Minister at Negotiations Department, Palestine Liberation Organization
Former Head of Palestinian Water Authority

Yossi Yaacoby
Director of WaTech Division, Mekorot Water Company

Amir Peleg
Founder & CEO, TaKaDu and Chairman, Smart Water Networks Forum

Complexity of Water Infrastructure in Israel and Palestine



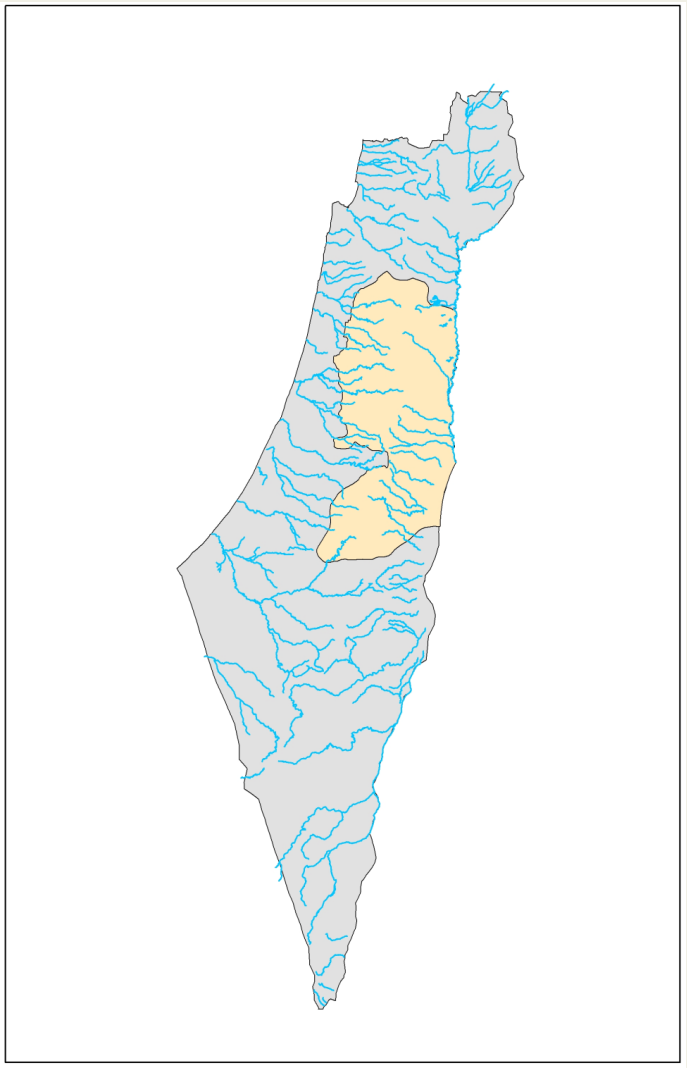


2015

Israel

93% treated

>85% reused



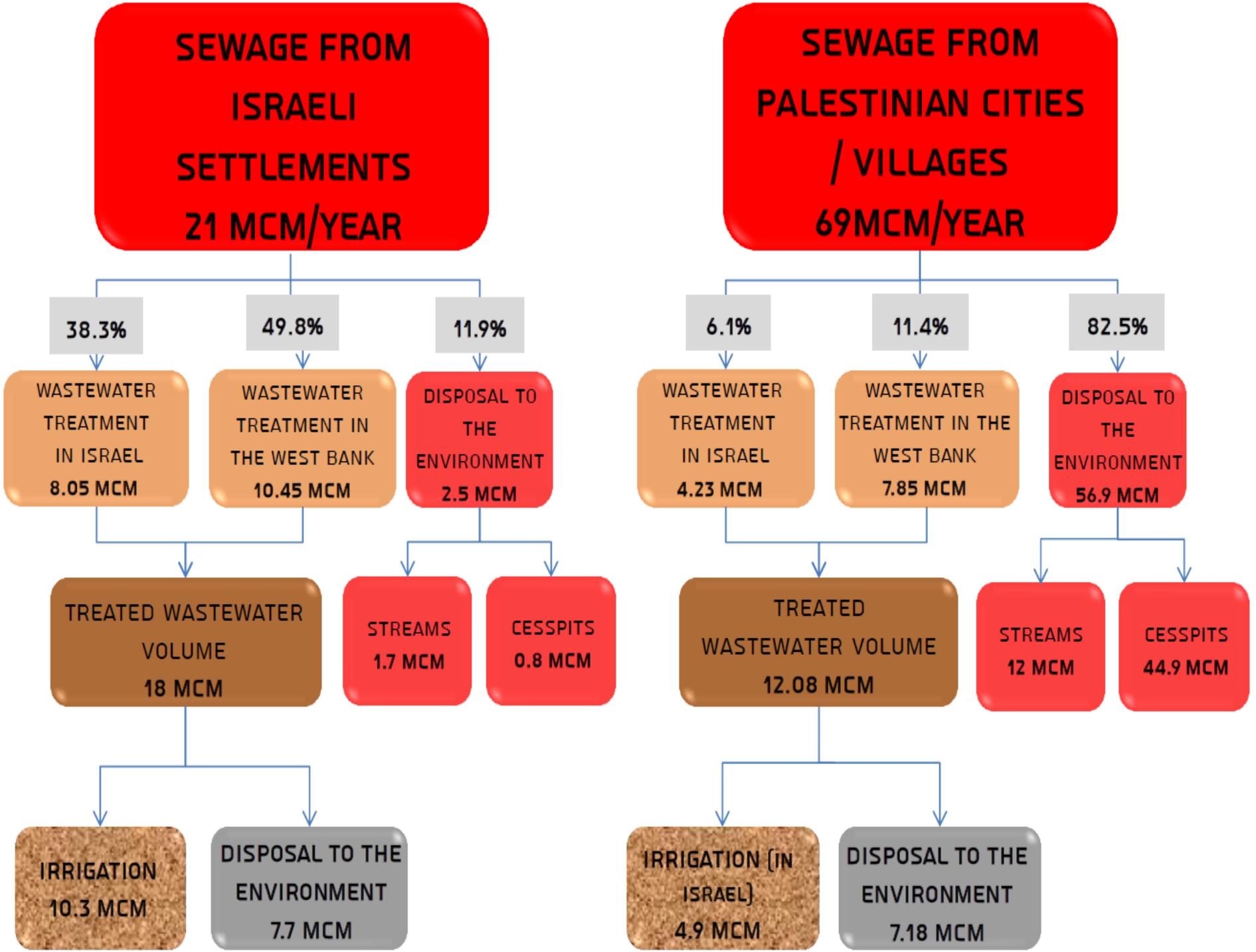
(Gordon-Kirsch, 2014)

West Bank

9% treated

0.1% reused

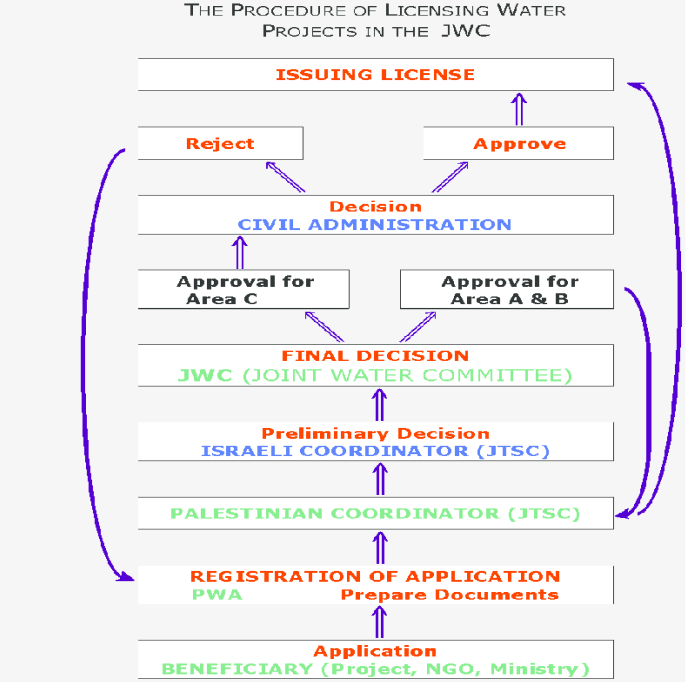
(Odeh, 2014)
(Shaheen, 2012)
(Water Authority, 2015)
(Garazi, 2015)


SEWAGE FROM ISRAELI SETTLEMENTS 21 MCM/YEAR
38.3%
49.8%
11.9%
WASTEWATER TREATMENT IN ISRAEL 8.05 MCM
WASTEWATER TREATMENT IN THE WEST BANK 10.45 MCM
DISPOSAL TO THE ENVIRONMENT 2.5 MCM
TREATED WASTEWATER VOLUME 18 MCM
STREAMS 1.7 MCM
CESSPITS 0.8 MCM
IRRIGATION 10.3 MCM
DISPOSAL TO THE ENVIRONMENT 7.7 MCM
SEWAGE FROM PALESTINIAN CITIES / VILLAGES 69MCM/YEAR
6.1%
11.4%
82.5%
WASTEWATER TREATMENT IN ISRAEL 4.23 MCM
WASTEWATER TREATMENT IN THE WEST BANK 7.85 MCM
DISPOSAL TO THE ENVIRONMENT 56.9 MCM
TREATED WASTEWATER VOLUME 12.08 MCM
STREAMS 12 MCM
CESSPITS 44.9 MCM
IRRIGATION (IN ISRAEL) 4.9 MCM
DISPOSAL TO THE ENVIRONMENT 7.18 MCM

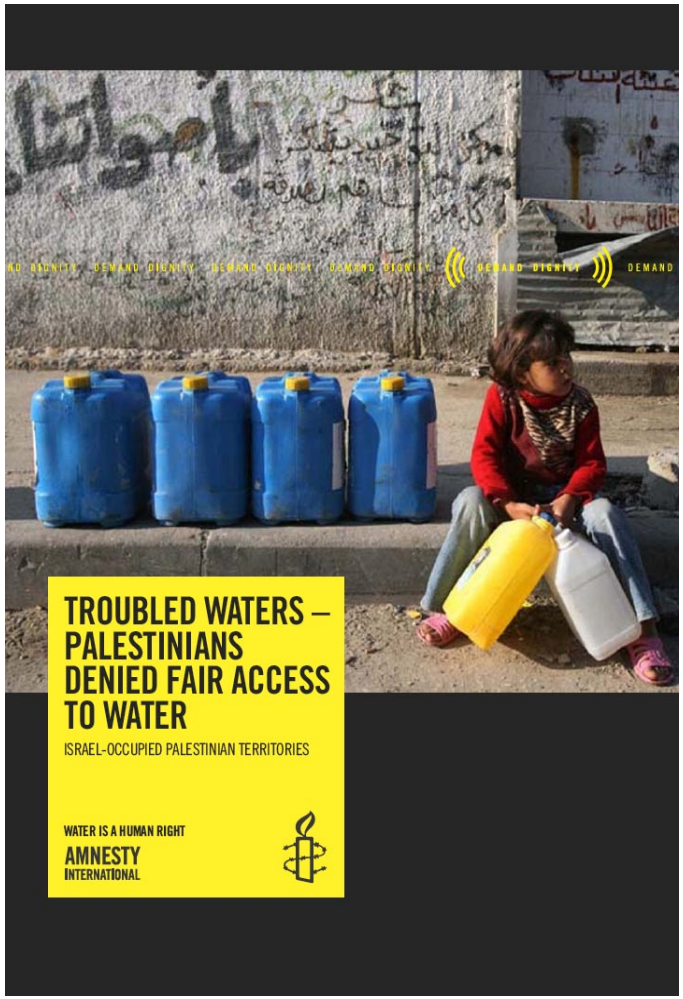
General Overview

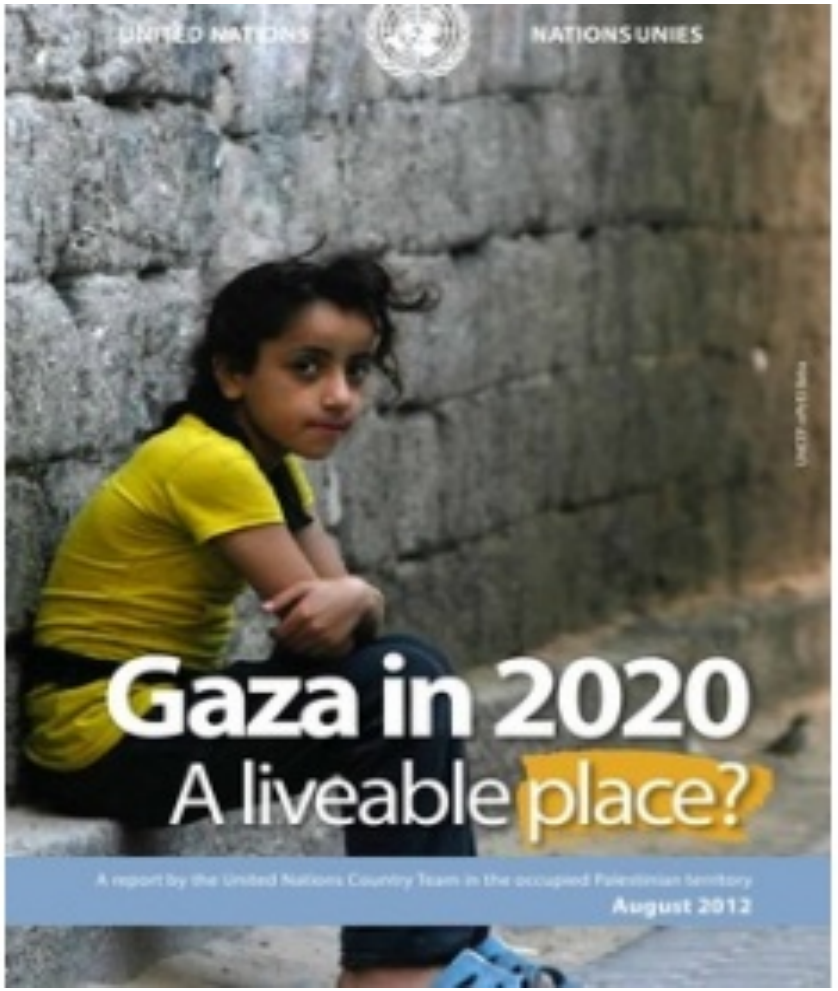
Shared Water Resources

- Water Right conflict
- 1995 Oslo Agreement "Interim" Allocations
- the Joint Water Committee



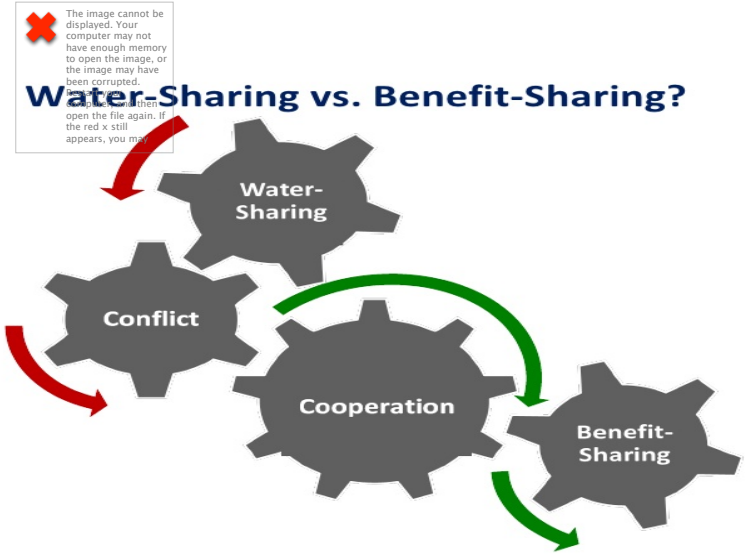
Current Situation





- Regional Cooperation
- US Envoy Statement and focus on Wastewater and reuse

Ways Forward



Water Playground in Israel

Ministry of Energy

Regulator

Israel Water Authority

Consumers

- Agriculture
- Households
- Industry

Jordan
Palestinian
Authority
Gaza Strip

Suppliers

Mekorot Group – Bulk utility

Regional & Municipal Water Utilities

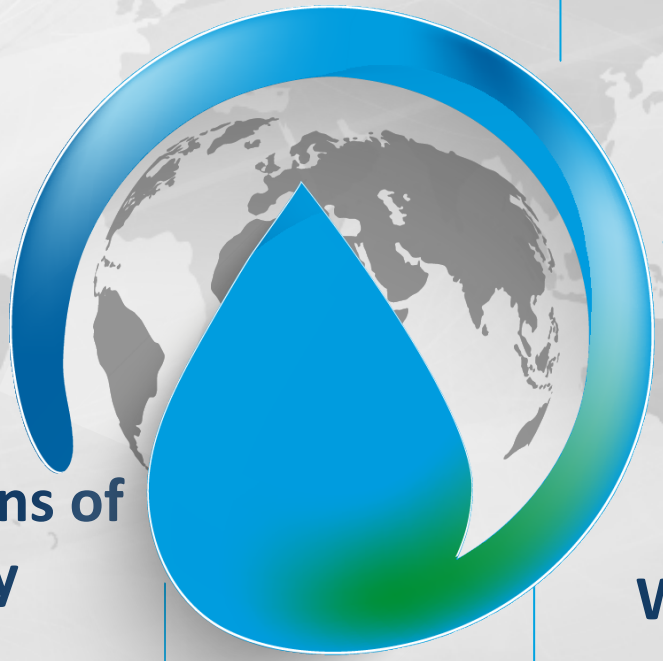
International Center for Knowledge & Expertise

Water production and supply

Water Treatment

Operation and maintenance

Wastewater Treatment & Reclamation



Producing millions of data per day

Water Quality

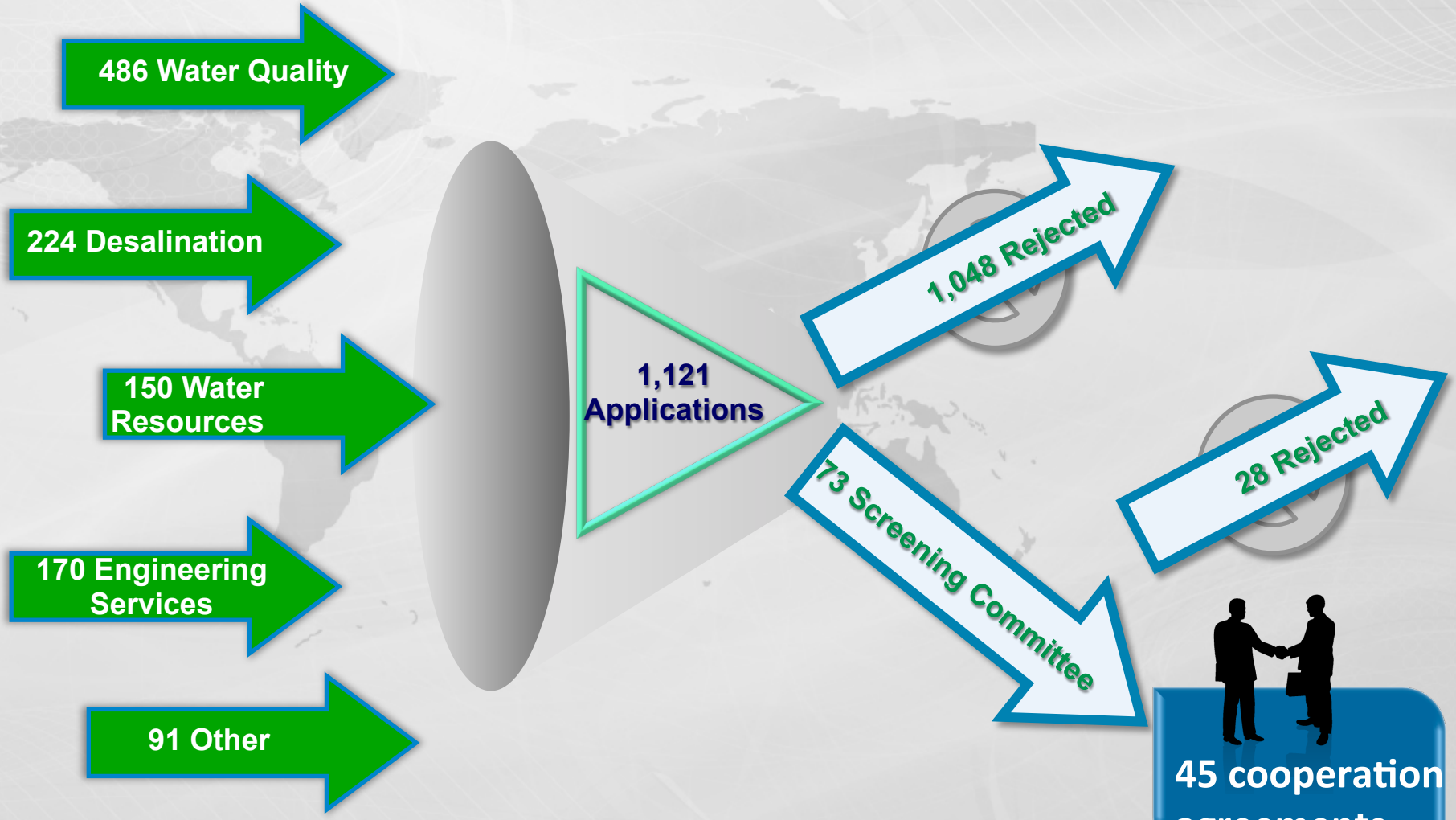
Coverage of more than 95% of the water Cycle

MEKOROT ISRAEL NATIONAL WATER CO. | WaTech Water Technologies Accelerator

WaTech®

The Entrepreneurship & Partnership Center for Water Technologies

The Number of Applications Handled
by the WaTech® Division 8/2017



WaTech® Portfolio Companies

Water Quality & Safety

Genaphora

IOSight

AYYEKA

Water Resources Management

Building a Bridge

StreamBooster

PHASE3 Technologies — Maximizing Your Assets

BQR Reliable Engineering Optimized Maintenance

Solaris Synergy

Water & Wastewater Treatment

Aqwise

Applied Cavitation Technologies

C.Q.M

BallTech Energy

WADIS

ROTEC Reverse Osmosis Technologies

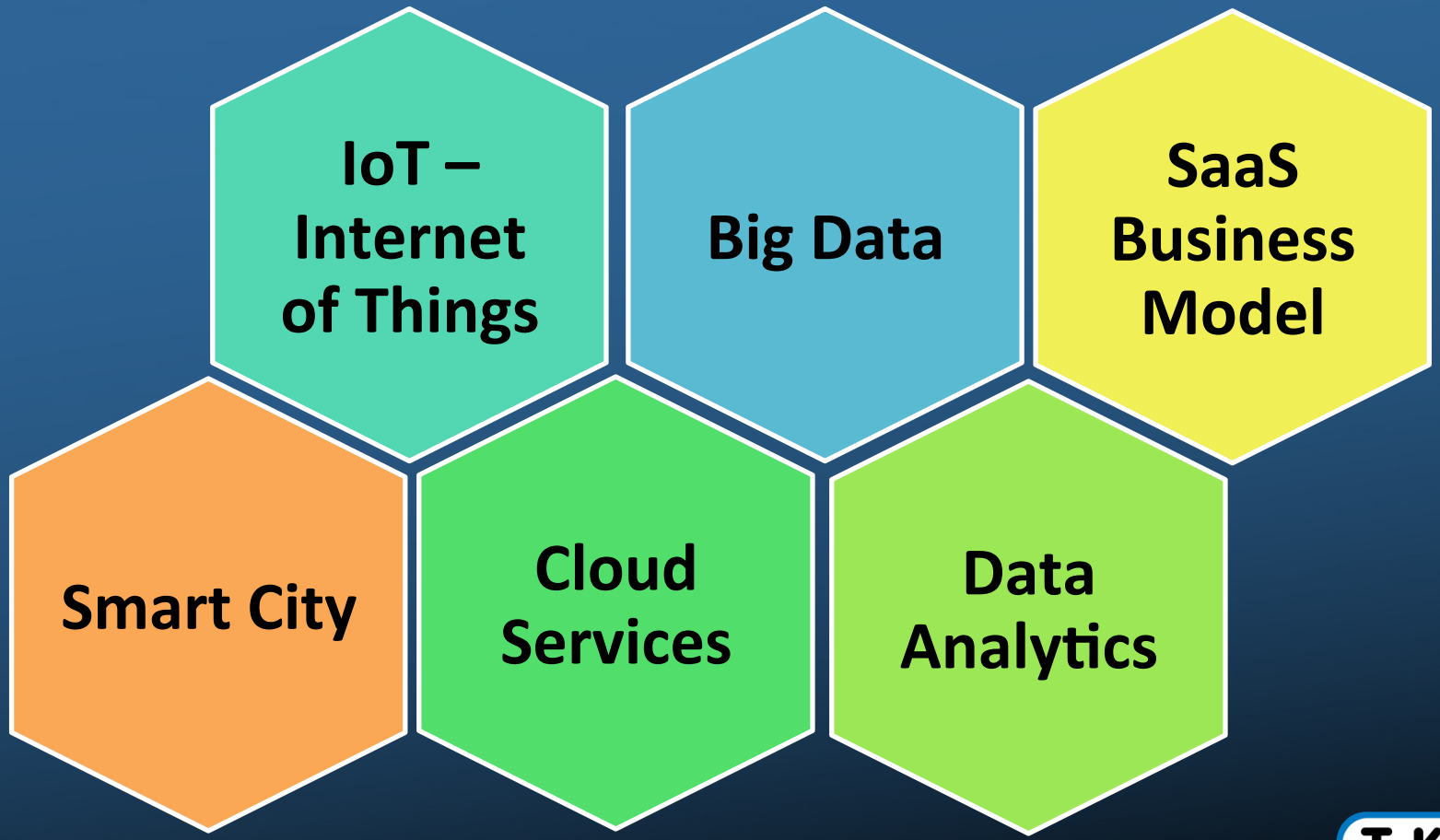
Desalitech

Traditional Water Solutions

Digital Solutions

MEKOROT Israel National Water Co. | WaTech Water Technologies Accelerator

Global (Water) Industry Trends and Buzzwords



TaKaDu


Data Explosion
Number & types of sensors deployed
Frequency of data collected
Big Data
IoT revolution


- Convert Data to Knowledge
- Event Management Paradigm
- Cloud Service
- SaaS Business Model

Things Do Change…

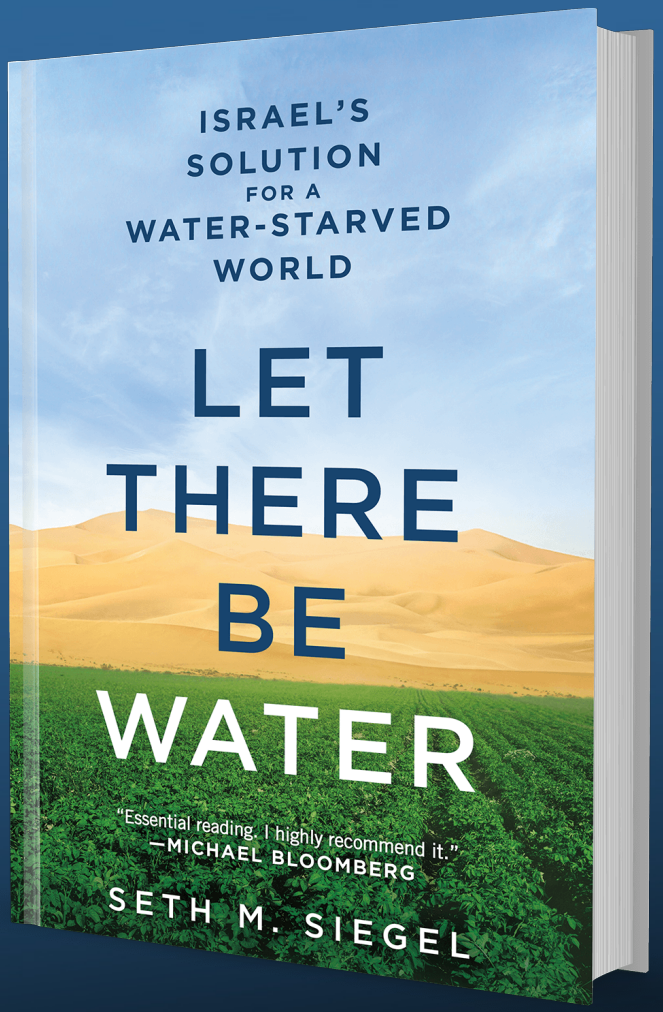
The New York Times

The Opinion Pages | OP-ED CONTRIBUTOR

Water Is Broken. Data Can Fix It.

By CHARLES FISHMAN MARCH 17, 2016

Sprinklers in an agricultural field in California. Max Whittaker for The New York Times



TaKaDu

Panel Two: Sustaining Western U.S. Water – How Information and Collaboration Are Improving Water Management

11:00am – 12:15pm

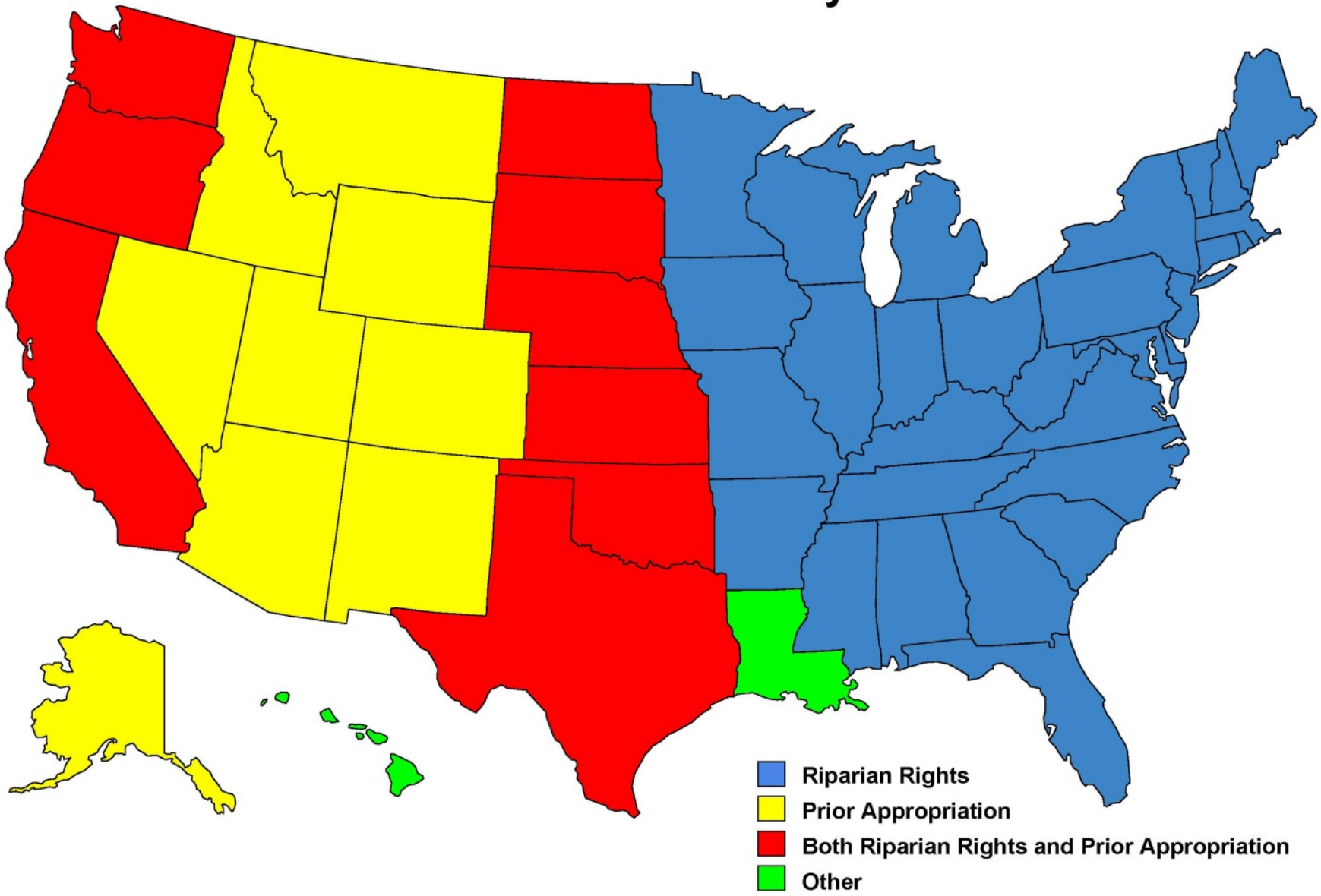
Adam Schempp (Moderator)
Director, Western Water Program, Environmental Law Institute

Shanti Rosset
Colorado River Program Manager, Metropolitan Water District of Southern California

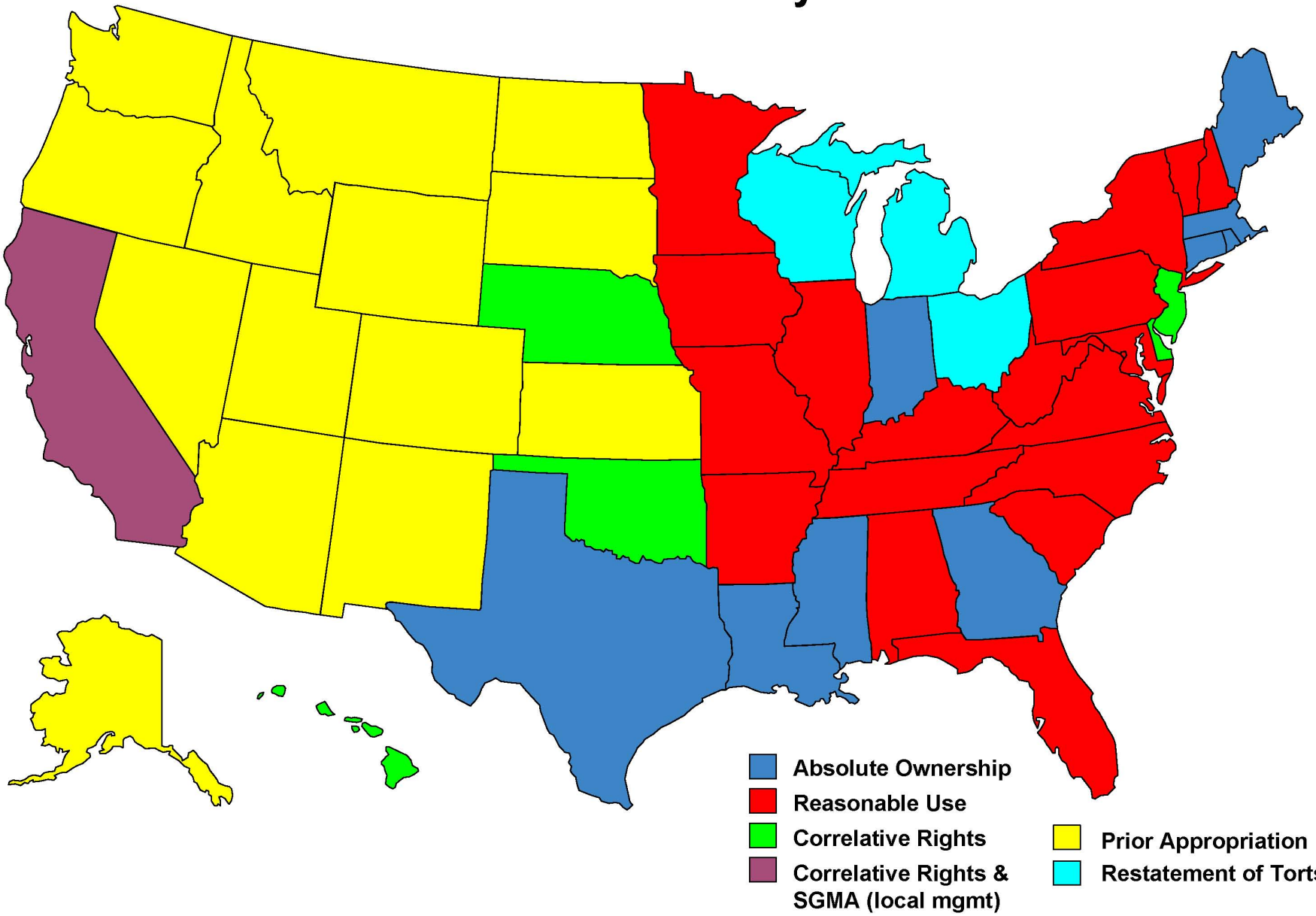
Dr. Katharine Dahm, P.E
Lead Research, Water Resources and Planning Division, Denver Office, U.S. Bureau of Reclamation

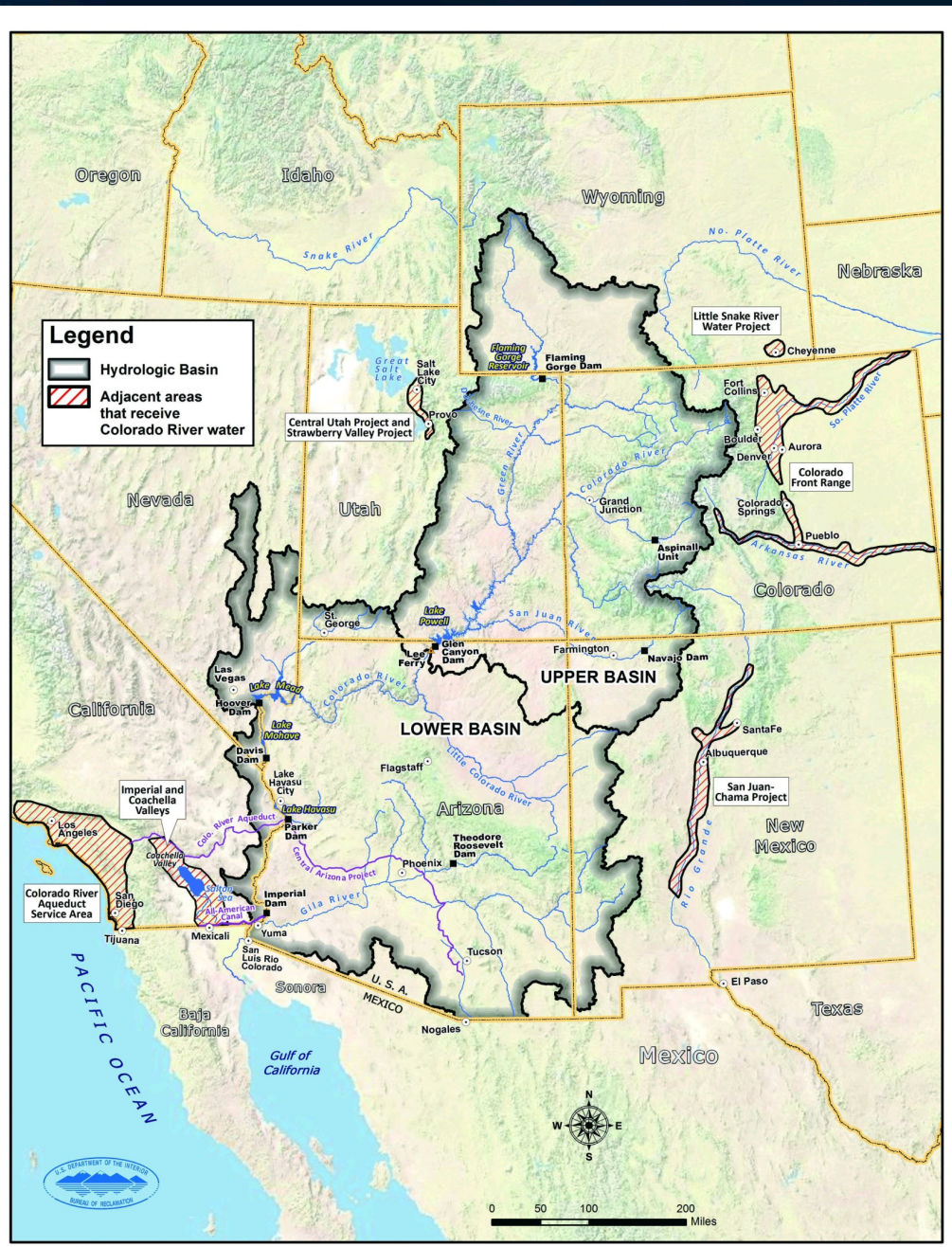
Lee Storey
Water Strategy Specialist and Partner, The Storey Lawyers

Surface Water Allocation Systems in the U.S.



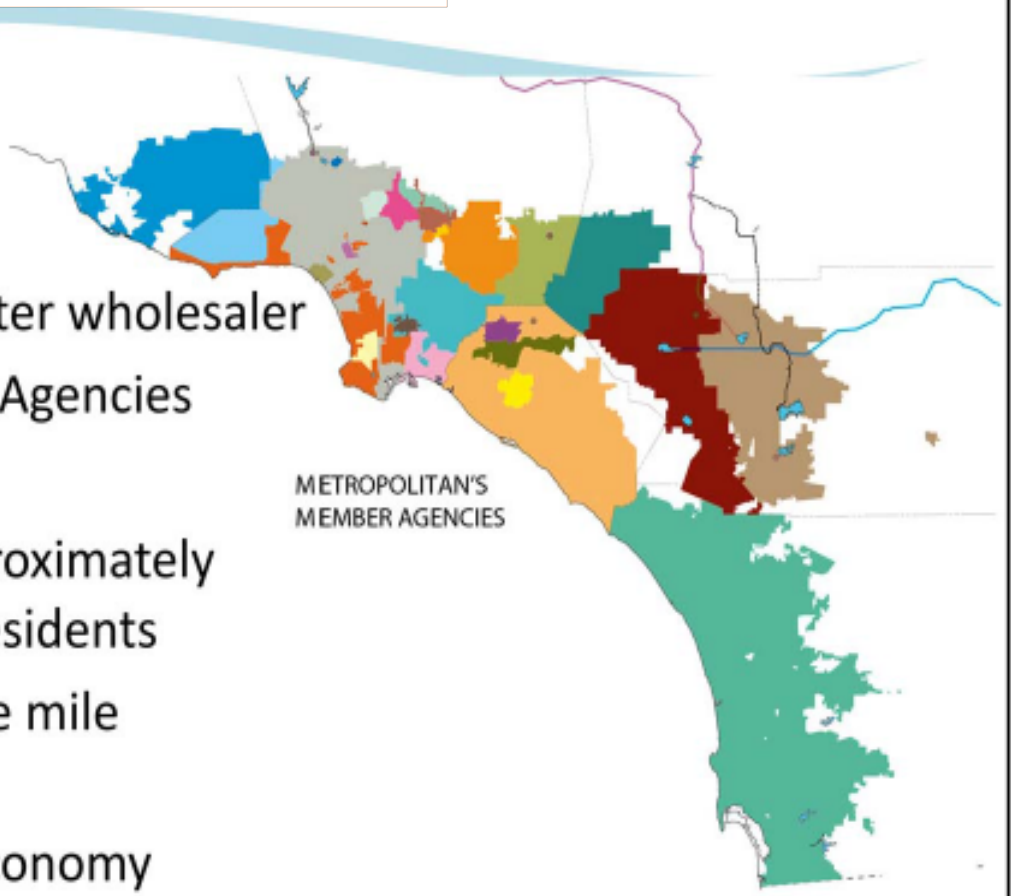
Groundwater Allocation Systems in the U.S.



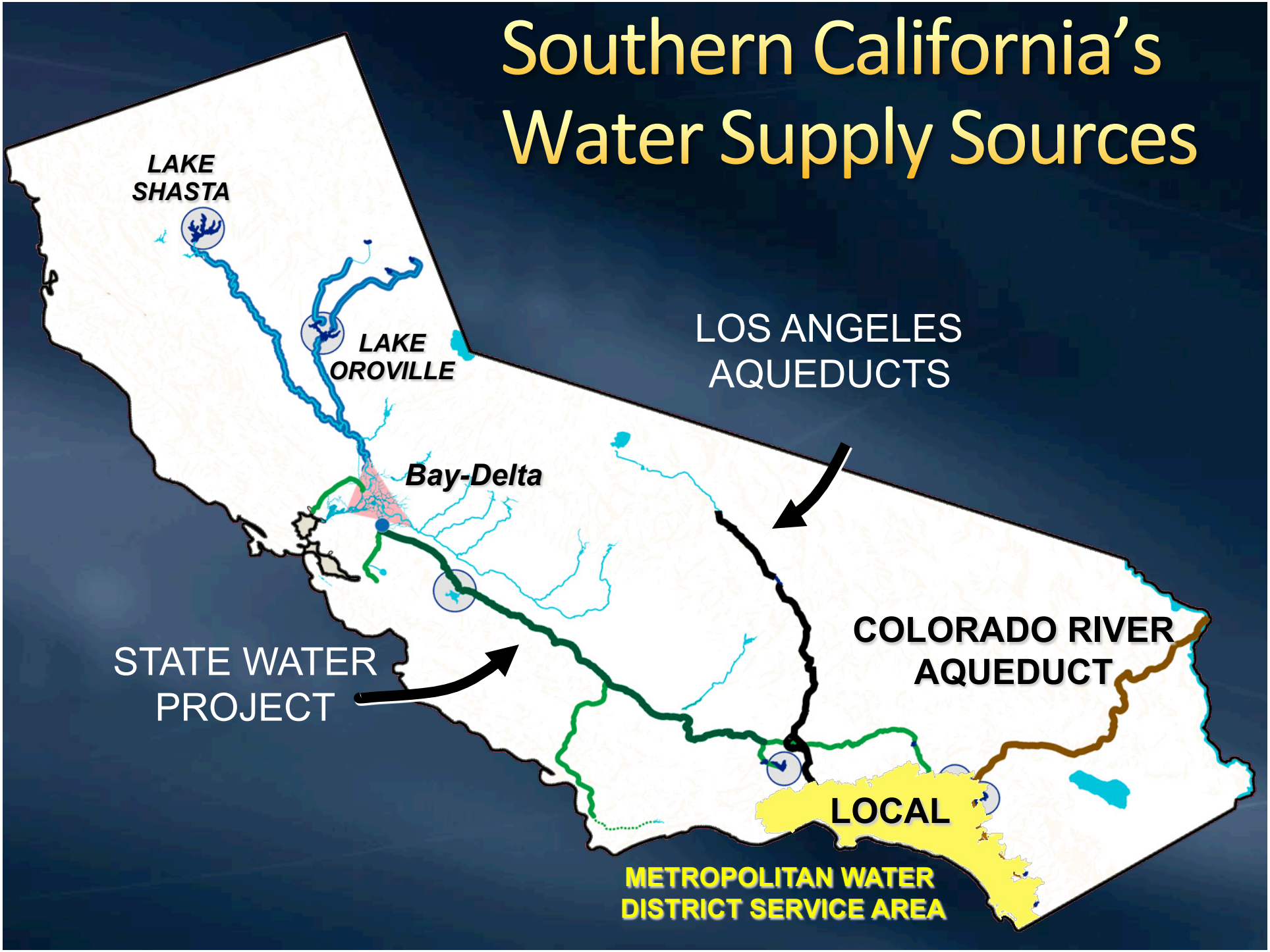

Legend
Hydrologic Basin
Adjacent areas that receive Colorado River water
Oregon
Idaho
Wyoming
Nebraska
Nevada
Utah
Colorado
California
Arizona
New Mexico
Texas
Mexico
Snake River
No. Platte River
Little Snake River Water Project
Cheyenne
Flaming Gorge Reservoir
Flaming Gorge Dam
Great Salt Lake
Salt Lake City
Provo
Central Utah Project and Strawberry Valley Project
Fort Collins
So. Platte River
Boulder
Aurora
Denver
Colorado Front Range
Colorado River
Green River
Grand Junction
Colorado Springs
Pueblo
Aspinall Unit
Arkansas River
St. George
Lake Powell
San Juan River
Glen Canyon Dam
Lee Ferry
Farmington
Navajo Dam
UPPER BASIN
LOWER BASIN
Las Vegas
Lake Mead
Hoover Dam
Lake Mohave
Davis Dam
Lake Havasu City
Lake Havasu
Parker Dam
Flagstaff
Little Colorado River
Imperial and Coachella Valleys
Colo. River Aqueduct
Los Angeles
Coachella Valley
Central Arizona Project
Theodore Roosevelt Dam
Phoenix
SantaFe
Albuquerque
San Juan-Chama Project
Rio Grande
Colorado River Aqueduct Service Area
San Diego
Salton Sea
All-American Canal
Imperial Dam
Gila River
Tijuana
Mexicali
Yuma
San Luis Rio Colorado
Tucson
El Paso
U. S. A.
MEXICO
Sonora
Nogales
Baja California
Gulf of California
PACIFIC OCEAN
N
W
E
S
0 50 100 200
Miles
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

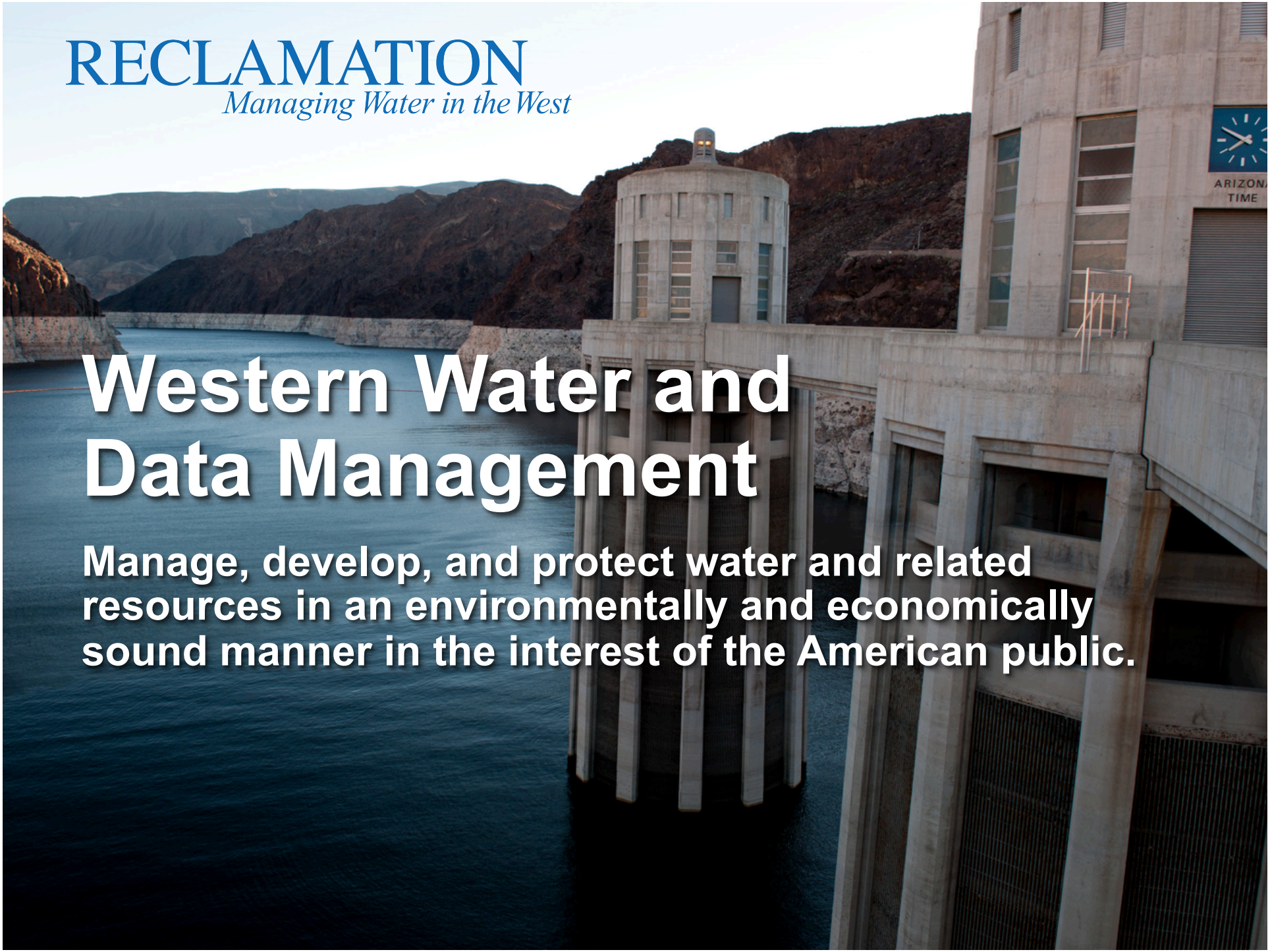
Metropolitan Water District

- Regional water wholesaler
- 26 Member Agencies
- 6 counties
- Serving approximately 19 million residents
- 5,200 square mile service area
- $1 trillion economy



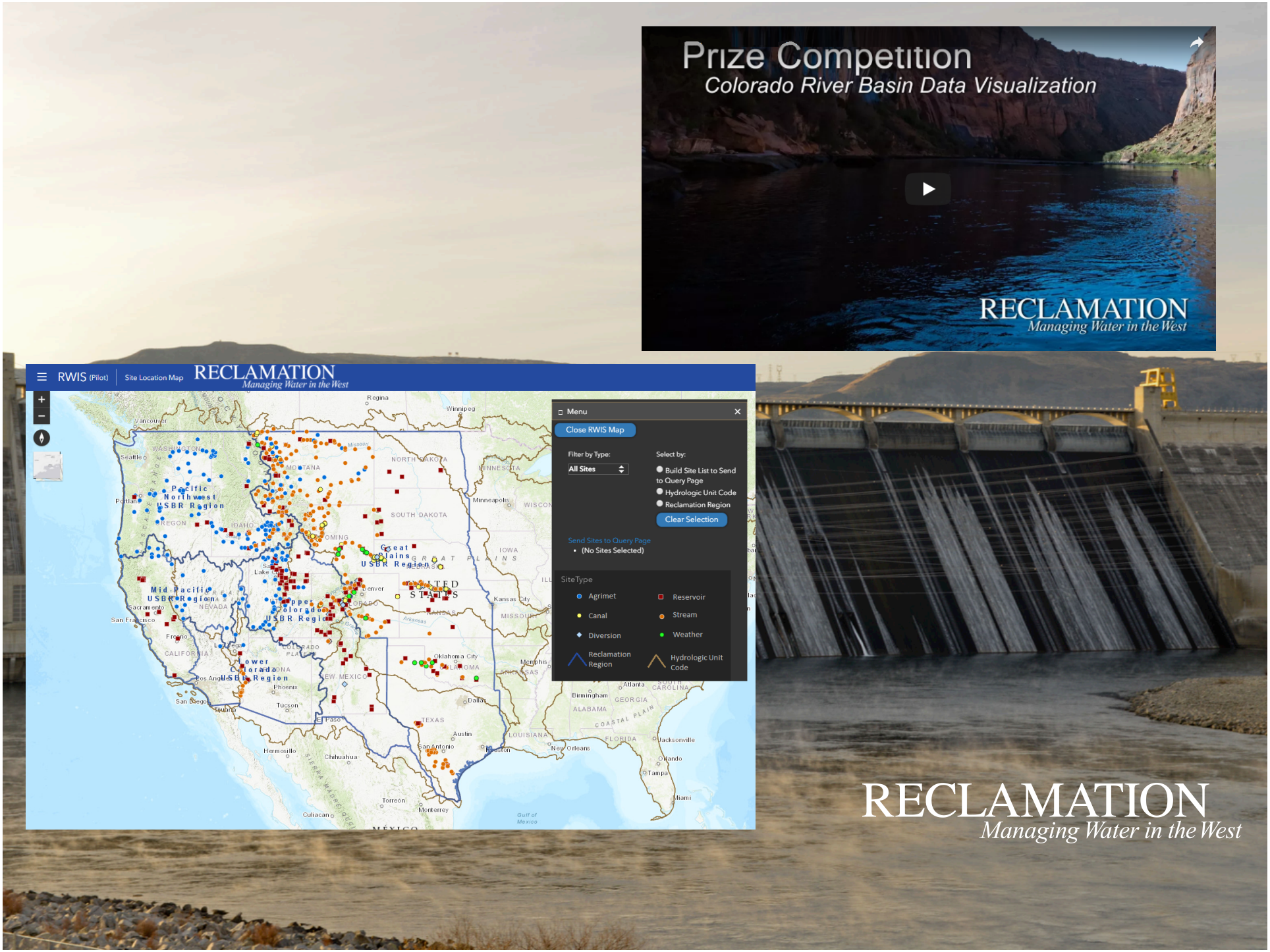
Southern California's Water Supply Sources




RECLAMATION
Managing Water in the West
ARIZONA
TIME
Western Water and
Data Management
Manage, develop, and protect water and related
resources in an environmentally and economically
sound manner in the interest of the American public.

Basin Scale Collaborative Planning

WaterSMART Basin Studies
Source: arcg.is/1TcT68S


Prize Competition
Colorado River Basin Data Visualization
RECLAMATION
Managing Water in the West
RWIS (Pilot)
Site Location Map
RECLAMATION
Managing Water in the West
Menu
Close RWIS Map
Filter by Type:
All Sites
Select by:
Build Site List to Send to Query Page
Hydrologic Unit Code
Reclamation Region
Clear Selection
Send Sites to Query Page
(No Sites Selected)
SiteType
Agrimet
Reservoir
Canal
Stream
Diversion
Weather
Reclamation Region
Hydrologic Unit Code
Pacific Northwest USBR Region
Great Plains USBR Region
Mid-Pacific USBR Region
Upper Colorado USBR Region
Lower Colorado USBR Region
RECLAMATION
Managing Water in the West

SUSTAINING WESTERN U.S. WATER:
Managing Wealth, Power & Life

STAKES ARE HIGH: Contracting a Shared Supply

NEWER INTERESTS

- Must be at the table
- Use data and experts
- Develop partnerships
- Get access to water
- Maintain, manage and reuse
- Adapt and be flexible

STRATEGIC RESPONSES & RISK MANAGEMENT

- **Interstate:** Nevada "banks" water in Arizona
- **International:** U.S./Mexico Minute 323
- **Public Private Partnerships:** City of Phoenix, Gila River Indian Community, and Walton Family Foundation

FEDERAL WATER RIGHTS MUST BE QUANTIFIED

- Many successful settlements but a long way to go
- Communication, trust and good data are essential
- Infrastructure funding often necessary
- Walk a mile in another's shoes; eat together and listen

Panel Three: Using Data and GeoHumanities to Improve System and Community Resiliency in the Mississippi River Basin

1:30 – 2:45pm

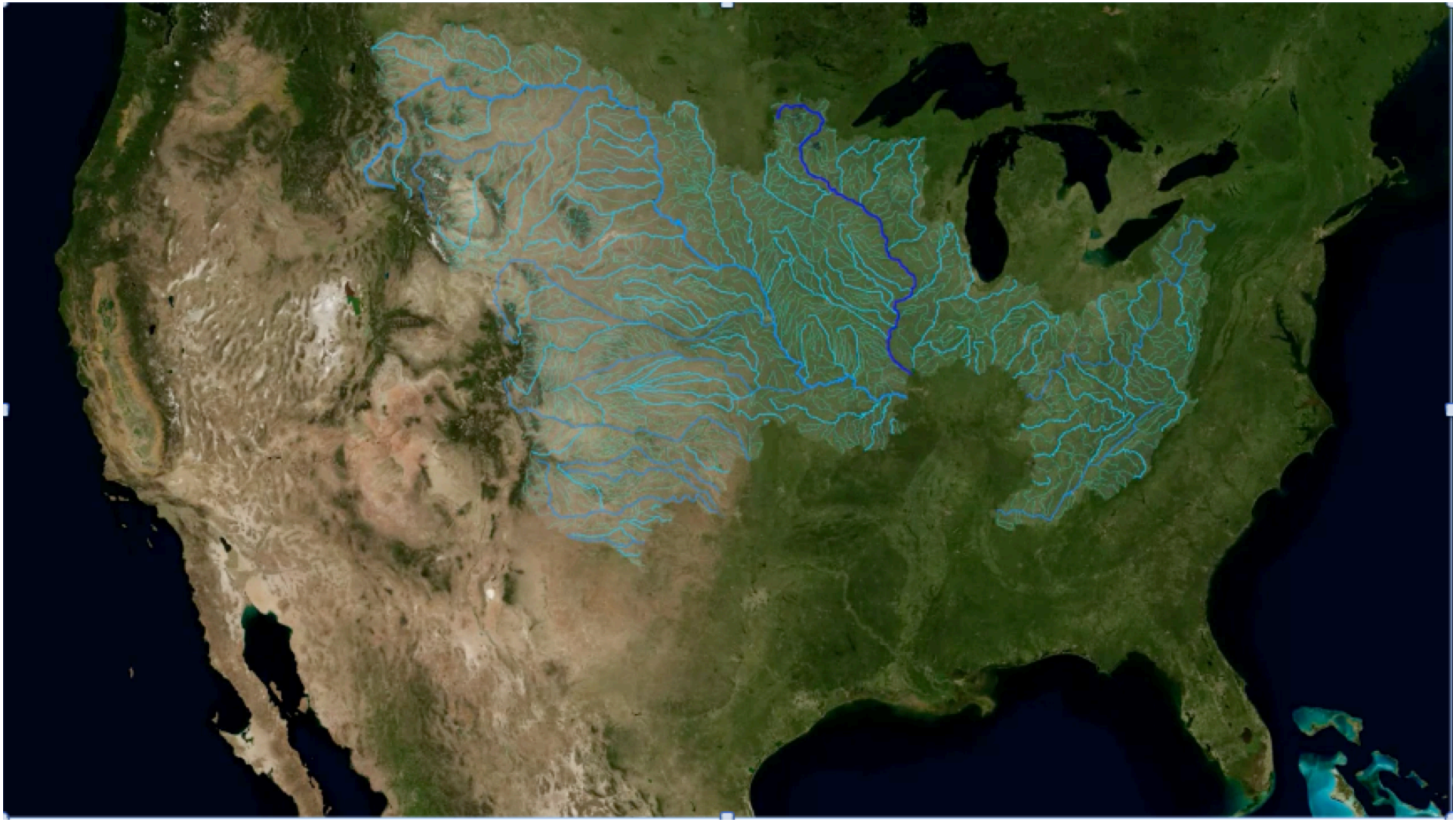
Ann Mills (Moderator)
Senior Fellow, Food Institute, The George Washington University
Former Deputy Under Secretary for Natural Resources and Environment, U.S. Department of Agriculture

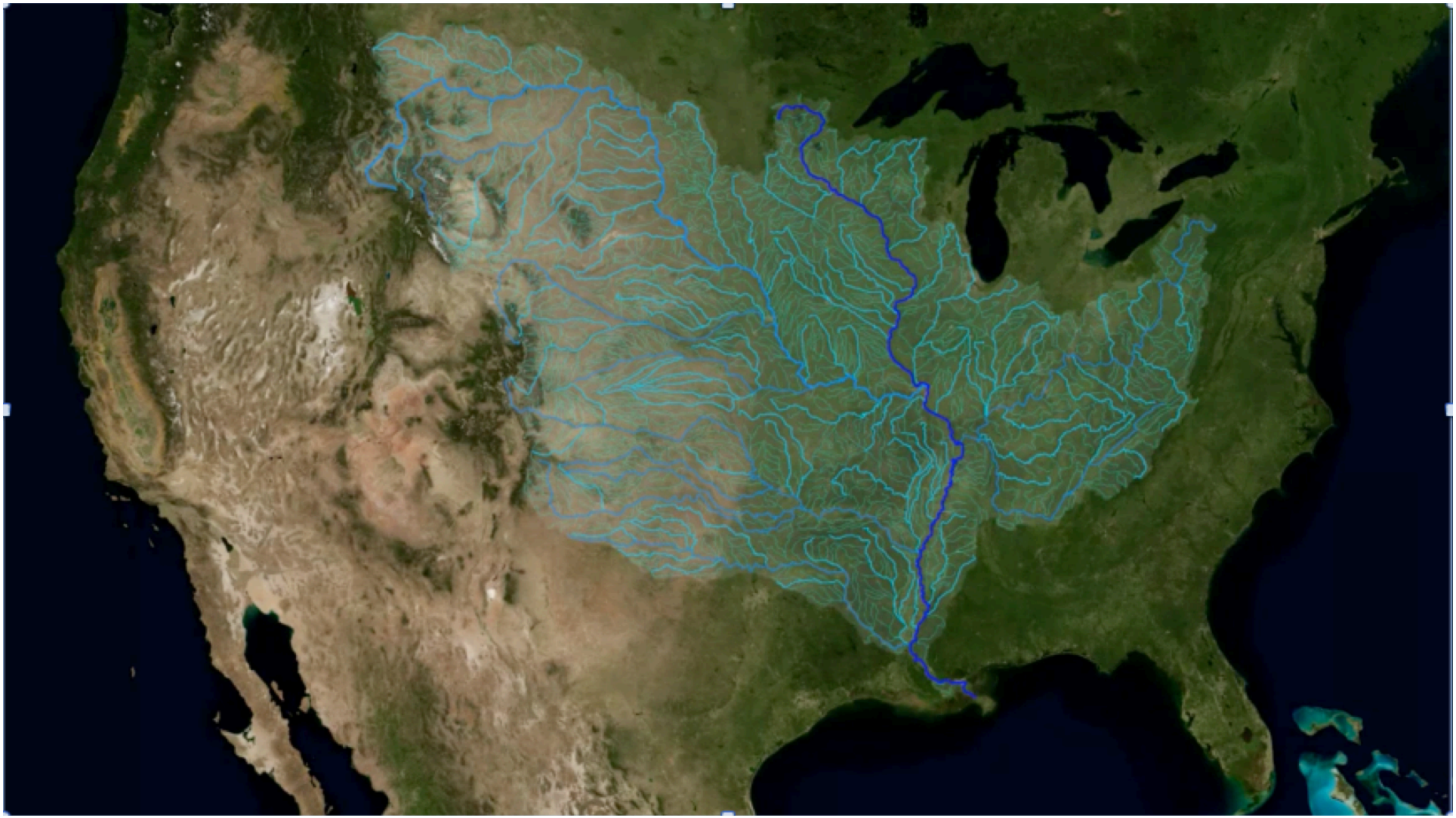
Steve Sonka
Professor Emeritus, Department of Agriculture and Consumer Economics, University of Illinois

John Ploschnitznig
Director, Modeling and Application Development, Riverside Research

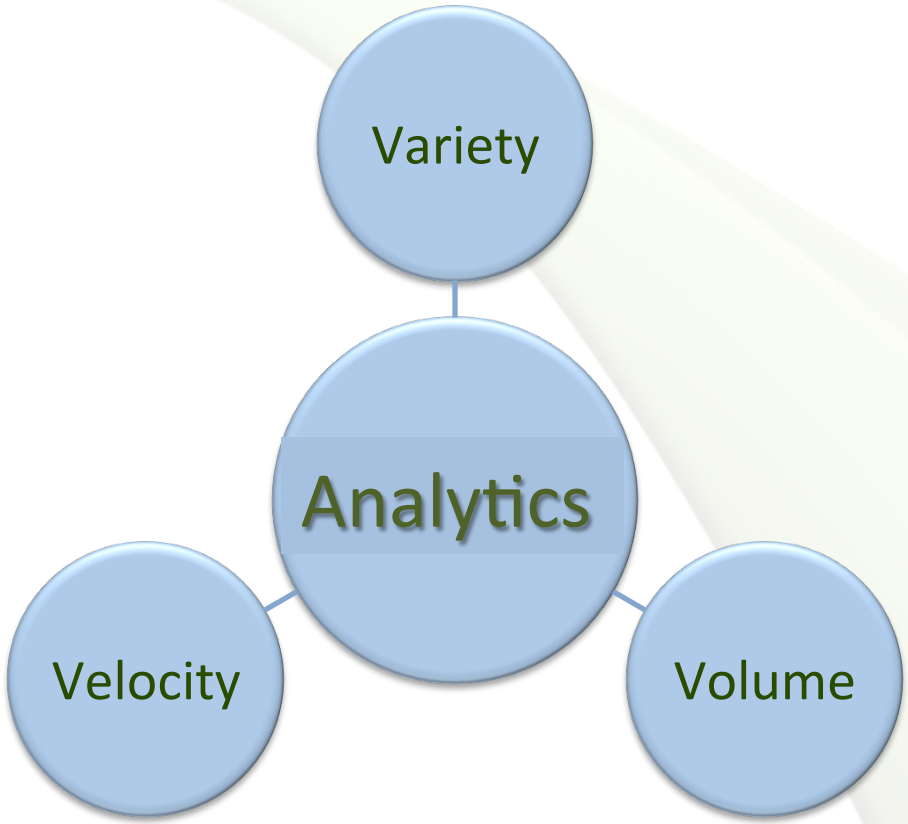
Alexandra Campbell-Ferrari
Executive Director, Center for Water Security and Cooperation

Dr. Michael Pasquier
Associate Professor of Religious Studies and History, Louisiana State University



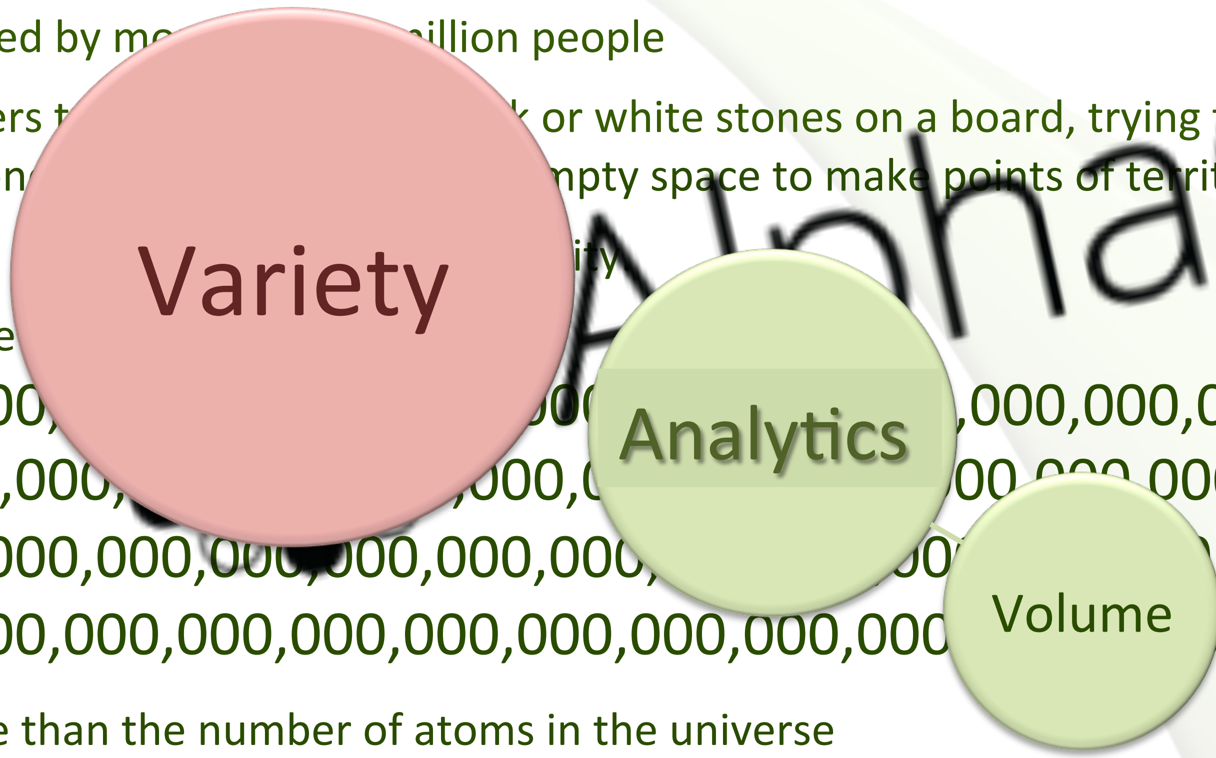


Dimensions of Big Data:
3 Vs and an A

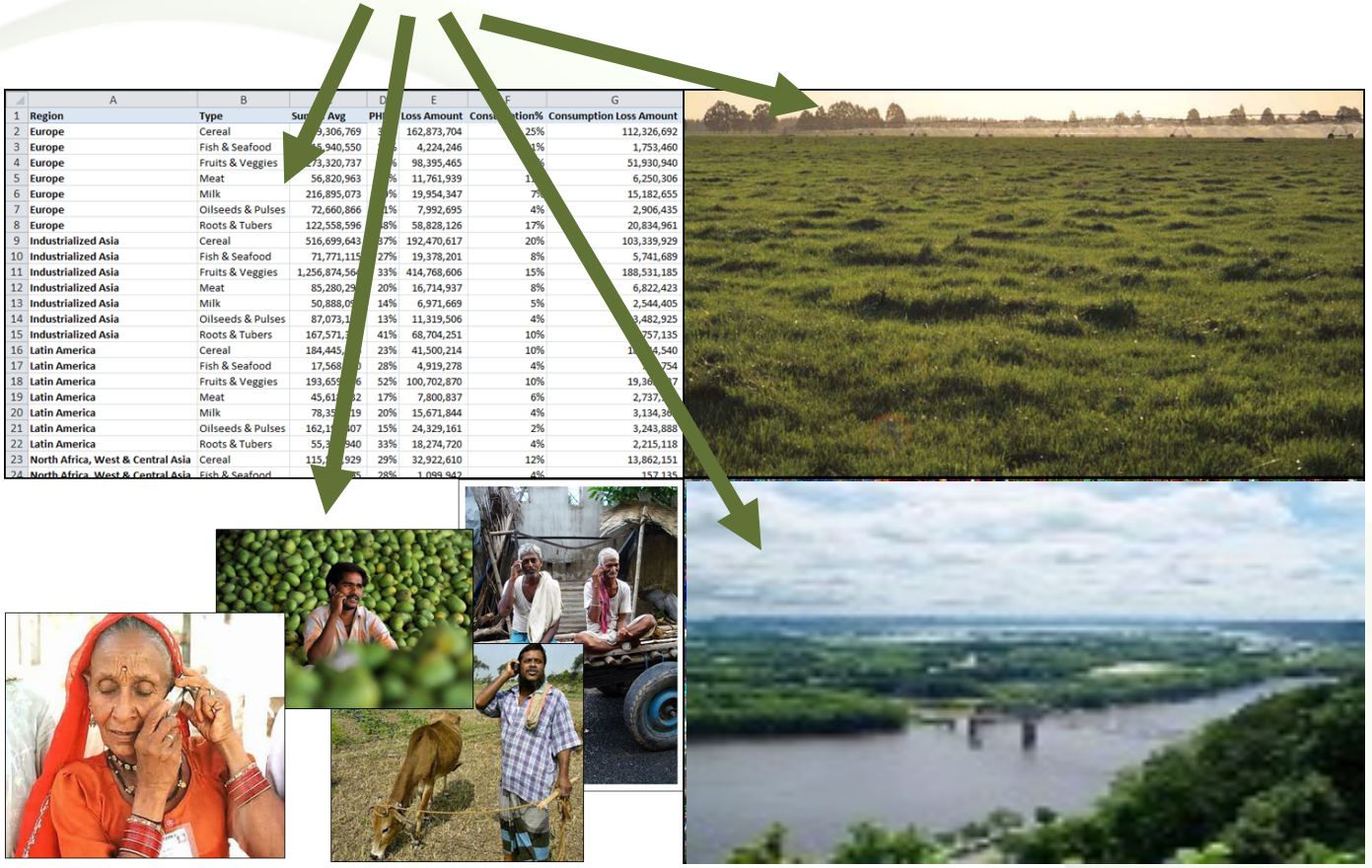


The Game of Go

- Originated in China more than 2,500 years ago.
- Played by mo… …illion people
- Players t… …k or white stones on a board, trying to capture the oppon… …mpty space to make points of territory.
- Go is … …ity
- There …
  1,000,… …00… …,000,000,000,000,000,000, 000,000,… …,000,… …00,000,000,000,000,000,0 00,000,000,000,000,000,000,… …00… …,000,000,000,00 0,000,000,000,000,000,000,000,000,000… …ossible positions
- More than the number of atoms in the universe



Data Sources – Today !

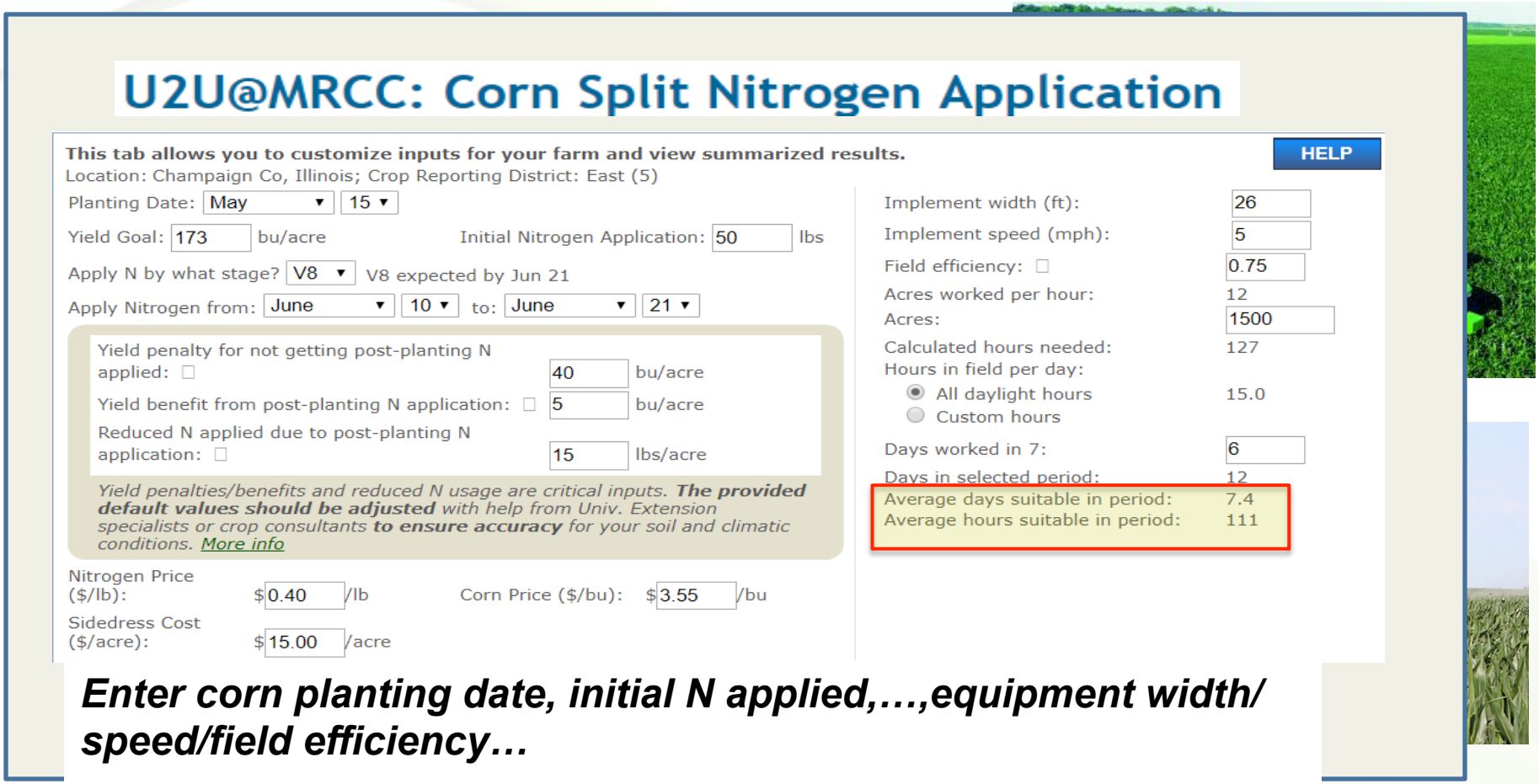


	A	B	C	D	E	F	G
1	Region	Type	Sum of Avg	PHL	Loss Amount	Consumption%	Consumption Loss Amount
2	Europe	Cereal	9,306,769	3	162,873,704	25%	112,326,692
3	Europe	Fish & Seafood	6,940,550		4,224,246	1%	1,753,460
4	Europe	Fruits & Veggies	73,320,737		98,395,465		51,930,940
5	Europe	Meat	56,820,963	7%	11,761,939	1	6,250,306
6	Europe	Milk	216,895,073	9%	19,954,347	7	15,182,655
7	Europe	Oilseeds & Pulses	72,660,866	1%	7,992,695	4%	2,906,435
8	Europe	Roots & Tubers	122,558,596	48%	58,828,126	17%	20,834,961
9	Industrialized Asia	Cereal	516,699,643	37%	192,470,617	20%	103,339,929
10	Industrialized Asia	Fish & Seafood	71,771,115	27%	19,378,201	8%	5,741,689
11	Industrialized Asia	Fruits & Veggies	1,256,874,56	33%	414,768,606	15%	188,531,185
12	Industrialized Asia	Meat	85,280,29	20%	16,714,937	8%	6,822,423
13	Industrialized Asia	Milk	50,888,0	14%	6,971,669	5%	2,544,405
14	Industrialized Asia	Oilseeds & Pulses	87,073,1	13%	11,319,506	4%	3,482,925
15	Industrialized Asia	Roots & Tubers	167,571,3	41%	68,704,251	10%	757,135
16	Latin America	Cereal	184,445,	23%	41,500,214	10%	4,540
17	Latin America	Fish & Seafood	17,568	28%	4,919,278	4%	754
18	Latin America	Fruits & Veggies	193,659	52%	100,702,870	10%	19,36
19	Latin America	Meat	45,61	17%	7,800,837	6%	2,737
20	Latin America	Milk	78,3	20%	15,671,844	4%	3,134,3
21	Latin America	Oilseeds & Pulses	162,1	15%	24,329,161	2%	3,243,888
22	Latin America	Roots & Tubers	55,3	33%	18,274,720	4%	2,215,118
23	North Africa, West & Central Asia	Cereal	115,	29%	32,922,610	12%	13,862,151
24	North Africa, West & Central Asia	Fish & Seafood		28%	1,099,942	4%	157,135

Great Lakes To Gulf

Capturing data
From 4,605 monitoring sites comprising
23,557,430 sampling events

Nitrogen fertilizer application



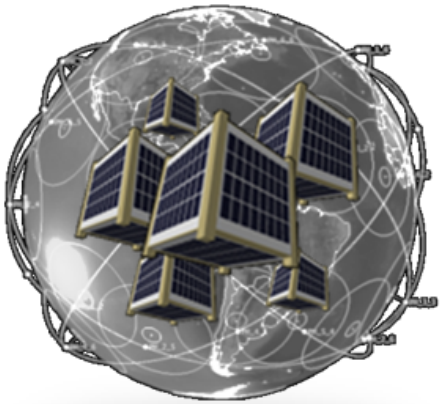
Enter corn planting date, initial N applied,…,equipment width/ speed/field efficiency…

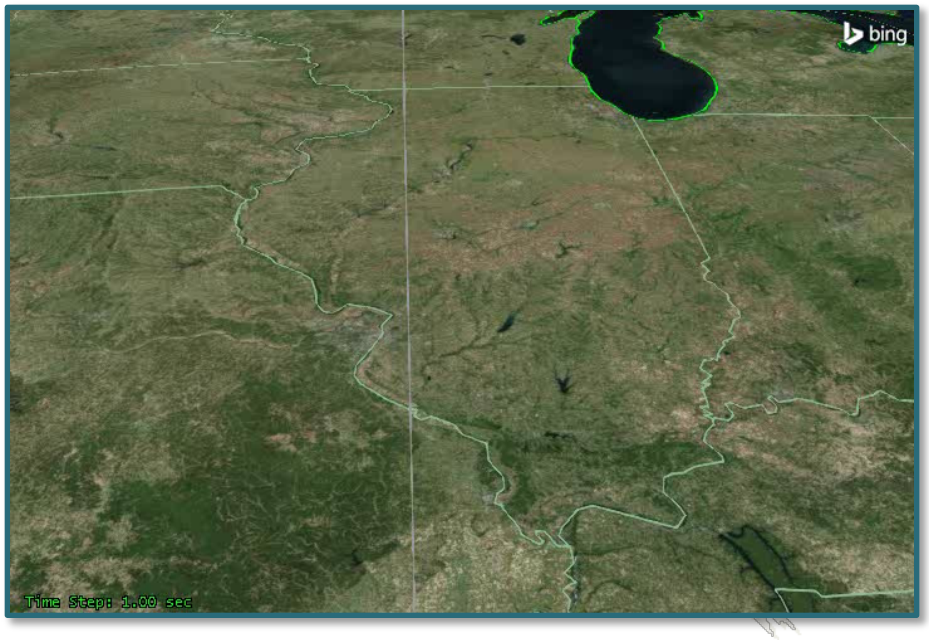
The Goal

The National Great Rivers Research & Education Center

RIVERSIDE RESEARCH

Create a capability which leverages space based collection systems, hyperspectral sensor technology, and a Bayesian Belief Network Model to characterize a select set of collected data and associated big data to assess and monitor water quality.



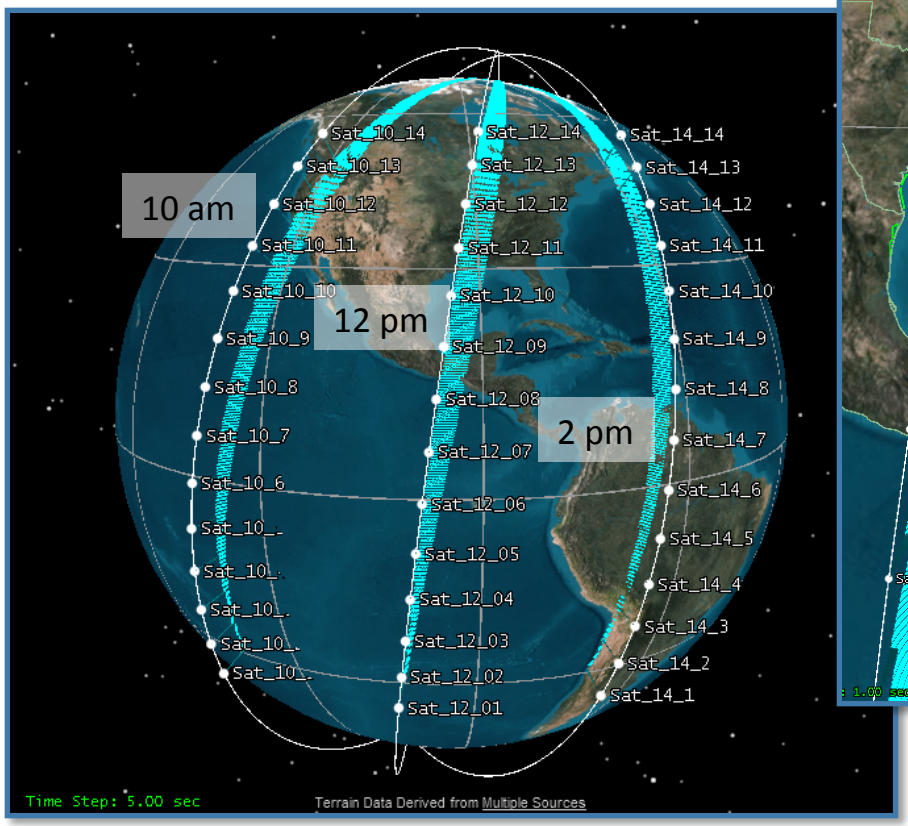


Remote Data Collection

The National Great Rivers Research & Education Center

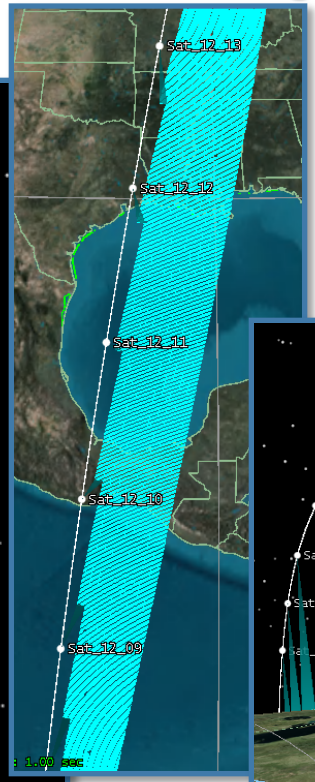
RIVERSIDE RESEARCH

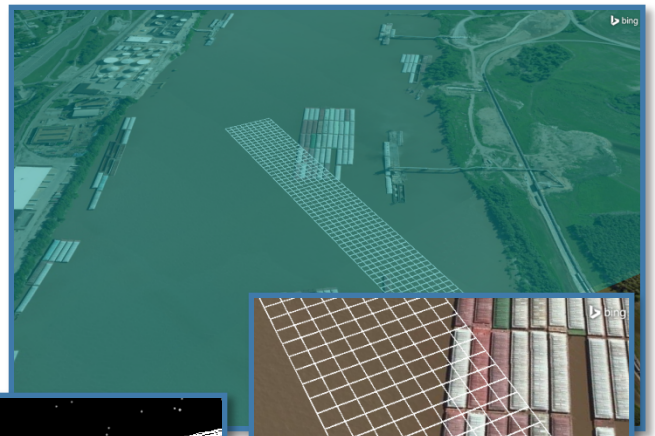
Sun-Synchronous Orbit

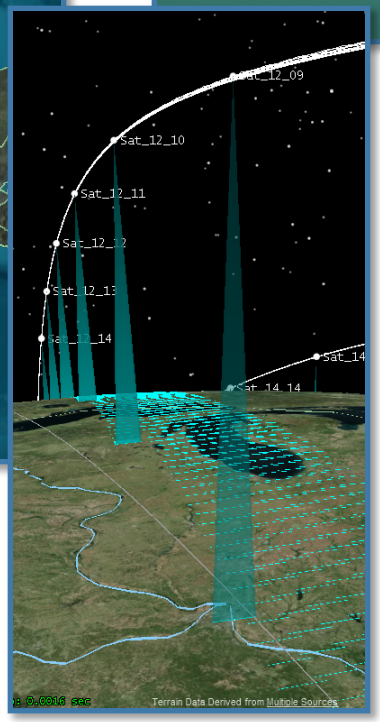


3 Orbits with 60 satellites each

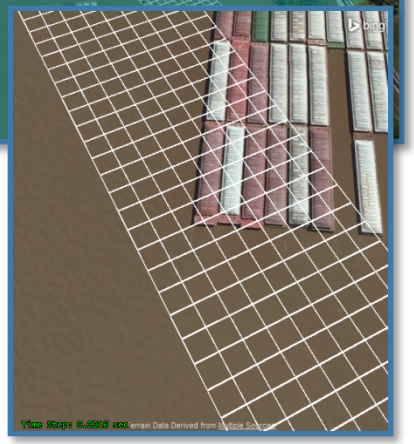
Global Coverage







Stacked Footprints



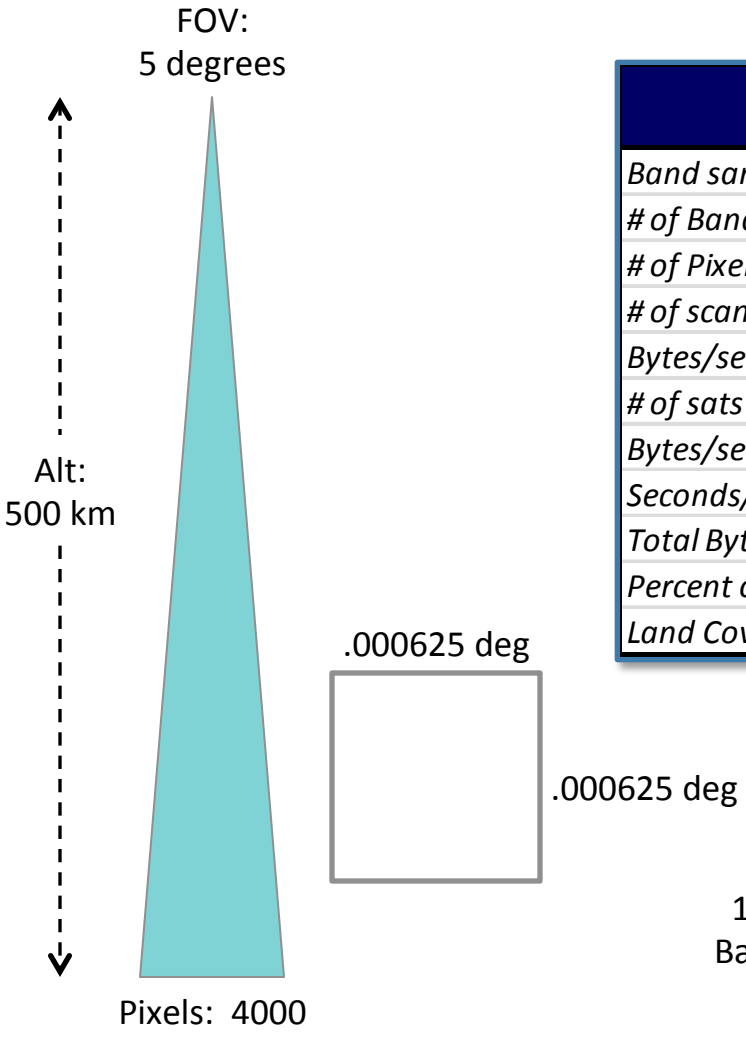
Pixel Grid

MODELING & APPLICATION DEVELOPMENT LAB

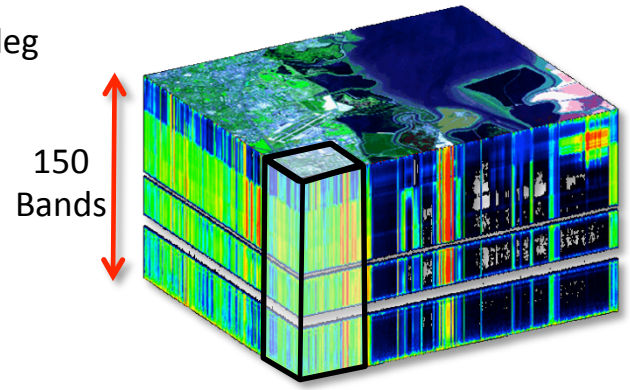
Data, Data, Data, Data, Data, Data, Data, Data, Data, Data

The National Great Rivers Research & Education Center

RIVERSIDE RESEARCH



DATA COLLECTED			
Band sample size	2.00	*Bytes*	
# of Bands	150.00		*Example from Resonon*
# of Pixels	4000.00		*Probable design*
# of scans / sec	625.00		*STK Calc*
Bytes/sec/sat	750.00	*Mbytes*	
# of sats	180.00		*3 orbits, 60 sats*
Bytes/sec	135.00	*Gbytes*	
Seconds/day	86400.00	*sec*	
Total Bytes/day	11.66	*PBytes*	
Percent of Land	0.29		*Land percentage of earth*
Land Cov Collects	3.38	*PBytes*	



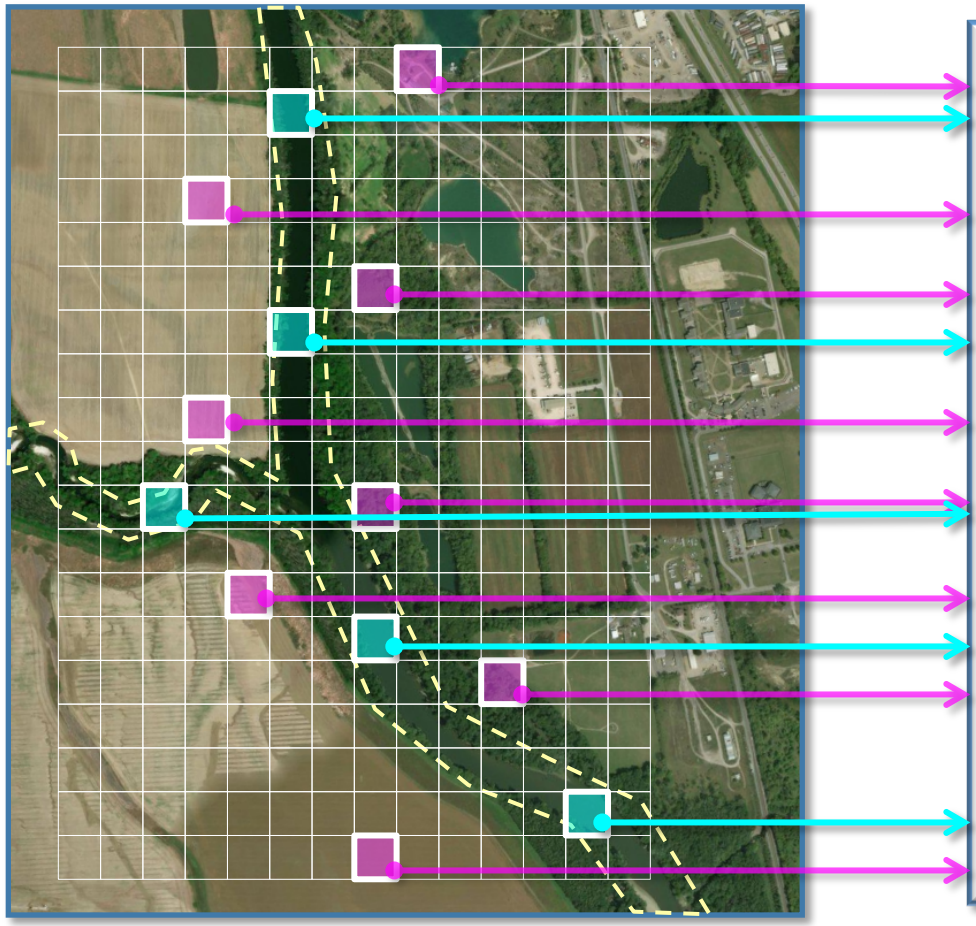
3.38 PetaBytes Per Day!

MODELING & APPLICATION DEVELOPMENT LAB

Bayesian Belief Network

The National Great Rivers Research & Education Center

RIVERSIDE RESEARCH



MODELING & APPLICATION DEVELOPMENT LAB

Plenary Session: Rallying Proof of Concept Initiatives and Key Next Steps

2:45 – 4:00pm

Bill Kruidenier (Facilitator)
Associate Director, National Great Rivers Research and Education Center

Facilitated plenary session on next steps to identify and rally support around benchmark initiatives that could demonstrate interjurisdictional cooperation, local capacity building, and impact in fostering greater adaptive water resource stewardship and community resiliency.