Water Project Marvels

October 23, 2020

Hosted by

emwd EASTERN MUNICIPAL WATER DISTRICT

WESTERN MUNICIPAL WATER DISTRICT

WRCOG Western Riverside Council of Governments

RIVERSIDE COUNTY WATER TASK FORCE

Paul Jones II, P.E.

Task Force Chair

General Manager

Eastern Municipal Water District

RIVERSIDE COUNTY WATER TASK FORCE

RIVERSIDE COUNTY WATER TASK FORCE

Agenda

i. Welcome and Introductions

ii. WRCOG Update: Chris Gray, Director of Transportation & Planning

iii. Panel Discussion: Water Project Marvels

   a. Jeff Kightlinger, Metropolitan Water District of Southern California

   b. Dr. Sharon Megdal, University of Arizona

   c. Cristina Ahmadpour, Isle Inc.

iv. Facilitated Question and Answer

v. Closing Remarks

Chris Gray

Director of Transportation & Planning

Western Riverside Council of Governments (WRCOG)

RIVERSIDE COUNTY WATER TASK FORCE

How Are We Doing?- Some Good News

- Decrease in the unemployment rate from a high of 15% to 10%
- Traffic congestion is back, traffic levels are at 90% of pre-pandemic levels
- Development activity is approaching pre-pandemic levels
- Single-family residential and industrial projects represent most new development applications

SCAG Regional Plan

- In September, the Southern California Association of Governments (SCAG) adopted its 20-year plan
- Western Riverside County Region projected to be on one of the fastest growing in Southern California

20 Year Projected Growth	
Population	600,000
Dwelling Units	250,000
Employment	300,000

Future Forward

- **Date:** Thursday, October 29
- **Time:** 9 AM – 10 AM
- **Description:** "The Future of the Office"
- **Key Topic:** Will We Go Back To The Office? (sorry, yes)

Jeff Kightlinger

General Manager

Metropolitan Water District of Southern California

RIVERSIDE COUNTY WATER TASK FORCE

RIVERSIDE COUNTY WATER TASK FORCE

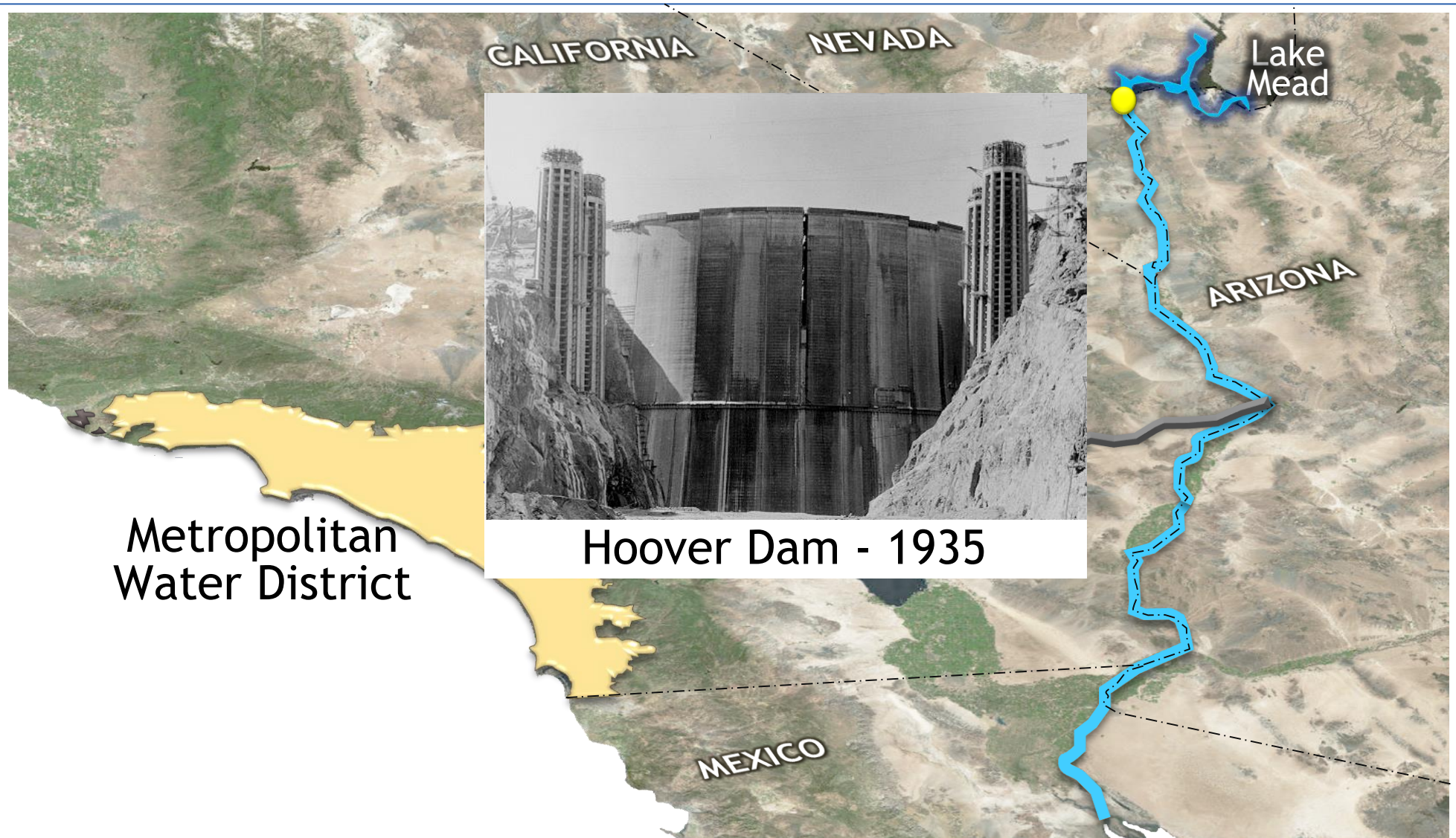
Colorado River Aqueduct

RIVERSIDE COUNTY WATER TASK FORCE

Colorado River Aqueduct

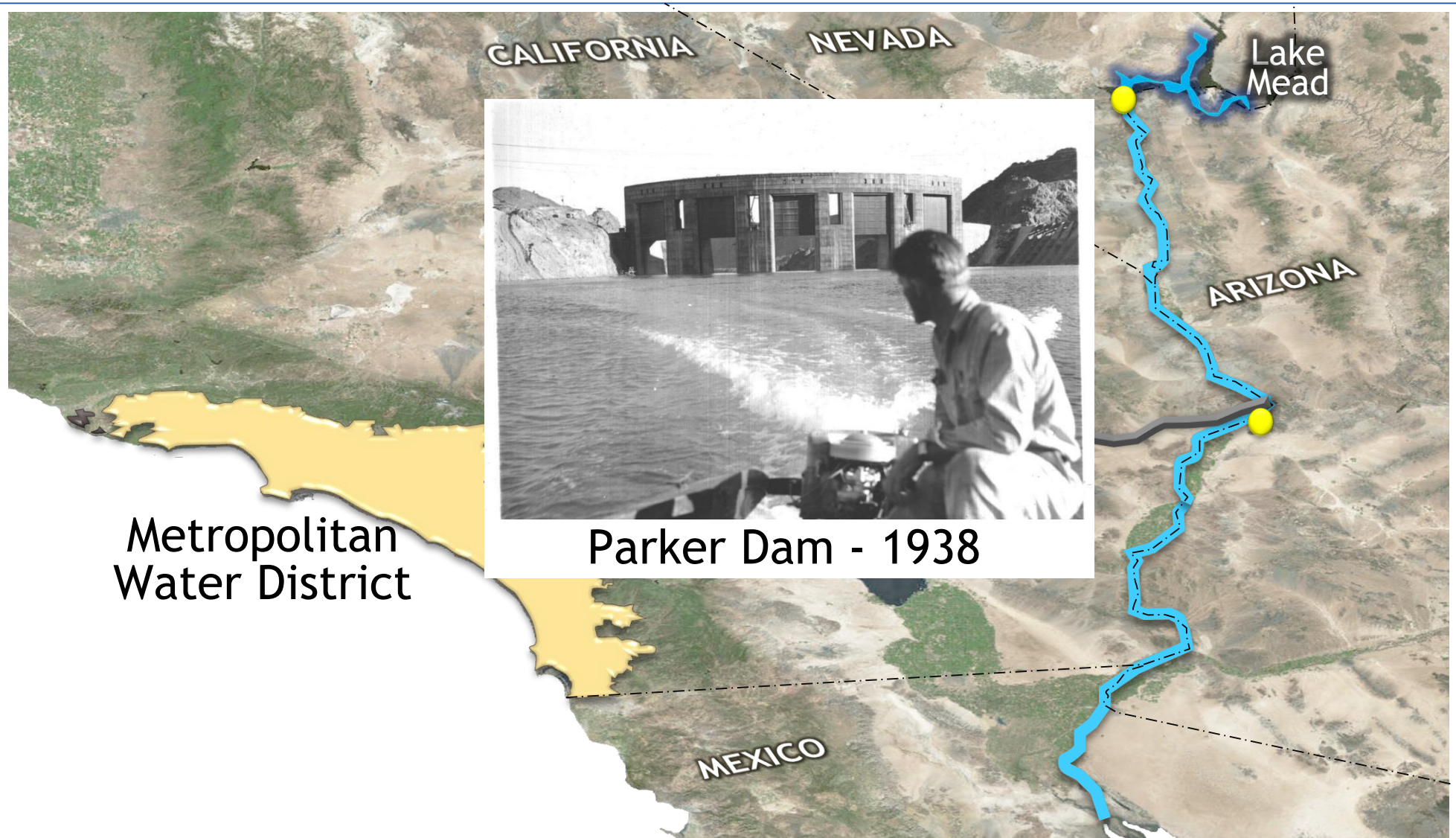
RIVERSIDE COUNTY WATER TASK FORCE

Colorado River Aqueduct



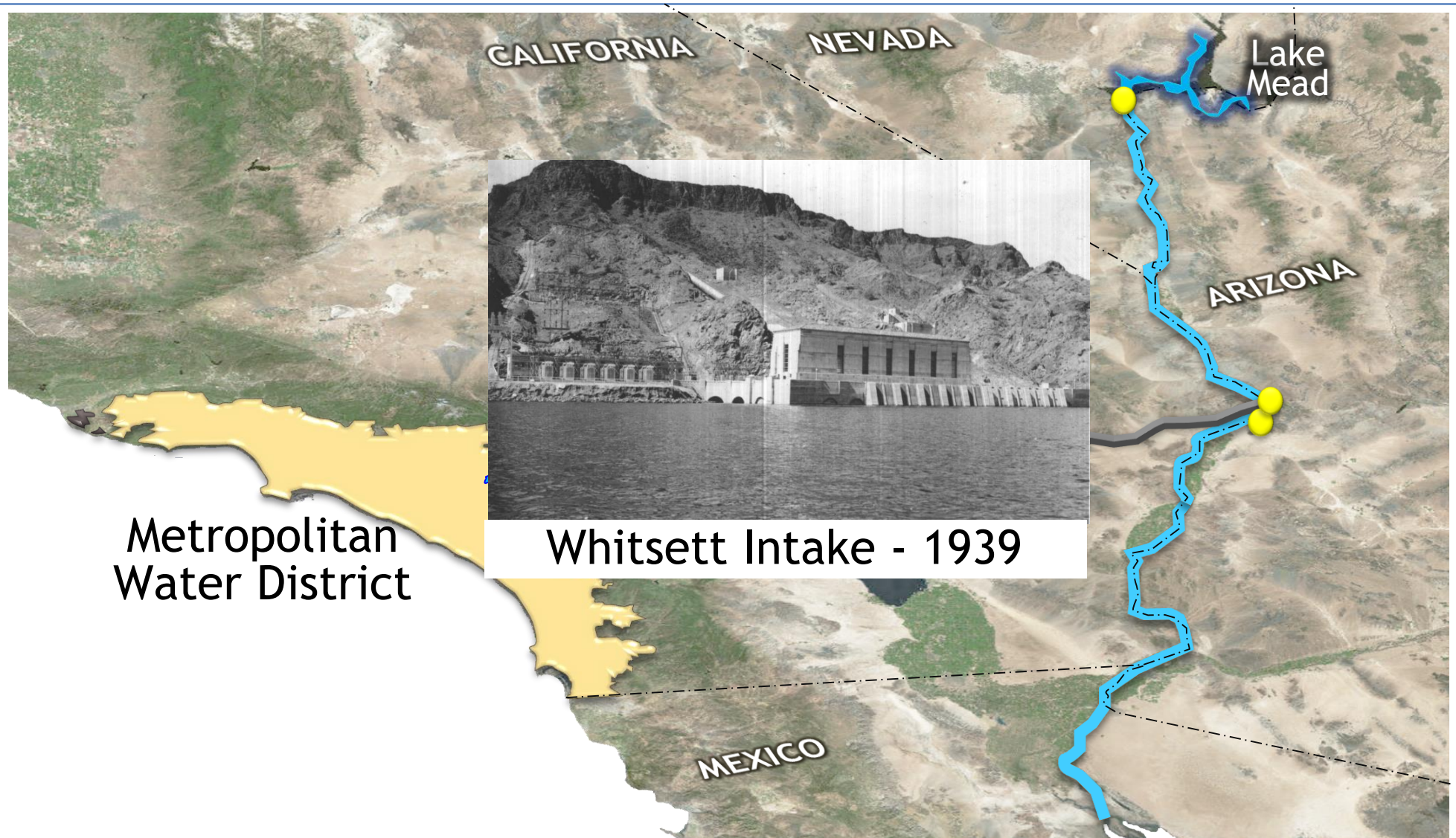
RIVERSIDE COUNTY WATER TASK FORCE

Colorado River Aqueduct



RIVERSIDE COUNTY WATER TASK FORCE

Colorado River Aqueduct



Whitsett Intake - 1939

RIVERSIDE COUNTY WATER TASK FORCE

Colorado River Aqueduct

- 242 miles from the Colorado River to Lake Mathews
- 92 miles of tunnels
- 55 miles of concrete pipe
- 28 miles of pressurized siphons
- 5 pumping plants
- 30,000 workers over 8-year construction period

- Recognized by the American Society of Civil Engineers in 1955 as one of the “Seven Engineering Wonders of American Engineering”.

RIVERSIDE COUNTY WATER TASK FORCE

State Water Project

RIVERSIDE COUNTY WATER TASK FORCE

State Water Project

Oroville Reservoir - 1970

RIVERSIDE COUNTY WATER TASK FORCE

State Water Project

President John F. Kennedy and
Governor Edmund G. Brown - 1962

San Luis Reservoir groundbreaking ceremony

RIVERSIDE COUNTY WATER TASK FORCE

State Water Project

Governor Ronald Reagan - 1971

A.D. Edmonston PP dedication ceremony

RIVERSIDE COUNTY WATER TASK FORCE

State Water Project

- 21 dams
- 6 Aqueducts
- More than 700 miles of canals, pipelines and tunnels
- 18 pumping plants
- 10 powerplants
- 2,000 feet lift over the Tehachapi Mountains
- 29 State Water Project contractors

- Largest state-built, multi-purpose, user-financed water project in the nation.

RIVERSIDE COUNTY WATER TASK FORCE

Diamond Valley Lake

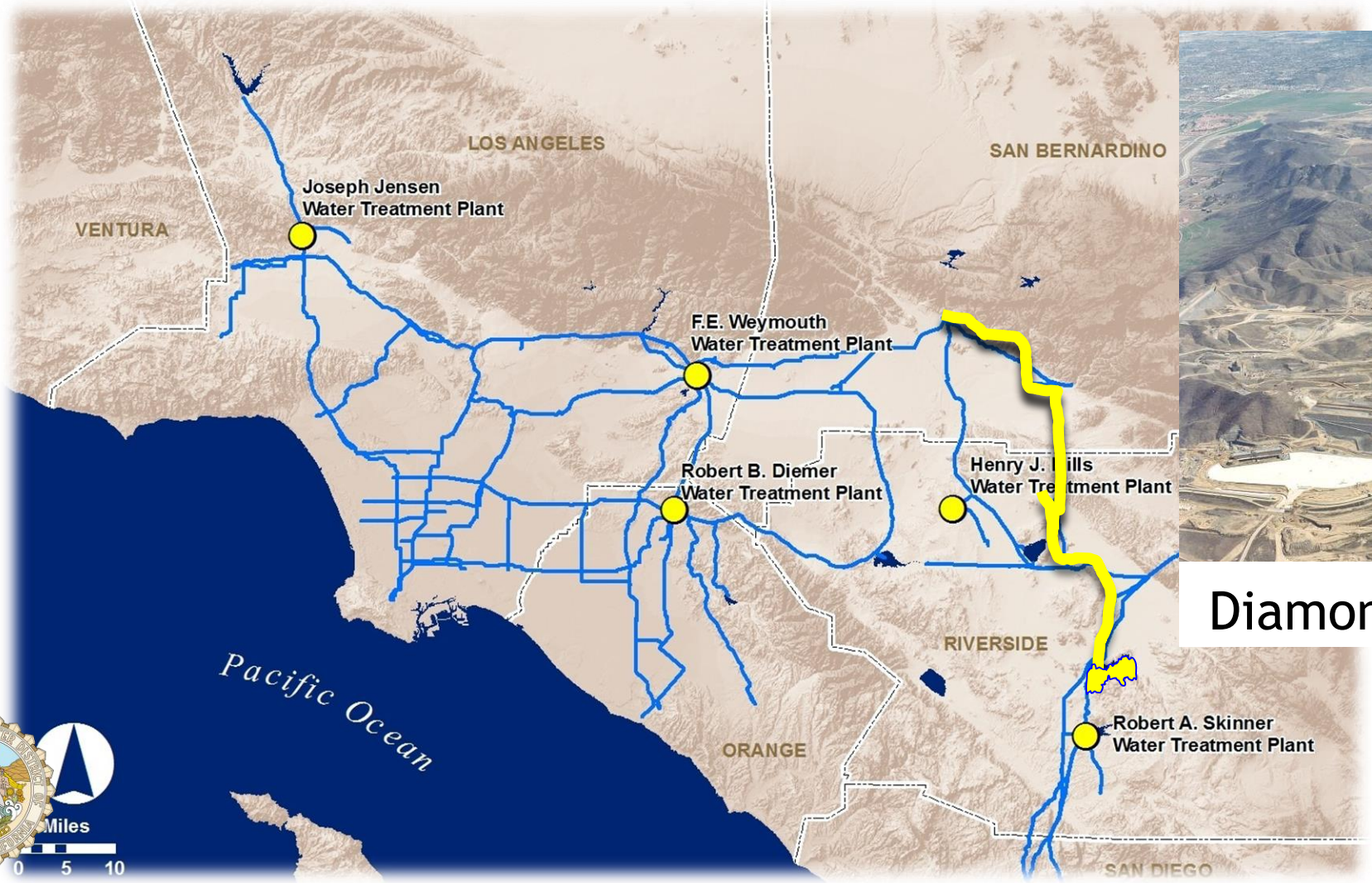
RIVERSIDE COUNTY WATER TASK FORCE

Diamond Valley Lake

Inland Feeder

RIVERSIDE COUNTY WATER TASK FORCE

Diamond Valley Lake



Diamond Valley Lake - 2002

RIVERSIDE COUNTY WATER TASK FORCE

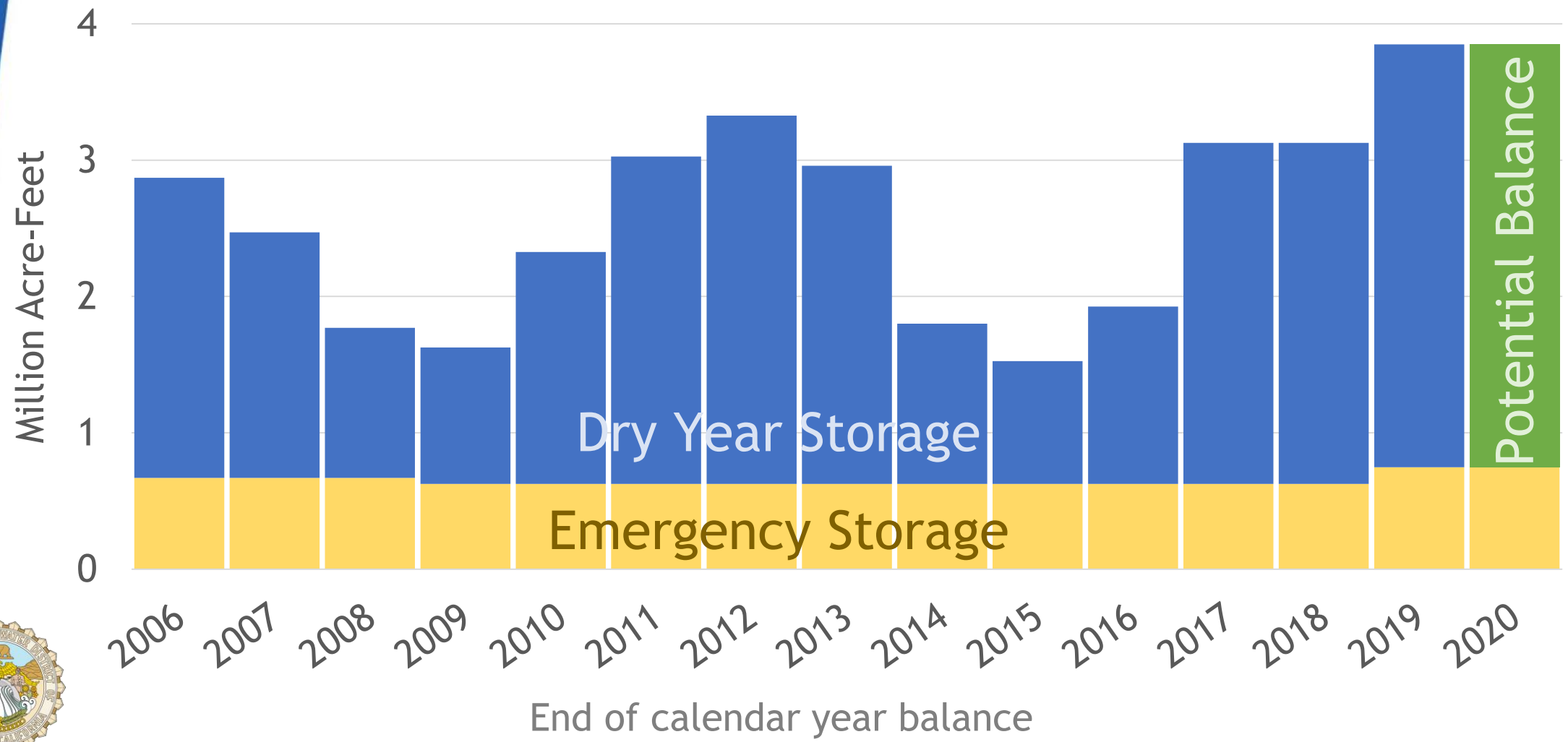
Diamond Valley Lake

Nearly full
(October 2011)

During drought
(June 2015)

RIVERSIDE COUNTY WATER TASK FORCE

Metropolitan's Storage for Dry Years



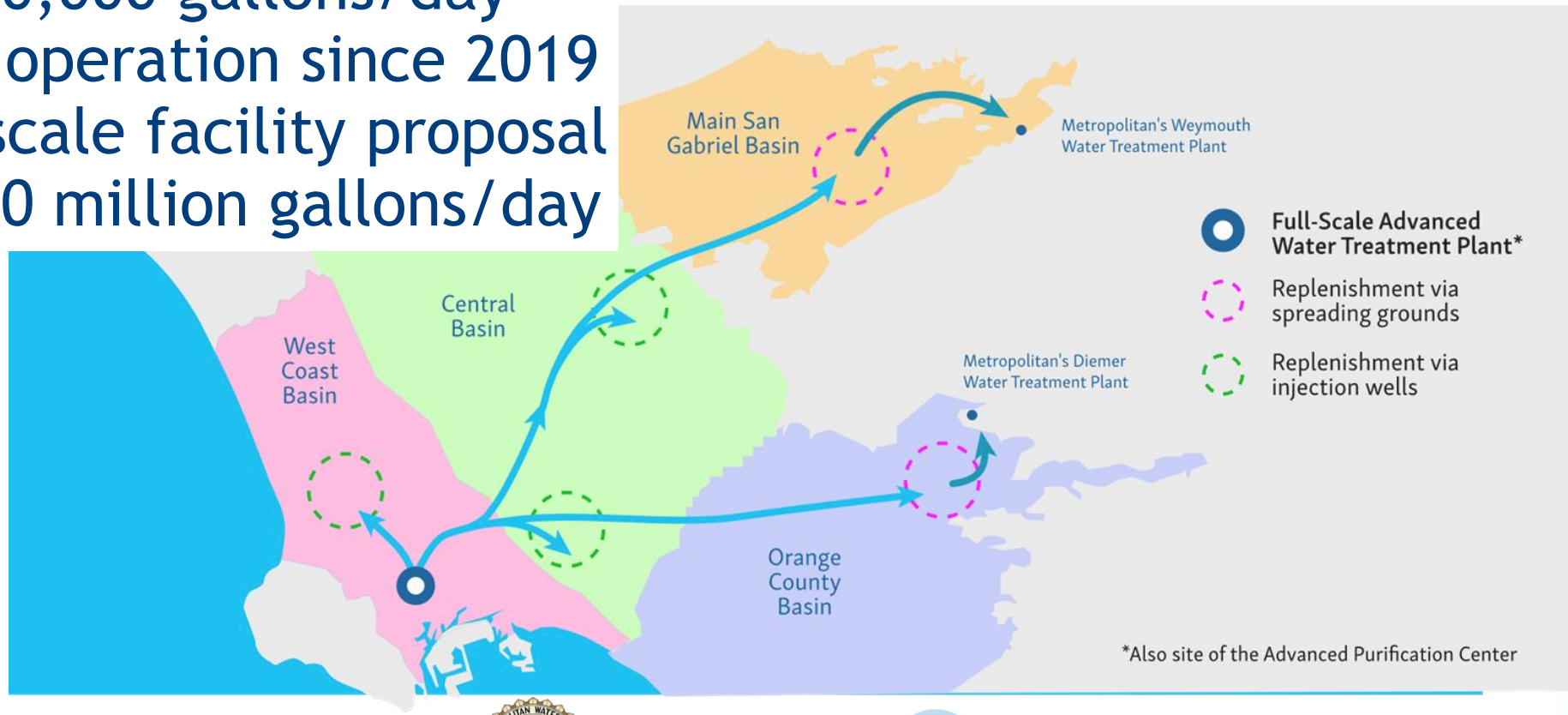
RIVERSIDE COUNTY WATER TASK FORCE

Regional Recycled Water Program

RIVERSIDE COUNTY WATER TASK FORCE

Regional Recycled Water Program

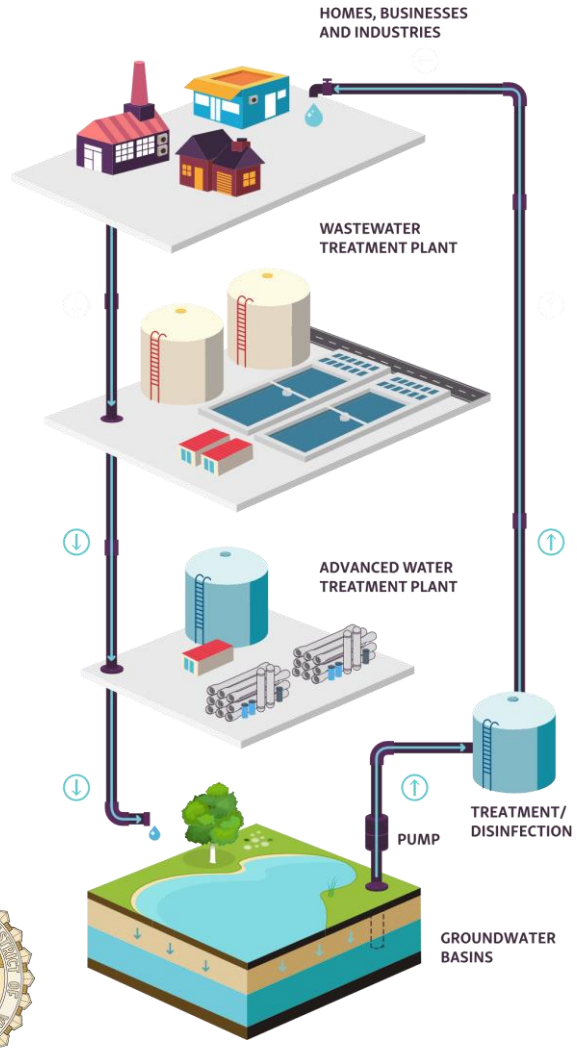
- Demonstration facility
  - 500,000 gallons/day
  - In operation since 2019
- Full-scale facility proposal
  - 150 million gallons/day



- Partnership between: THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA; LOS ANGELES COUNTY SANITATION DISTRICTS, Converting Waste Into Resources

RIVERSIDE COUNTY WATER TASK FORCE

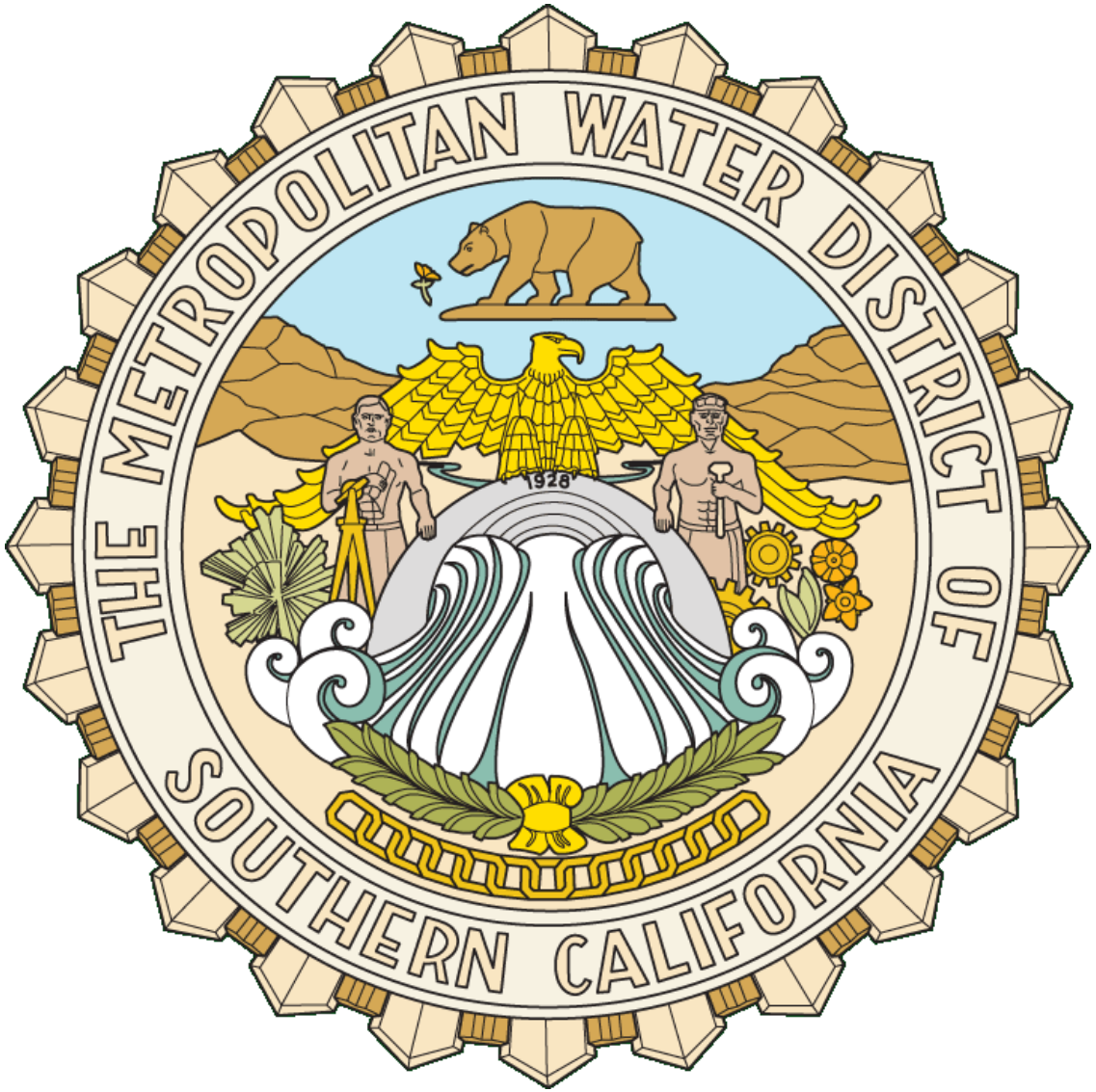
Regional Recycled Water Program



For virtual tours:
http://mwdh2o.com/RRWP

Regional Recycled Water Advanced Purification Center

RIVERSIDE COUNTY WATER TASK FORCE



Jeff Kightlinger

Dr. Sharon Megdal

Director

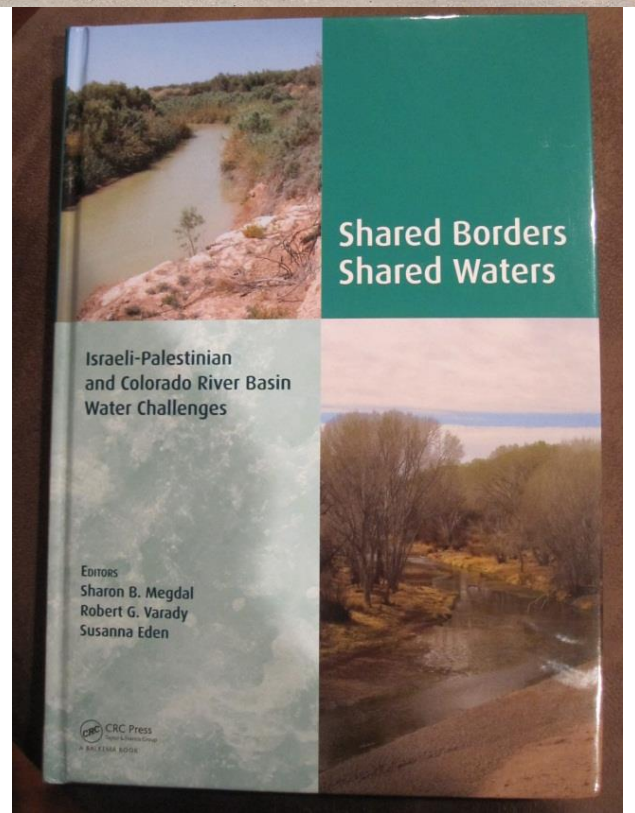
University of Arizona
Water Resources Research Center

RIVERSIDE COUNTY WATER TASK FORCE

Desal to the Rescue!

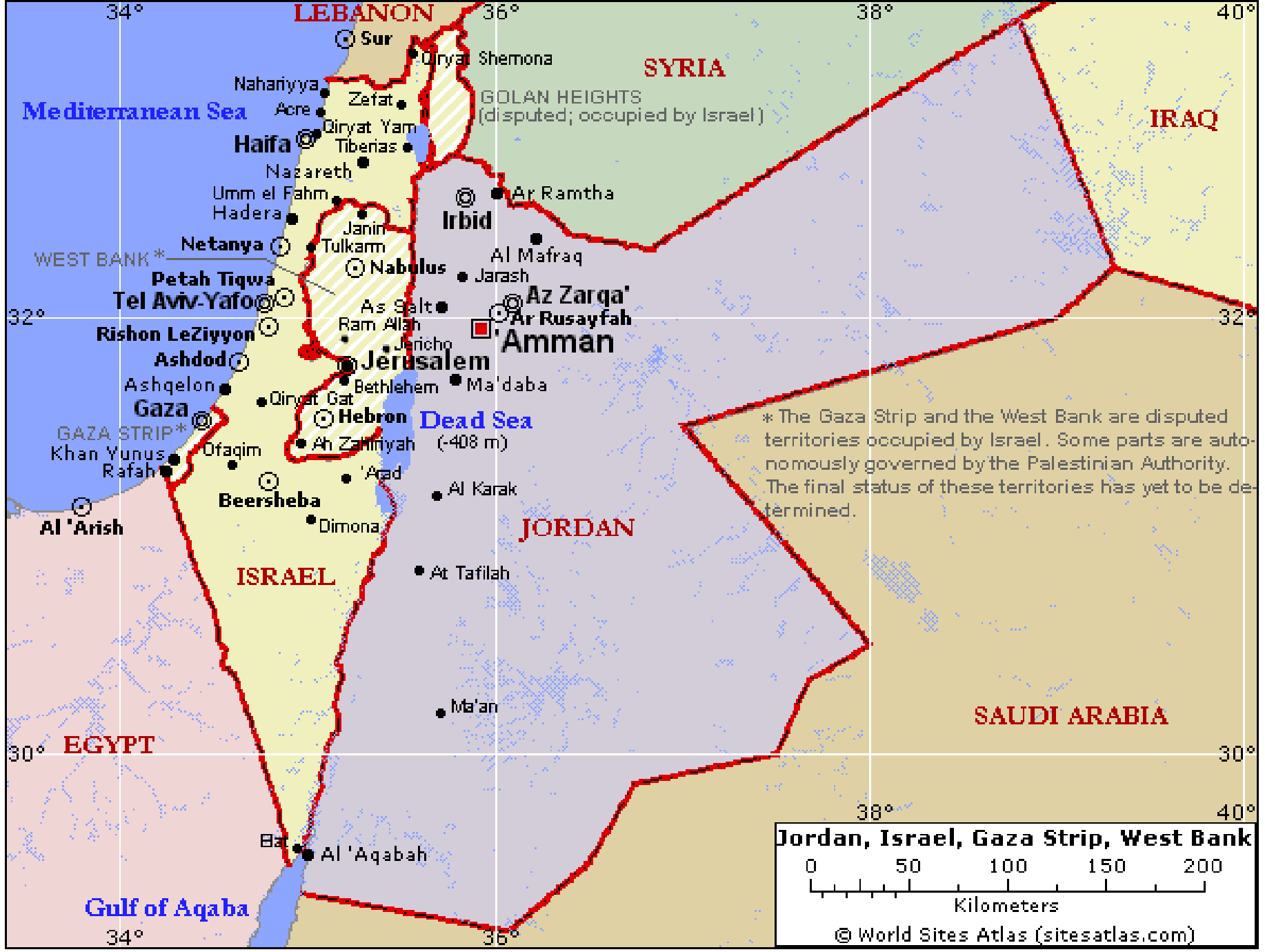
Outline

- About Israel and connecting the regions
- Israel's water management and regulatory system
- How/why desalination in Israel?
- Water management innovations and challenges
- The value of sharing lessons learned



COLLEGE OF AGRICULTURE & LIFE SCIENCES
COOPERATIVE EXTENSION
WATER RESOURCES RESEARCH CENTER

Sharon B. Megdal
October 23, 2020



SOURCE: http://travelquaz.com/jordan-map-free.html/political-map-of-israel-jordan-and-the-israeli-occupied

Connecting the Regions

- Semi-arid region experience climate change impacts
- Scarcity of natural water
- Degraded natural environment
- Vibrant agricultural sector
- Growing population and economies
- High land values
- Shared borders

Journal of Arid Environments 112 (2015) 109–123

Contents lists available at ScienceDirect

Journal of Arid Environments

journal homepage: www.elsevier.com/locate/jaridenv

A tale of two rivers: Pathways for improving water management in the Jordan and Colorado River basins

Assaf Chen [a, *], Adam Abramson [b], Nir Becker [c], Sharon B. Megdal [d]

[a] The Remote Sensing Laboratory, Jacob Blaustein Institutes for Desert Research, The Albert Katz International School for Desert Studies, Ben-Gurion University of the Negev, Sede Boqer Campus, 84990, Israel
[b] Department of Environmental Hydrology & Microbiology, Zuckerberg Institute for Water Research, Jacob Blaustein Institutes for Desert Research, Ben-Gurion University of the Negev, Sede Boqer Campus, 84990, Israel
[c] Department of Economics and Management, Tel-Hai College, Upper Galilee 12210, Israel
[d] Water Resources Research Center, University of Arizona, Tucson, AZ 85721, USA

Water diverted from shrinking Dead Sea for potash processing

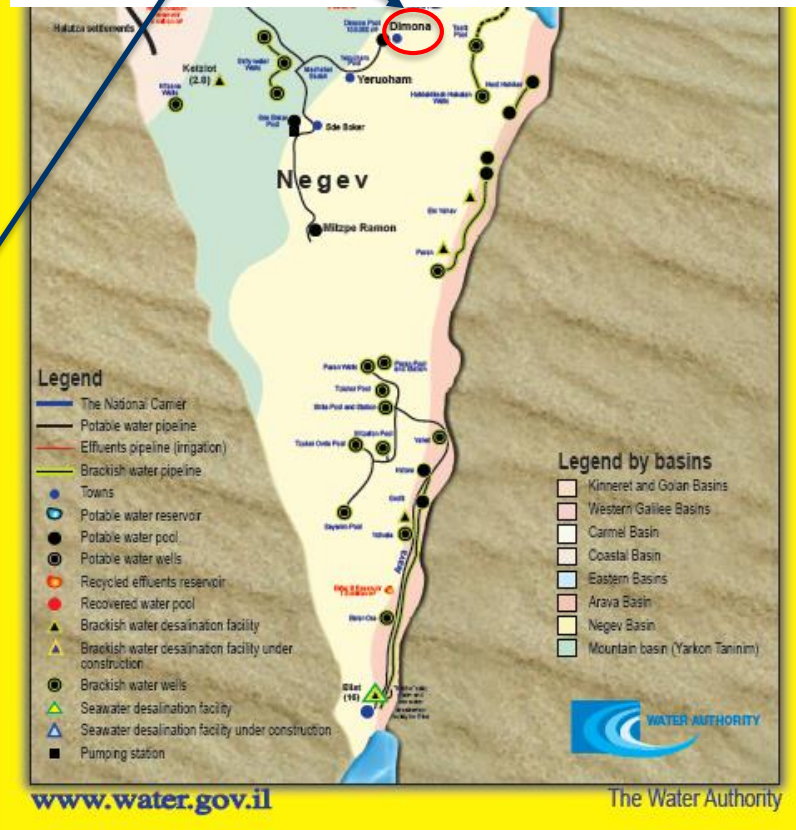
Some differences – Israel's water regulatory and management systems

- All water is owned by the Israeli government
- Single agency, the Israel Water Authority, sets prices for water users
- Water Authority set quotas and prices for agricultural sector, which does not flood irrigate
- National water carrier – Mekorot
- Master plan for water and master plan for wastewater
- Pricing is centralized; residents of different cities pay the same rate for water
- Law requires allocation of water for nature
- Water reuse is very high; most of it reused by agriculture after tertiary treatment through water storage and recovery
- One golf course in the entire country, which is about the size of New Jersey

Arava Region of Israel 2018

How/why seawater desalination became a key component of Israel's water supply about 15 years ago. There is brackish water desal, too.

Dimona



3/9/2017 Sea of Galilee at lowest level in a century | Jewish News

THE JEWISH NEWS | jewishnews.timesofisrael.com

Sea of Galilee at lowest level in a century

Article from 2017

February was one of the driest months on record, with the northern Israeli lake receiving just 10 percent of average rainfall

BY JTA | March 8, 2017, 2:58 pm |


1
EvaporationPonds_KziotDesalBrine


2
Hadera By C. Sheehy 2015


ARIZONA.EDU
EXPERIENCE
SHOWTIMES
NEWS & EVENTS
SOCIAL
TRAILER
PURCHASE DVD/BLURAY
3
BEYOND THE
MIRAGE
THE FUTURE OF WATER IN THE WEST
A full feature documentary that tells the story about the future of water in the west


Aerial photo of Sorek Desal Plant
4


October 2015
Sorek Desal Plant
7


October 2015
Palmahim Desal Plant
6


October 2015
Palmahim Desal Plant
5

Innovations *and* Challenges

Innovations

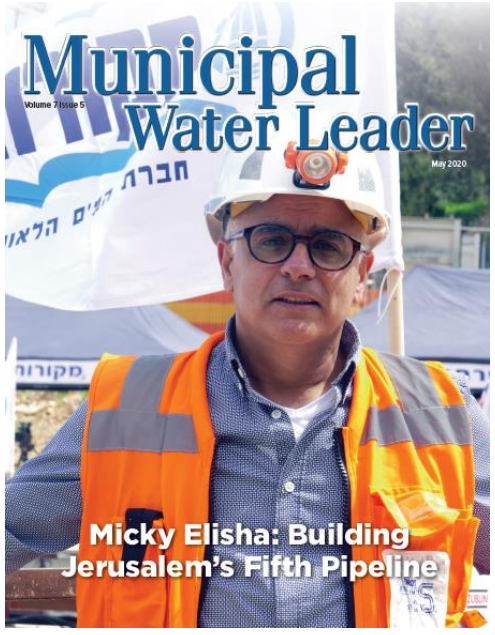
- Use of public-private partnerships
- Strong water conservation culture
- Working on replumbing the system
- Red Sea – Dead Sea Desalination Project with Jordan on the horizon

Challenges

- Working with their neighbors - Lack of well-functioning collaborative mechanisms
- Climate change
- Government budgetary issues

Sharing lessons learned – positive and negative

1



2

Reflections on a Successful Israeli Conference Experience

by Sharon B. Megdal
12/06/2019

3

Bridging Through Water

by Sharon B. Megdal

Since my first professional visit to Israel in 2006, I have endeavored to connect that region and ours through sharing water management challenges and solutions. In late Fall I had the honor of traveling to Israel, the West Bank, and Jordan with the two International Boundary and Water Commission

November 20, our day in Israel, included visiting the Yad Hanna Wastewater Treatment Plant, which is located just on the Israel side of the Green Line and wall separating the West Bank and Israel. Treating the wastewater from the West Bank communities of Nablus and Tulkarem and Israel's Emek Hefer region to avoid contamination of the Alexander creek and the surrounding aquifer currently lacks a comprehensive bilateral approach. We then visited Israel's (and the world's) largest reverse osmosis desalination plant, the Sorek plant. The

MAY 2017
Municipal Water Leader
VOLUME 3 ISSUE 5
Municipal Water Leader is published 10 times a year with combined issues for July/August and November/December by
Water Strategies LLC
4 E Street SE
Washington, DC 20003

STAFF:
Kris Polly, *Editor-in-Chief*
John Crotty, *Senior Writer*
Matt Dermody, *Writer*
Robin Pursley, *Graphic Designer*
Capital Copyediting LLC, *Copyeditor*

SUBMISSIONS:
Municipal Water Leader welcomes manuscript, photography, and art submissions. However, the right to edit or deny publishing submissions is reserved. Submissions are returned only on request. For more information, please contact John Crotty at (202) 698-0690 or John.Crotty@waterstrategies.com.

ADVERTISING:
Municipal Water Leader accepts one-quarter, half-page, and full-page ads. For more information on rates and placement, please contact Kris Polly at (703) 517-3962 or Municipal.WaterLeader@waterstrategies.com.

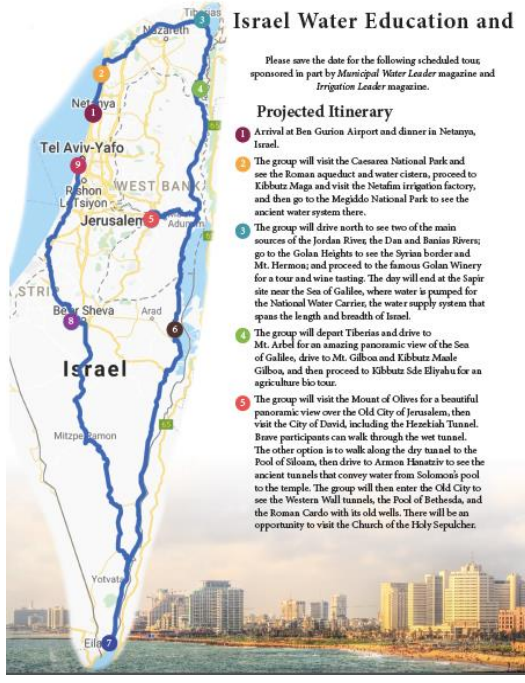
CIRCULATION:
Municipal Water Leader is distributed nationally to managers and boards of directors of water agencies with annual budgets of $10 million or more; the governors and state legislators in all 50 states; all members of Congress and select committee staff; and advertising sponsors. For address corrections or additions, please contact our office at Municipal.WaterLeader@waterstrategies.com.

6

COVER PHOTO: John Balliew, President and Chief Executive Officer of El Paso Water.

CONTENTS

Follow *Municipal Water Leader* magazine on social media
facebook /MuniWaterLeader
twitter @MuniWaterLeader



Israel Water Education and Trade Tour Preview, June 28–July 6, 2021

Please save the date for the following scheduled tour, sponsored in part by *Municipal Water Leader* magazine and *Irrigation Leader* magazine.

Projected Itinerary

1. Arrival at Ben Gurion Airport and dinner in Netanya, Israel.
2. The group will visit the Caesarea National Park and see the Roman aqueduct and water cistern, proceed to Kibbutz Maga and visit the Netafim irrigation factory, and then go to the Megiddo National Park to see the ancient water system there.
3. The group will drive north to see two of the main sources of the Jordan River, the Dan and Banias Rivers; go to the Golan Heights to see the Syrian border and Mt. Hermon; and proceed to the famous Golan Winery for a tour and wine tasting. The day will end at the Sapir site near the Sea of Galilee, where water is pumped for the National Water Carrier, the water supply system that spans the length and breadth of Israel.
4. The group will depart Tiberias and drive to Mt. Arbel for an amazing panoramic view of the Sea of Galilee, drive to Mt. Gilboa and Kibbutz Maale Gilboa, and then proceed to Kibbutz Sde Eliyahu for an agriculture bio tour.
5. The group will visit the Mount of Olives for a beautiful panoramic view over the Old City of Jerusalem, then visit the City of David, including the Hezekiah Tunnel. Brave participants can walk through the wet tunnel. The other option is to walk along the dry tunnel to the Pool of Siloam, then drive to Armon Hanatziv to see the ancient tunnels that convey water from Solomon's pool to the temple. The group will then enter the Old City to see the Western Wall tunnels, the Pool of Bethesda, and the Roman Cardo with its old wells. There will be an opportunity to visit the Church of the Holy Sepulcher.
6. The group will depart Jerusalem and drive to the Einot Zukim Nature Reserve, where there are freshwater springs and typical oasis vegetation and animal life. Next, in the desert next to the Dead Sea, which has salty water and no life at all, the group will proceed to the Ein Gedi Nature Reserve, where kibbutz members pump water for their mineral water factory. The group will then visit the world heritage site of Masada, where participants can walk the snake trail by foot or ascend via cable car to see King Herod's fortress, an ancient synagogue, a Byzantine church, and the water cistern.
7. The group will depart the Dead Sea and drive via the Arava Desert Valley to the Yair Research and Development Agriculture Center and tour the Center for Modern Desert Farming, one of the world's most advanced. There will be a guided visit to the experimental greenhouses and a presentation of agricultural inventions to deal with the challenges of soil and desert climate. The group will then continue to the ecological Kibbutz Lotan near Eilat and learn how it transformed sandy desert soil into a green and flowering organic garden. Participants will learn basic organic and permaculture tips and practical solutions that the Center for Creative Ecology has developed over the years to treat waste, raise healthy food, save energy, and build naturally. Proceeding to Eilat, the tour will aim to visit a desalination facility the draws from the Red Sea.
8. The group will depart Eilat and drive via the Ramon Crater to the Negev Desert Research and Development Center near Ashalim, which specializes in using salty water for agriculture. The group will proceed to Kibbutz Hatzerim near Beersheba, the southern branch of the Netafim irrigation factory, and continue to the desalination facility in Ashkelon or Ashdod on the Mediterranean Sea.
9. We will hold a farewell dinner in Jaffa and then drive to Ben Gurion Airport for a night flight back home.

Services Included

- meeting and assistance at Ben Gurion Airport on arrival
- licensed English-speaking guide for all transfers and sightseeing days
- luxury air-conditioned coach
- transfer to/from Ben Gurion airport
- entrance fees for all visits and tours
- eight nights of hotel accommodation
- breakfasts and dinners at hotels and farewell dinner at local restaurant

Information on pricing will be presented in updated advertisements and posted to our websites, www.irrigationleadermagazine.com and www.municipalwaterleader.com, in the near future. To receive more information about the tour and to tentatively reserve a participation slot, please email Tom Wacker at tom.wacker@waterstrategies.com.

5

4

Thank you!
I look forward to the Q&A

Sharon B. Megdal

smegdal@arizona.edu/director
@SBMWater
wrrc.arizona.edu
wrrc.arizona.edu/subscribe

Cristina Ahmadpour

President

Isle, Inc.

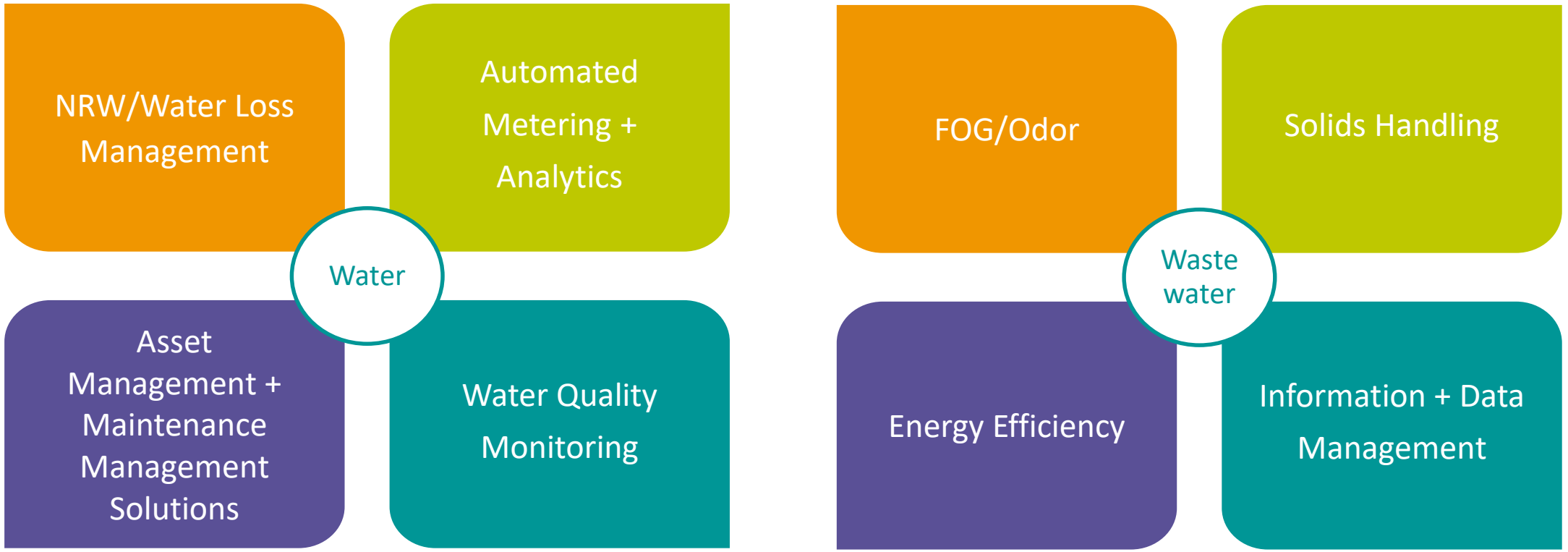
RIVERSIDE COUNTY WATER TASK FORCE

Riverside County Water Task Force

Future of Water Project Marvels

October 23, 2020

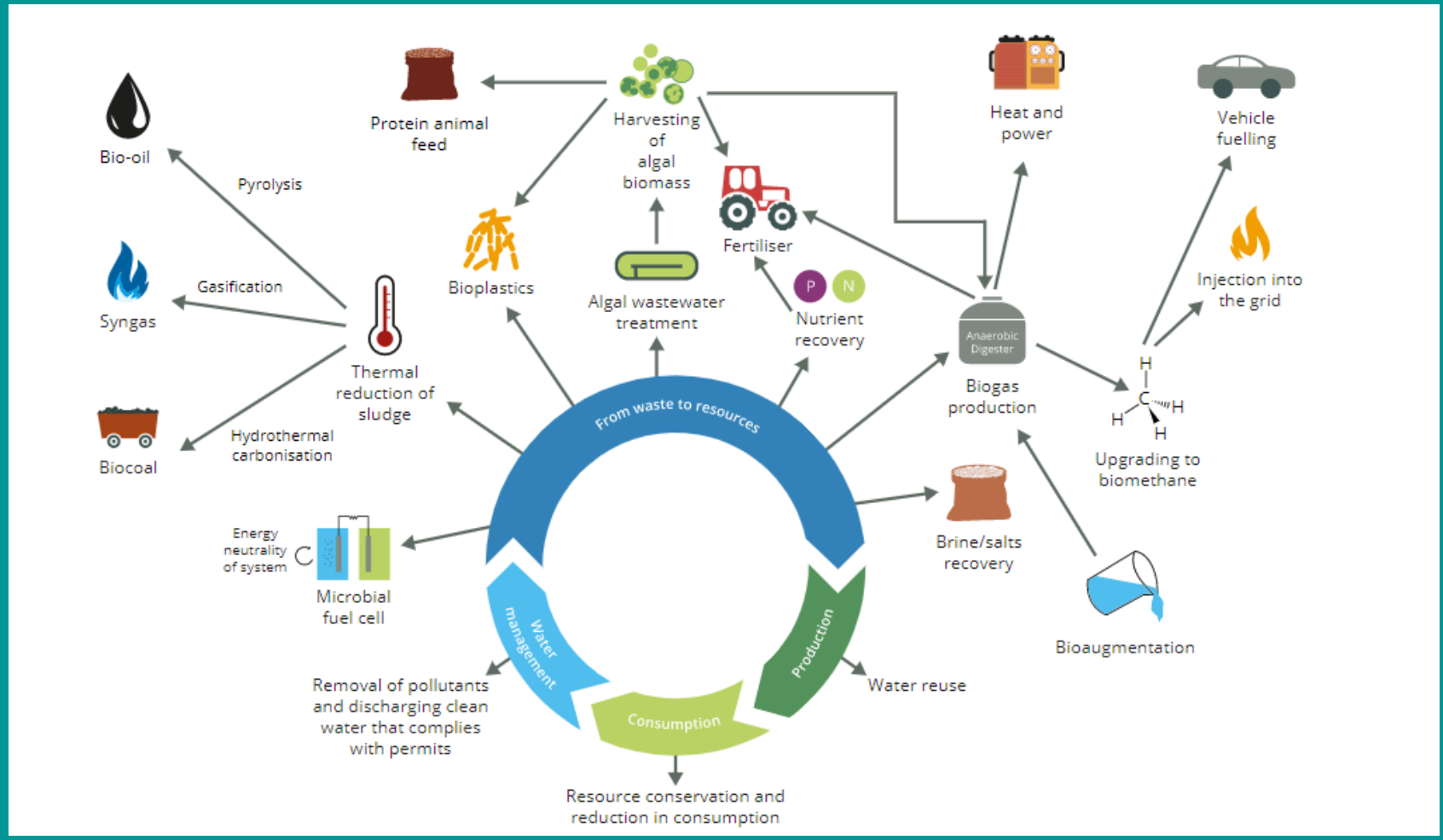
Regional Priorities



Future Outlook: Next 10 Years

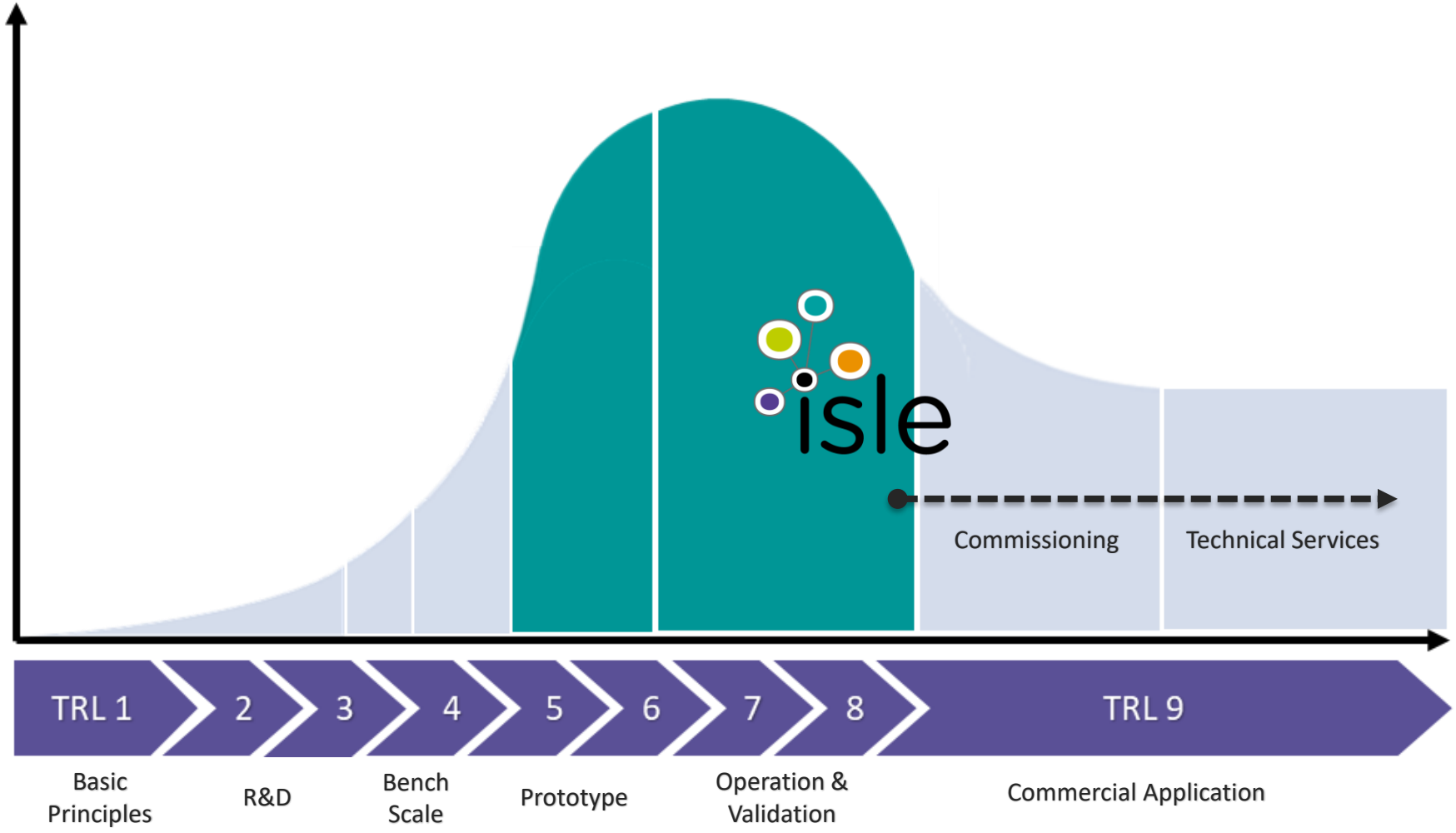
- Increase capacity of non-potable sources and indirect potable reuse projects, building resiliency through water reuse will be important in water strained communities
- Source water quality management, algal blooms and other concerns
- Improved business case for advanced treatment (demand, costs, regulation, risk)
- Wastewater utilities will look towards revenue generation opportunities through resource recovery, including recycled water that can be “designed” for certain local customers
- Industrial end users will continue to look towards ZLD to enhance water security, management costs and reliability
- Increased investment in treatment (advanced oxidation, GAC, Ion Exchange to meet growing regulatory requirements) of indirect and direct potable uses
- Data collection, management, and visualization is a big challenge and opportunity

Future Outlook: Next 20 Years



Credit: Kelly Thompson at GWI, May 2020

Process for Leading Innovation and Technology



OPERATIONS

Voda Inc.

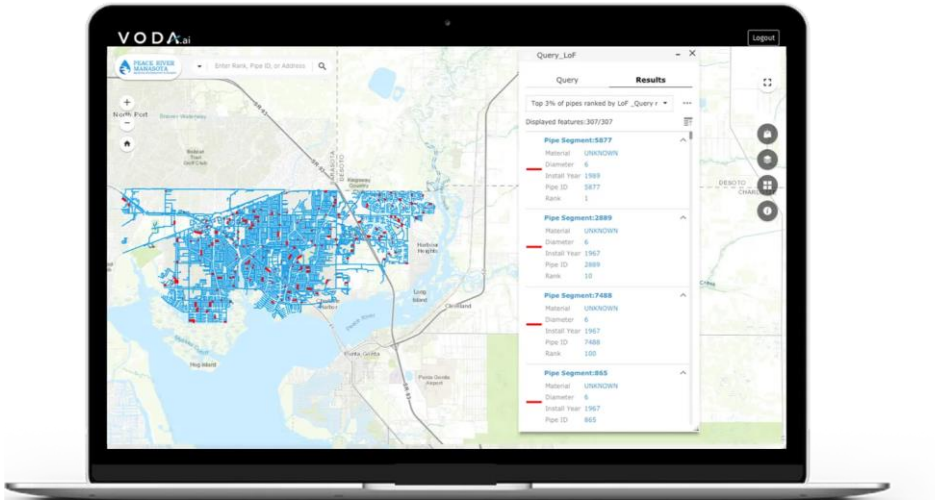
USA | TRL 8

What challenge does this technology solve?

- Identifying likelihood of pipe failure in distribution network

What does it do?

- Voda's software identifies the probability of failure for every active pipe in a utility's inventory
- Uses artificial intelligence to find patterns that led to previous pipe failures and applies those patterns to assign a probability of failure
- Combines utility and public data to build predictive models



Unique Selling Point / Competitive Advantage?

- Predictions are generated with the probabilities of every pipe segment to fail within the next twelve months

TREATMENT

Pharem

Sweden | TRL 8

What challenge does this technology solve?

- Removal of organic compounds in water- pesticides, pharmaceuticals

What does it do?

- The patented Pharem Filtration System for industry (PFS Industry) enables low-energy enzymatic removal of organic compounds in industrial process water
- System can be integrated in any existing water treatment plant for targeted removal of organic substances
- Enzymes achieve removal to ppb levels

Unique Selling Point / Competitive Advantage?

- Utilizes the latest developments in biotechnology
- Robust enough for real life industrial/municipal water treatment conditions
- Compact and cost-effective (low energy) micropollutant removal process

ASSET MANAGMENT

Abyss Solutions

Australia | TRL 9

What challenge does this technology solve?

- Condition assessment of submerged assets, especially turbid waters

How does it work?

- Robotics company that focuses on remote under-water vehicles for high fidelity imaging and data capture
- Autonomous inspections platform based on machine learning algorithms
- Automatically detects faults and features such as cracks, corrosion and other major surface defects

Unique Selling Point / Competitive Advantage?

- Collects high-quality visual data underwater which was previously unattainable
- Operates in zero-light conditions and up to 100 NTU of turbid water
- High-quality data capture, data analysis, and reporting is a unique service

OPERATIONS/ ENGINEERING

AR/VR for Field Operations and Design

V-LABs

vGIS

FulMaxx Cub

Igloo

Drivers/Trends

- Moving to visualization for design in the office or in the field
- Improved internal/external collaboration
- Changes in the workforce
- High capex investment- “nice to have”?

TREATMENT

Organica Water

USA | TRL 9

What challenge does this technology solve?

- Footprint limitations and odor in centralized wastewater treatment facilities using conventional activated sludge

What does it do?

- Organica Food Chain Reactor (FCR) facility is a type of fixed-film activated sludge system using both natural and engineered media
- Growth of a robust and diverse biomass for wastewater treatment
- Biofilm that can handle a higher amount of fluctuations in influent quality and quantity compared to conventional systems
- Significantly reduced reactor volume

Unique Selling Point / Competitive Advantage?

- Resilient, small-footprint system and reduced operating costs
- Opportunity to provide system flexibility with decentralized treatment
- Aesthetic appeal, particularly in urban environments

WASTEWATER

Mango Materials

USA | TRL 7

What challenge does this technology solve?

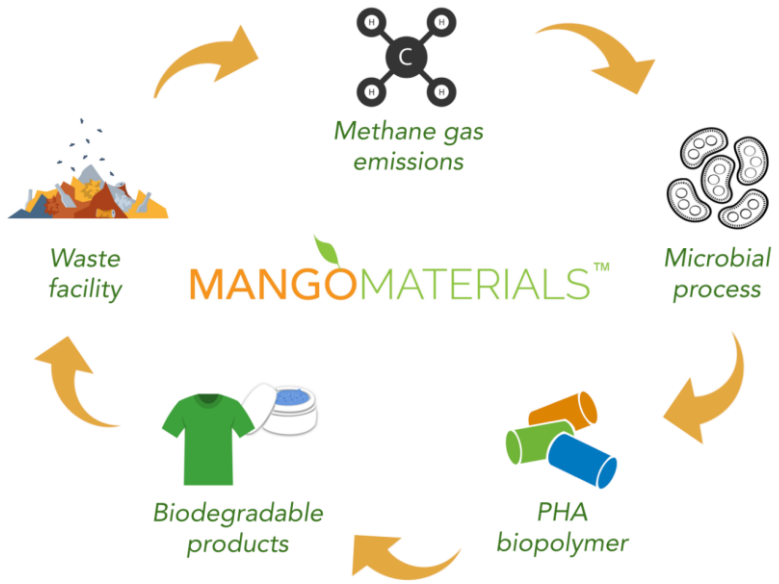
- Recovery of valuable resources from wastewater streams

How does it work?

- Platform technology to produces various bioproducts from methane biogas
- In the MangoStandard process, bacteria grown in a liquid media convert the carbon component of methane into longer chain biopolymers
- Bacteria are harvested and processed into a saleable product (polyhydroxyalkanoate, PHA)

Unique Selling Point / Competitive Advantage?

- More profitable than current resource recovery techniques
- Methane-derived PHA could sell for $1 to $2.5 per pound of material



Thank you!

PRESIDENT & MANAGING DIRECTOR
Isle Utilities (Americas)

Tel: +1 (760) 707-8959
Email: cristina.ahmadpour@isleutilities.com

Questions to the Panelists?

RIVERSIDE COUNTY WATER TASK FORCE

Thank You

Save the Date

Friday, Feb. 26, 2021

Hosted by

EASTERN MUNICIPAL WATER DISTRICT

WESTERN MUNICIPAL WATER DISTRICT

WRCOG Western Riverside Council of Governments

RIVERSIDE COUNTY WATER TASK FORCE