

Program
11th International Conference on Irrigation and Drainage

**Water Reuse and Non-Traditional
Water Sources for Irrigated Agriculture**



USCID

The U.S. society for irrigation and drainage professionals

Cooperating Organization

The Water Research Foundation

October 15 -19, 2018

Phoenix, Arizona

Program

Monday, October 15

10:00 a.m. - 6:00 p.m. **Irrigation District Modernization Workshop**

This **optional** one-day Workshop will cover strategies of irrigation district modernization, and technical details that have proven successful in irrigation projects throughout the US and abroad. Problems and failures will also be discussed. Topics will include recirculation of return flows, regulating reservoirs, the difference between improving a single structure versus modernizing a system, canal lining, automation of canals and pumps with PLC-based control and more simple hydraulic structures, SCADA, special considerations of VFDs, pipeline options, and philosophies of modernization. The workshop will be led by Charles M. Burt (Chairman of the Irrigation Training and Research Center) who has extensive practical and theoretical experience in modernization throughout the U.S. and internationally. The ASCE Manual of Practice No. 131, *Canal Automation for Irrigation Systems*, will be the primary reference for the Workshop and copies will be available for purchase.

Tuesday, October 16

7:00 a.m. - 5:30 p.m. **Registration**

8:00 a.m. - 11:30 a.m. **Field Tour**

The Tour will visit the Riparian Preserve, Salt River Project Eastern Canal, and the Town of Gilbert drinking water treatment plant. In 1986, Gilbert made a commitment to reuse 100% of its effluent water. The Town's desire to create innovative and unique ways to combine water resource development with wildlife habitat, educational and recreational opportunities led to the development of the Riparian Preserve in 1999. Of the 110 acres, 70 acres make up the 7 water recharge basins that are filled on a rotating basis with treated effluent and allowed to percolate into the aquifer where it is stored for future use. One of the ponds has a unique distribution stream that mimics the action of an ephemeral desert stream. An additional lake is filled with reclaimed water, and is designated as an urban fishing resource through the Arizona Game and Fish Department. The Preserve is organized into various vegetative zones ranging from marshlands to native riparian and upland vegetation areas. Approximately 298 species of birds have been identified on the site, and many insects, fish, amphibians, reptiles, and mammals have found homes there as well. Over 4.5 miles of trails weave through the park, and there are interpretive education panels on wildlife and vegetation throughout. The Riparian Preserve is one part of the property known as Water Ranch, which extends from Greenfield Road east to Higley Road, encompassing the majority of the land between Guadalupe Road and the utility easement. Water Ranch includes the Southeast Regional Library building, the Salt River Project Eastern Canal, and the Town of Gilbert Drinking Water Treatment Plant.

12:00 noon - 1:15 p.m. **Lunch with Speaker**

Moderator — **Brian T. Wahlin**, WEST Consultants, Inc., and President, USCID, Tempe, AZ

Speaker — **John Shadegg**, former U.S. Representative, Arizona, Phoenix, AZ

1:30 p.m. - 3:00 p.m. **Opening Plenary Session**

Moderator — **Eduardo Bautista**, Agricultural Research Service, USDA, Maricopa, AZ

Keynote Address

Brenda Burman, Commissioner, Bureau of Reclamation, Washington, DC (invited)

Arizona Department of Water Resources Update

Tom Buschatzke, Director, Arizona Department of Water Resources, Phoenix, AZ

The Water Research Foundation Update

John Albert, Chief Research Officer, The Water Research Foundation, Alexandria, VA

3:00 p.m. - 3:30 p.m. **Break**

3:30 p.m. - 4:30 p.m. **Opening Plenary Session, (continued)**

Moderator — **Eduardo Bautista**

Salt River Project Update

Dave Roberts, Associate General Manager, Water Resources, Salt River Project, Phoenix, AZ

Use of Geosynthetics for Lining Irrigation Canals

Herve L. Plusquellec, Consultant, Washington, DC

4:30 p.m. - 5:00 p.m. **USCID Update**

Speakerr — **Brian T. Wahlin**

5:00 p.m. - 5:30 p.m. **Meet the Exhibitors**

5:30 p.m. - 7:30 p.m. **Networking Reception, Exhibition and Poster Session**

Wednesday, October 17

7:00 a.m. - 5:00 p.m. **Registration**

7:00 a.m. - 8:00 a.m. **Continental Breakfast with Exhibits and Poster Papers**

8:00 a.m. - 10:00 a.m. **Panel Discussion — Use of Recycled Water in Agriculture**

Moderator — **Kristan VandenHeuvel**, The Water Research Foundation, Alexandria, VA

Panel Members:

Brent Haddad, Professor, University of California, Santa Cruz, Santa Cruz, CA

Kara Nelson, Professor, University of California, Berkeley, Berkeley, CA

Anne Thebo, Research Scientist, Pacific Institute, Oakland, CA

Bahman Sheikh, Research Scientist, Bahman Sheikh Water Reuse Consulting, San Francisco, CA

Shannon Spurlock, Director of External Relations, Denver Urban Gardens, Denver CO

10:00 a.m. - 10:30 a.m. **Break with Exhibits and Poster Papers**

10:30 a.m. - 12:00 noon **Panel Discussion — Use of Recycled Water in Agriculture (continued)**

12:00 noon - 1:15 p.m. **Lunch with Speaker**

Moderator — **Brian T. Wahlin**

Speaker — **George Seperich**, Arizona State University, Tempe, AZ

1:30 p.m. - 3:00 p.m. **Concurrent Technical Session A — Water Reuse**

Moderators — **Kristan VandenHeuvel**, The Water Research Foundation, Alexandria, VA; and **Anne Thebo**, Pacific Institute, Oakland, CA

Varying Practices and Attitudes Associated with Water Reuse for Agricultural and Residential Irrigation in Northern Utah

L. Niel Allen, **Courtney Flint** and **Kristen Koci**, Utah State University, Logan, UT

Pathogen Occurrence in Treated Domestic Wastewater intended for Irrigation

Walter Betancourt, **Libin Zhu**, **Sadhana Ravishankar**, **Channah Rock**, **Luisa Ikner** and **Charles Gerba**, The University of Arizona, Tucson, AZ

Investigation and Analysis of a Variety of Pharmaceuticals and Personal Care Products in Reclaimed Domestic Wastewater Used for Urban Agriculture in Northern Utah

Leila Ahmadi, **R. Ryan Dupont** and **Joan E. McLean**, Utah State University, Logan, UT

1:30 p.m. - 3:00 p.m. **Concurrent Technical Session B — Non-Traditional Sources of Water**

Moderators — **Peggy B. Graham**, Advanced Drainage Systems, Longmont, CO; and **Hassan A. Elsaad**, Salt River Project, Phoenix, AZ

A New Perspective in Stormwater Management

Ricardo Aguirre, Holistic Engineering and Land Management, Phoenix, AZ

Salt River Project Irrigation Lateral Capacity Tool

Bert Clemmens, **Brent Travis**, **Brian Wahlin**, and **Jorge Garcia**, WEST Consultants, Inc., Tempe, AZ

A Guide to Agricultural Water Conservation Projects and Regulatory Barriers: A Case Study from the Sweeney McCune Automation and Recovery Project in Solano County, California

Justin M. Hopkins, Solano Irrigation District, Vacaville, CA;

Amy E. Storck, Dokken Engineering, Folsom, CA; and

Kevin L. King, Solano Irrigation District, Vacaville, CA

1:30 p.m. - 3:00 p.m. **Concurrent Technical Session C — Infrastructure**

Moderators — **David T. Phelps**, Stantec Consulting Services, Inc., Phoenix, AZ; and **Erling A. Juel**, Greenfields Irrigation District, Fairfield, MT

Modernizing Aging Pipe Infrastructure in Irrigation Districts

Charles M. Burt, **Kyle Feist** and **Zachary Markow**, Irrigation Training and Research Center, San Luis Obispo, CA

Lake Houston Dam Rehabilitation Project

Mike Gerlach, Stantec Consulting Services, Inc., Phoenix, AZ

Hydromodification Water Storage

Tom LaRue, Advanced Drainage Systems, Perris, CA

3:00 p.m. - 3:30 p.m. **Break with Exhibits and Poster Papers**

3:30 p.m. - 5:30 p.m. **Concurrent Technical Session A — Water Reuse (continued)**

Moderators — **Kristan VandenHeuvel** and **Anne Thebo**

Investigating Various Methods of Pharmaceutical Compound Detection in Aerosols from Reclaimed Water Sprinkler Irrigation

Leila Ahmadi, **Kwame T. Duodu**, **R. Ryan Dupont**, **Randal S. Martin** and **Joan E. McLean**, Utah State University, Logan, UT

Verification of Enteric Virus Removal by Soil Aquifer Treatment via Non-human Viruses Used as Conservative Indicators

Christina M. Morrison and **Walter Q. Betancourt**, The University of Arizona, Tucson, AZ; **Daniel R. Quintanar**, The City of Tucson Water, Tucson, AZ; and **Ian L. Pepper** and **Charles P. Gerba**, The University of Arizona, Tucson, AZ

From Plant to Pipe to Plants: Re-Purposing Process Water to Grow the Phoenix Valley

Taylor Ahrensdorf, Stantec Consulting Services, Inc., Phoenix, AZ

In-Situ Autonomous Bacterial Pathogen Sensor for Ag Reuse Water Monitoring

Dan Angelescu, **Joyce Wong** and **Andreas Hauso**, Fluidion US Inc., Los Angeles, CA

3:30 p.m. - 5:30 p.m. Concurrent Technical Session B — Non-Traditional Sources of Water (continued)

Moderators — **Peggy Graham** and **Hassan A. Elsaad**

CAP System Use Agreement

Marcus Shapiro, Central Arizona Project, Phoenix, AZ

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3:30 p.m. - 5:30 p.m. Concurrent Technical Session C — Infrastructure (continued)

Moderators — **David T. Phelps** and **Erling A. Juel**

SCADA System Maintenance: An Often Overlooked Necessity

Kyle E. Feist and **Charles M. Burt**, Irrigation Training and Research Center, San Luis Obispo, CA

Electronic Monitoring and Control of the Water Delivery System at Hammond Conservancy District

Tom Gill and **Kent Walker**, Bureau of Reclamation, Denver, CO

Infrastructure Issues in Water Use for Irrigated Agriculture: A Case Study from Pakistan

Sajid Ali Bhutto, Irrigation Department Government of Sindh, Hyderabad, Pakistan

Unlined Ditch Conversions with an Emphasis on Thermoplastic Pipe

Peggy B. Graham, Advanced Drainage Systems, Longmont, CO

6:30 p.m. - 7:00 p.m. Reception

7:00 p.m. - 9:00 p.m. Awards Dinner with Speaker

Moderator — **Brian T. Wahlin**

Speaker — **Guy Carpenter**, Carollo Engineers, Phoenix, AZ

Thursday, October 18

7:00 a.m. - 5:00 p.m. Registration

7:00 a.m. - 8:00 a.m. Continental Breakfast with Exhibits and Poster Papers

8:00 a.m. - 10:00 a.m. Panel Discussion — Water Reuse in Irrigated Agriculture: Recommendations Towards a Safe and Sustainable Solution to Climate Variability

Moderator — **Channah M. Rock**, University of Arizona, Maricopa, AZ

Panel Members

Amy Sapkota, University of Maryland, College Park, MD

Channah Rock, University of Arizona, Maricopa, AZ

Sean Ellis, University of Delaware, Newark, DE

Charles Gerba, University of Arizona, Tucson, AZ

Manan Sharma, Agricultural Research Service, USDA, Beltsville, MD

8:00 a.m. - 10:00 a.m. Concurrent Technical Session D — Evapotranspiration

Moderators — **W. Martin Roche**, Consultant, Grass Valley, CA; and **Sara Harper**, Dewberry, Sacramento, CA

Water Use of Micro-irrigated Pistachio Orchards Grown on Increasingly Saline Soils in California

Giulia Marino, University of California, Davis, Davis, CA;

Blake Sanden, University of California Cooperative

Extension, Bakersfield, CA; **Louise Ferguson** and **Bruce Lampinen**, University of California, Davis, Davis, CA; **Cayle**

Little, California Department of Water Resources,

Sacramento, CA; and **Mahesh Lal Maskey**, **Richard Snyder**

and **Daniele Zaccaria**, University of California, Davis, Davis, CA

Impact of Sensor Spatial Response in Evapotranspiration Estimation Using Landsat Satellite Data

Aldo Piñón-Villarreal, Angelo State University, San Angelo, TX; and **Zohrab Samani** and **Salim Bawazir**, New Mexico

State University, Las Cruces, NM

Evapotranspiration Measurements over Lettuce and Wheat in Yuma, Arizona

Andrew French, Agricultural Research Service, USDA,

Maricopa, AZ; **Charles Sanchez**, University of Arizona,

Maricopa, AZ; and **Mazin Saber**, University of Arizona, Yuma, AZ

Phenotyping Cotton Water Use with Multispectral Drone Imagery and Geospatial FAO-56 Methods

K. R. Thorp, **A. L. Thompson**, **S. J. Harders**, **A. N. French**

and **R. W. Ward**, Agricultural Research Service, USDA,

Maricopa, AZ

8:00 a.m. - 10:00 a.m. **Concurrent Technical Session E — Irrigation and Water Management**

Moderators — **David E. Bradshaw**, Imperial Irrigation District, Imperial, CA; and **Blair L. Stringam**, New Mexico State University, Las Cruces, NM

Managing Irrigation with Limited Water Using iCrop

I. Kisekka, University of California, Davis, Davis, CA; and **J. Kim**, Colorado State University, Fort Collins, CO

FloodMAR under SGMA in the San Joaquin Valley, CA

Philip Bachand, Bachand & Associates, Davis, CA; **Calvin Monreal** and **Randy Hopkins**, Provost & Pritchard Consulting Group, Clovis, CA; **David Merritt**, Kings River Conservation District, Fresno, CA; and **Don Cameron**, Terranova Ranch, Helm, CA

Using Net Groundwater Extractions for Farm Level Groundwater Sustainability Monitoring

Daniel Howes and **Morgan Whinery**, California Polytechnic State University, San Luis Obispo, CA; and **Eric Limas** and **Dan Vink**, Lower Tule River and Pixley Irrigation Districts, Tipton, CA

Improving Water Management through Managed Aquifer Recharge Using Agricultural Field Drains

James Norris, California State University, Chico, Chico, CA

10:00 a.m. - 10:30 a.m. **Break with Exhibits and Poster Papers**

10:30 a.m. - 12:00 noon **Panel Discussion — Use of Recycled Water in Agriculture** (continued)

10:30 a.m. - 12:00 noon **Concurrent Technical Session D — Evapotranspiration** (continued)

Moderators — **W. Martin Roche** and **Sara Harper**

Application of Remote Sensing in Agricultural Water Management

Zohrab Samani and **Salim Bawazir**, New Mexico State University, Las Cruces, NM

Evapotranspiration Studies in Yuma, Arizona

Charles Sanchez, University of Arizona, Maricopa, AZ

e-Admin System for Agri-Irrigation Project

Dilip Yewalekar and **Manisha Kinge**, Jain Irrigation Systems Ltd, Jalgaon, India

10:30 a.m. - 12:00 noon **Concurrent Technical Session E — Irrigation and Water Management** (continued)

Moderators — **David E. Bradshaw** and **Blair L. Stringam**

Sharing of Colorado-Big Thompson Project Water for Agricultural, Industrial and Municipal Use

Jim Hall, Northern Water, Berthoud, CO

Alternative Water Sources in Stakeholder Frames of Agricultural Challenges and Solutions

Julia C. Bausch, University of Arizona, Tucson, AZ; and **Clinton F. Williams**, Agricultural Research Service, USDA, Maricopa, AZ

Assessing the Risk of Aquifer Salinization in a Large-Scale Coastal Irrigation Scheme of Southern Italy

Daniele Zaccaria, University of California, Davis, Davis, CA; **Giuseppe Passarella**, Water Research Institute, Bari, Italy; **Daniela D'Agostino**, Mediterranean Agronomic Institute of Bari, Bari, Italy; **Samuel Sandoval Solis** and **Mahesh Maskey**, University of California, Davis, Davis, CA; and **Laura Foglia**, University of California, Davis, Davis, CA

12:00 noon - 1:15 p.m. **Lunch with Speaker**

Moderator — **Brian T. Wahlin**

Speaker — **Larry Mays**, Arizona State University, Tempe, AZ

1:30 p.m. - 3:00 p.m. **Concurrent Technical Session F — Groundwater**

Moderators — **Aldo R. Pinon-Villarreal**, Angelo State University, San Angelo, TX; and **Taylor Ahrensdorf**, Stantec Consulting Services, Inc., Phoenix, AZ

LAT 7.70R (Canal 1 Joint Works) / MAR 1B Improvements Located Near Coolidge Arizona for Pima-Maricopa Irrigation Project, Arizona USA

David T. Phelps, Stantec Consulting Services Inc., Phoenix, AZ; and **Bill Eden**, Pima-Maricopa Irrigation Project, Sacaton, AZ

Incentivizing Incidental Groundwater Recharge in Teton Valley, Idaho

Kate Burchenal, **Morgan Campbell**, **Lucy Hedley**, **Emily Honn** and **Tessa Reeder**, University of California Santa Barbara, Santa Barbara, CA

Using Hydraulic Profiling for Irrigation Drainage Design

Roger Burnett, Bureau of Reclamation, Denver, CO

1:30 p.m. - 3:00 p.m. **Concurrent Technical Session G — Regulatory Issues**

Moderators — **Randy Hopkins**, Provost & Pritchard Consulting Group, Clovis, CA; and **Aung K. Hla**, Bureau of Reclamation, McCook, NE

New Mexico Unit of the Central Arizona Project

Anthony Gutierrez, New Mexico Central Arizona Project Entity, Cliff, NM; and **David Maxwell**, Stantec Consulting Services, Inc., Silver City, NM

The History of Wastewater Reuse in Agriculture in the U.S.

William F. Ritter, University of Delaware, Newark, DL

Arizona Recycled Water Use

Channah M. Rock, University of Arizona, Maricopa, AZ

1:30 p.m. - 3:00 p.m. **Concurrent Technical Session H — Western U.S. Water Infrastructure Updates**

Moderators — **Reed R. Murray**, U.S. Department of the Interior, Provo, UT; and **Nelson W. Plummer**, Consultant, Scottsdale, AZ

Bureau of Reclamation Infrastructure Plans in the Western U.S.

Delbert M. Smith, Bureau of Reclamation, Denver, CO

Lake Mead Intake No. 3 — Ensuring Access to Water Supply Under Extreme Drought Conditions

Erika Moonin, Southern Nevada Water Authority, Las Vegas, NV

Lake Powell Pipeline in southern Utah and Development of the Bear River

Joel Williams, Utah Division of Water Resources, Salt Lake City, UT

3:00 p.m. - 3:30 p.m. **Break with Exhibits and Poster Papers**

3:30 p.m. - 5:30 p.m. **Concurrent Technical Session F — Groundwater** (continued)

Moderators — **Aldo R. Pinon-Villarreal** and **Taylor Ahrens**

Effect of Conjunctive Use of Surface and Groundwater on Groundwater Recharge

Pooneh Pahlevani, WSP USA, Charlotte, NC; and **Zohrab Samani**, New Mexico State University, Las Cruces, NM

Transit Time of Agricultural Recharge to Aquifer

Hugo Perea, Arizona Department of Water Resources, Phoenix, AZ

Groundwater Issues in the State of Nebraska

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3:30 p.m. - 5:30 p.m. **Concurrent Technical Session G — Regulatory Issues** (continued)

Moderators — **Randy Hopkins** and **Aung K. Hla**

Rio Grande Compact: A History of Conflict and Compromise

Scott Verhines, Stantec Consulting Services, Inc., Albuquerque, NM; and **George V. Sabol**, Stantec Consulting Services, Inc., Phoenix, AZ

Regulatory and Implementation Topics for Water Reuse in the U.S.

Jeff Mosher, Carollo Engineers, Phoenix, AZ

Use of Municipal Wastewater for Irrigation in California Revisited

W. Martin Roche, Consultant, Grass Valley, CA

Regulatory-Public Perception Issues in Arizona

Jeff Tannler, Arizona Department of Water Resources, Phoenix, AZ

3:30 p.m. - 5:30 p.m. **Concurrent Technical Session H — Western U.S. Water Infrastructure Updates** (continued)

Moderators — **Reedy R. Murray** and **Nelson W. Plummer**
Sites Dam and California Developments
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Northern Water and Gross Dam Raise Projects in Colorado
Gerald A. Gibbens, Northern Water, Berthoud, CO

Shasta Dam Raise

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Klamath Dam Removal Project

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Friday, October 19

8:00 a.m. - 5:30 p.m. **Field Tour with lunch**

This Field Tour will visit the Pima-Maricopa Irrigation Project near Sacaton, Arizona. Lunch is included.

(July 13, 2018)