This presentation premiered at WaterSmart Innovations

watersmartinnovations.com



Building Resilient Communities Managing Landscapes During Drought

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WaterSmart Innovations Conference 10-6-2017

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A & N Technical Services Inc.















WARM UP

- Name
- Background
- Most Exciting Thing You Are Working On?

What is Resilience?



URBAN RESILIENCE IS THE CAPACITY OF INDIVIDUALS, COMMUNITIES, INSTITUTIONS, BUSINESSES, AND SYSTEMS WITHIN A CITY TO SURVIVE, ADAPT, AND GROW NO MATTER WHAT KINDS OF CHRONIC STRESSES AND ACUTE SHOCKS THEY EXPERIENCE.













FALL

GET BACK UP





REFLECTIVE ABLE TO LEARN



INTEGRATED

8 COMMUNICATION



INCLUSIVE

SYSTEMS WORK TOGETHER



RESOURCEFUL

CAN EASILY REPURPOSE RESOURCES



ROBUST

WELL CONCEIVED, CONSTRUCTED AND MANAGED



FLEXIBLE

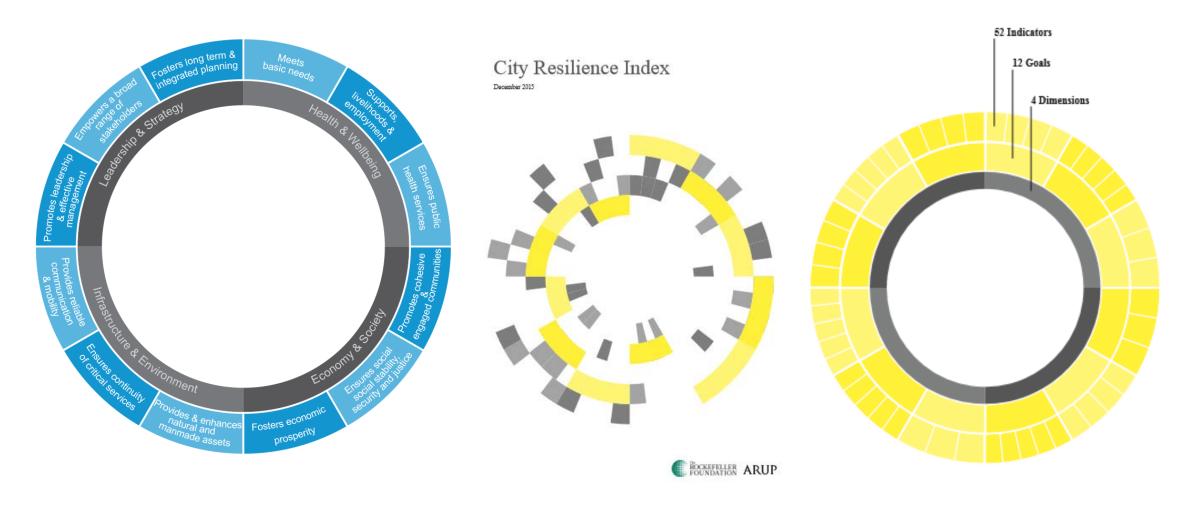
HAS ALTERNATIVE STRATEGIES



HAS BACKUP CAPACITY OF FAILURE

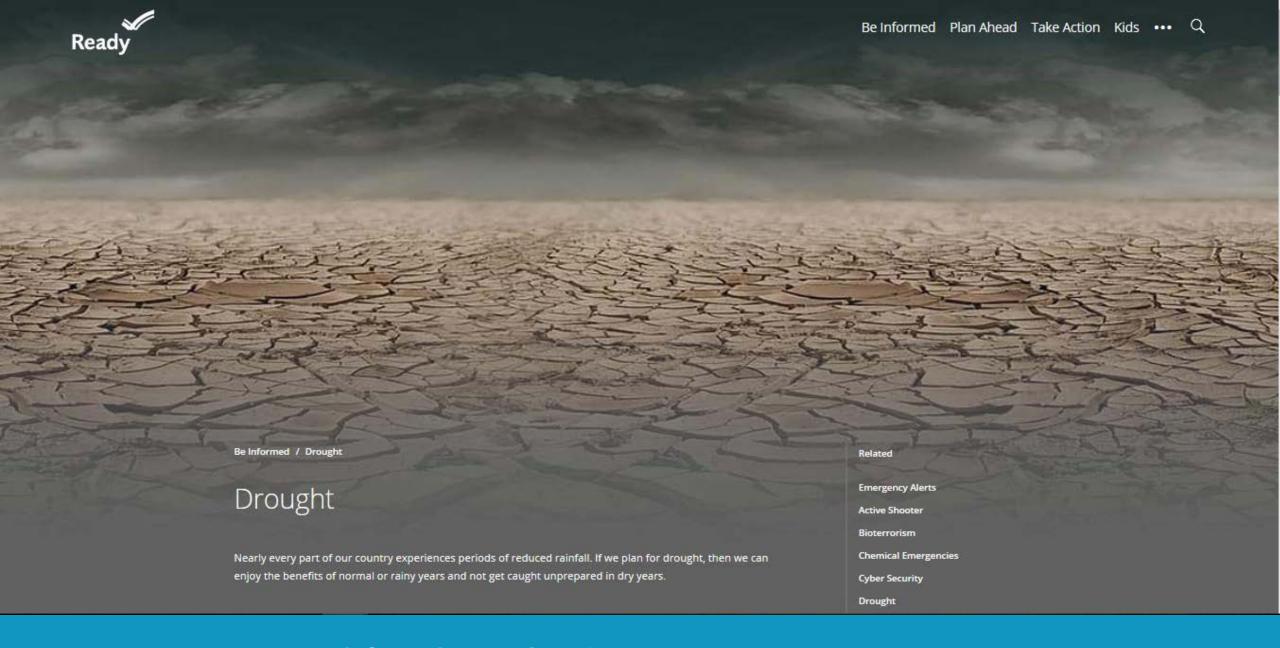
Community Resilience

Structure of the CRI



HEALTH & WELL-BEING





Are we prepared for droughts?



Outdoor Irrigation Inspections For Your HOA Or Business

Slow the Flow offers a quick and impactful way to evaluate the irrigation practices of your commercial property or HOA and makes simple suggestions for changes that will reduce waste and eliminate runoff. Slow the Flow's trained technicians perform a detailed analysis of your existing sprinkler system and will provide a comprehensive report detailing findings and recommendations to improve efficiency.

OUTDOOR IRRIGATION





How do droughts affect jobs?

RIPPED FROM THE HEADLINES

Water wars: Are hundreds of residents going to go thirsty north of Phoenix?



Hauling water in New River

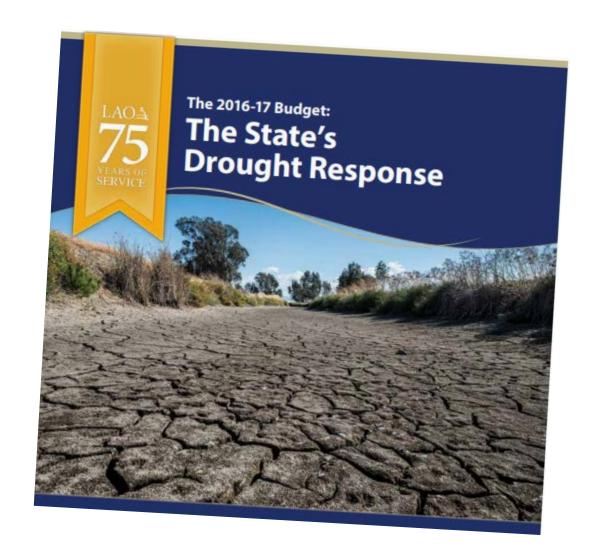
Damon Bruns of Dynamite Water tests water quality on Sept. 25, 2017, before filling his truck from a Phoenix hydrant at Interstate 17 and Pioneer Road.

How does drought effect health?

ECONOMY & SOCIETY



- California Drought Spending
- State Funded Both Short
 – and Long
 –Term Drought
 Response Activities.
- This includes appropriating \$3 billion to 13 different state departments between 2013–14 and 2015–16.



What are the real costs of drought?

RIPPED FROM THE HEADLINES



A ruling Monday said penalties for high water use, instead of one based on provider costs, violate Proposition 218 limits on government. Randall Benton - Sacramento Bee file

WATER & DROUGHT

California cities fret over tiered water rates after court decision



How are rules and regulations changing things?

RIPPED FROM RESEARCH

"During periods of mandatory restrictions, savings measured in expected use per capita ranged from 18 to 56 percent, compared to just 4 to 12 percent savings during periods of voluntary restrictions. "

JOURNAL OF THE AMERICAN WATER RESOURCES ASSOCIATION

USE AND EFFECTIVENESS OF MUNICIPAL WATER RESTRICTIONS DURING DROUGHT IN COLORADOL

Douglas S. Kenney, Roberta A. Klein, and Martyn P. Clark²

AND INCET DROUGHT CONSTRUCTS in the superner of times prompted account cities along Colorado's Front Europe is exact restrictions on suchiae water use, forming primarily on limiting the frequency of the construction of the colorado's account of the col scannes were use, incoming presency we assume the company of the contract of t area manning, and the state of And where terminate to interpretate time sever or water ascenage and, measured as a comparison of 2002 mage to 2000 to 2001 age usage, and also based on a statistical estimate of 2002 age unuspy, and and make the impact of drought conditions when due that accounts for the impact of drought conditions deed use: that accounts for the impact or drought consumers. cannot, Mandatary restrictions were shown to be an effective tool for deought coping. During periods of mandatory restrictions, he no consignt supage toward persons as remaining reservoirous, average necessaried in especial use per capita ranged from 18 to 56 persons, compared to just 4 to 12 persons savings during persons of manufacture constitutions. As associated association with the convaluetary restrictions. As antisipated, providers with the most reluciary restrictions. As autospaces, provinces were now some artispost neutrictions achieved the greatest artisps. (EET TERMS; water conservation; drought; water restrictions;

Kamery, Deceptes S., Roberts A. Klein, and Martyn P. Clark, 2004. Libe and Effec-Streets of Municipal Water Restrictors During Drought in Colorado, Austral of the American Water Resources Association (1488) 49(1):77-47.

INTRODUCTION

There is a long tradition in municipal governments to base water plans and associated water development activities on high growth scenarios, extreme drought conditions, and only a modest level of water conservation savings (Baumann et al., 1998). This worst case scenario planning greatly limits the risk of experiencing water shortages and thus the political fallout that can accompany such an event. For this reason, most municipal residents in the United States, even in arid and semi-arid regions, rarely if

ever experience shortages at the tap. It takes something truly out of the ordinary to seriously test the resilience of most municipal water systems.

In the summer of 2002, residents in the Denver metro area experienced something out of the ordinary. A few relatively dry but otherwise uneventful years quickly developed into the most extreme drought on record, surpassing even the 1954 drought often used for planning purposes. Faced with rapidly declining water supplies and the prospects of real shortages, most municipalities in the region turned to outdoor lawn watering restrictions as an emergency coping mechanism. Restrictions, both voluntary and mandatory, were coupled with public education campaigns tory, were coupled was placed and associated and associated other elements such as price

In this study the experiences of municipal water providers serving the following cities along Colorado's porthern Front Range were tracked: Aurora, Boulder, Fort Collins, Lafayette, Louisville, Thornton, and Westminster, Denver Water also was tracked. In addition to serving Colorado's largest city, Denver Water provides full or partial supplies to approximately 90 surrounding communities and water districts (Hydrosphere Resource Consultants, Inc.; HRS Water Consultants, Inc.; Mulbern MRE, Inc.; and Spreak Water Engineers, Inc., 1999, unpublished report). As shown in Table 1, these eight providers collectively serve more than 1.85 million customers. Each of the eight municipal water providers studied operates with a different mix of supply sources and water rights portfolios, and each exacted a slightly different suite of

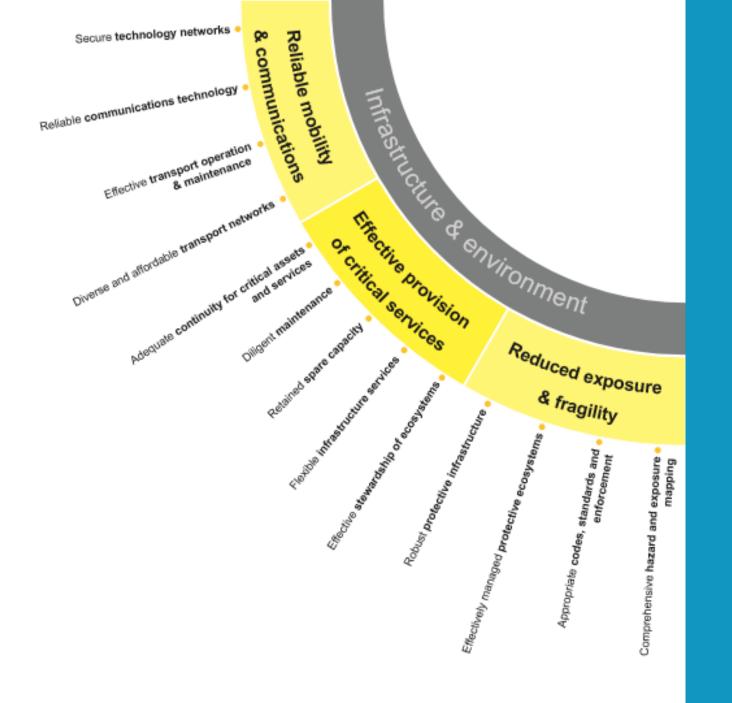
e Journal of the American Water Resources Americation (IABRA) (Copyright © 2004). Discussions are open until August 1, 2004.

**Suspectively, Remarch Associate, Natural Resources Law Center, University of Colorado, UCR 401, Realider, Colorado 80309-0401; Manging Director, Control for Science and Technology Policy Research, University of Colorado, UCR 401, Realider, Colorado 80309-0401; Manging Director, Western Water Associated, University of Colorado, UCR 488, Realider, Colorado 80309-0408; Realider, Colorado 80309-0408; Manging Colorado, UCR 488, Realider, Colorado 80309-0408; Realider, Colorado

Voluntary of mandatory restrictions?



How can communities change to be more prepared?



INFRASTRUCTURE & ENVIRONMENT

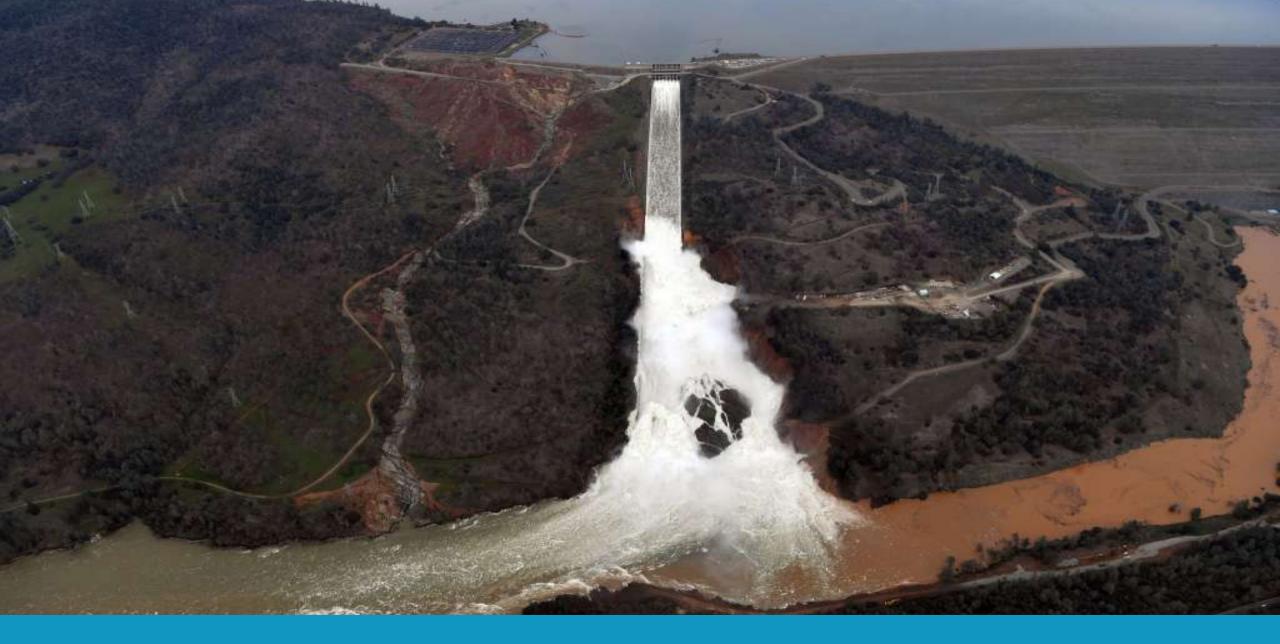
Those who are most at risk can least afford to be resilient



What are the equity issues with drought response?



How does climate change increase risk?



What are the infrastructure concerns?



LEADERSHIP & STRATEGY



Urban Development

Water flows through development – big ideas from World Water Week















Are we planning for growth with water in mind?

ABOUT US

HOW DO I?

ADWR NEWS



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Arizona Water Resources director joins U.S. & Mexico in finalizing epic CO River agreement



Published: September 27, 2017



With an eye to long-term, binational cooperation and to managing a more stable Colorado River System, representatives of the United States, Mexico and the Colorado River Basin States of the U.S. on Wednesday celebrated the "entry into force" of an agreement deemed essential to the System's future.



The American signing, conducted at an "entry into force" ceremony in Santa Fe. N.M., applies the final



Overview

News Articles

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Are we planning for growth with water in mind?



Final Thoughts

What's Next

- Big Innovation?
- Big Idea?
- Big Data?

Photo Credits & References

Rockefeller Foundation, ARUP, 100 Resilient Cities Community Resilience Index

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Ready.gov website

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California drought spending

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Xeriscape House

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California drought spending

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Colorado River Basin

• http://discovermagazine.com/2015/jan-feb/14-a-river-resurrected

Climate Change is Water Change

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Drought & Inequality

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Piggy Bank

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