



WESTERN RESOURCE
ADVOCATES



SMART *Water*

A Comparative Study
of Urban Water Use
Efficiency Across
the Southwest



WESTERN RESOURCE
ADVOCATES

SMART *Water*

A Comparative Study
of Urban Water Use
Efficiency Across
the Southwest

SMART Water

A Comparative Study of Urban Water Use Across the Southwest

Produced and written by Western Resource Advocates

Graphic Design, Cover Design:
Karen Y. Gerhardt/Westerly Design
Cover Photos: Jeff Widen

Copies of *Smart Water* may be obtained by contacting:

Western Resource Advocates
2260 Baseline Road, Suite 200
Boulder, CO 80302
Tel: (303) 444-1188 x247
Fax: (303) 786-8054
www.westernresourceadvocates.org



WESTERN RESOURCE
ADVOCATES

Western Resource Advocates uses law, economics, and policy analysis to protect land and water resources and assure that energy demands are met in environmentally sound and sustainable ways. It collaborates with environmental and community groups to protect the natural environment of the Interior West, taking into account the economic and cultural framework of the region.



Printed on recycled paper

©Copyright December 2003. All rights reserved.

Foreword/Acknowledgements

This report was made possible by grants from the William and Flora Hewlett Foundation, the Surdna Foundation, and the Turner Foundation. We are extremely grateful for their support.

Bruce Driver, Executive Director of Western Resource Advocates, conceived of the report. He was co-author along with Bart Miller (Water Program Director) and Don Wojcik (Smart Water Technical Analyst). Claudia Putnam (Communications Director) and Melanie Newton (Program Assistant) provided editing and production assistance.

Western Resource Advocates wishes to thank many others who contributed. First and foremost, we must thank Amy Vickers. Well-known across the country for her work on urban water conservation, Amy served as a special consultant on the report. She provided crucial guidance and input throughout the process.

Eli Feldman drafted the Smart Water survey and carried out substantial preliminary research. Jarett Zuboy contributed research related to the connection between water and sprawl. Tim Carstensen assessed water rate data and helped generate the rate curves in Chapter 3. Greg Adams supplemented research on programs and systems of specific water providers. Traci Garner completed research on legal authorization for water rates.

We are very grateful for efforts of the water providers who completed our Smart Water survey, responded to subsequent

requests for information, and provided comments on a draft of Chapter 3 and Appendices A and B. Specifically, we wish to thank the helpful staff of the City of Albuquerque Public Works Department, City of Boulder Water Utilities Department, Denver Water, El Paso Water Utilities, City of Grand Junction Water Utilities Department, Centennial Water and Sanitation District, Las Vegas Valley Water District, City of Mesa Utilities Department, City of Phoenix Water Services Department, City of Scottsdale Water Resources Department, Taylorsville-Bennion Improvement District, Tempe Water Utilities Department, and City of Tucson Water Department.

A number of individuals provided insightful comments on drafts of the complete report. We thank Val Little, Bonnie Colby, Dan Luecke, David Nickum, Melinda Kassen, Ann Livingston, Leanne Leith, Kara Gillon, Erica Thoen, and Alan Matheson.

The report's findings, views, and opinions are those of Western Resource Advocates and do not imply endorsement by our funders, contributors, and reviewers. Any factual inaccuracies are the sole responsibility of Western Resource Advocates.



Table of Contents

Executive Summary	1
Chapter 1	
Environmental Issues Related to Water Supply & Growth.....	5
Escalating Population: The Depth of the Challenge	8
Growing Impacts on River Systems.....	10
Arizona	11
Nevada.....	14
New Mexico.....	16
Texas.....	17
Utah.....	19
Colorado.....	20
Why the Focus on Urban Populations?.....	22
Denver’s Water Future: A Case in Point	23
Chapter 2	
Water Use Efficiency: State-of-the-Art	25
Supply-Side Water Use Efficiency Measures.....	26
Water Loss Management	26
Cooperative Water Management and Transfers	29
Aquifer Storage and Recovery and Conjunctive Use	32
Water Reuse and Recycling.....	33
Demand-Side Water Use Efficiency Measures	36
Measures for Outdoor Efficiency.....	37
Measures for Indoor Efficiency	43
Implementing Water Use Efficiency Measures: Via Incentives, Regulations, and Education Programs.....	46
Incentives	46
Water Rate Structures	46
Rebate and Retrofit Programs.....	48
Regulations	50
Education	51
Integrated Demand and Supply-Side Planning.....	53
Conclusion	54
Chapter 3	
Comparative Analysis of Water Providers in the Southwest: Water Use and Demand-Side Efficiency.....	55
Background: Smart Water Survey Participants	56
“Ends” – 2001 Water Use Comparisons.....	59
Single-Family Residential Consumption	60
System-wide per capita Water Consumption	66
Unaccounted For Water (UFW).....	67



Chapter 3 (continued)

“Means” – 2001 Water Conservation Measures, Incentives, and Programs.....	71
Rebates, Education, and Regulations.....	72
Water Rate Structures	74
2001 Conservation Budgets	87
2002 Drought Response Measures	88
Observations and Conclusions of Comparative Analysis.....	90

Chapter 4

Urban Sprawl: Impacts on Urban Water Use	93
What Exactly Is Urban Sprawl?	94
How Are Western Cities Sprawling?.....	94
How Does Sprawl Affect Water Use?.....	96
How Can Smart Development Decrease Water Consumption?	100
Conclusion	103

Chapter 5

Recommendations	105
-----------------------	-----

Appendix A

Smart Water Survey and Data Analysis Methodology	115
--	-----

Appendix B

City-By-City Analysis: Summary of Systems and 2001 Programs and Policies.....	121
Albuquerque.....	122
Boulder.....	127
Denver.....	130
El Paso.....	134
Grand Junction.....	139
Highlands Ranch	142
Las Vegas	145
Mesa	149
Phoenix	154
Scottsdale	159
Taylorsville.....	164
Tempe.....	168
Tucson	173
Water Provider Contact Information.....	178



Space for Notes