A REPORT ON ADDRESSING CALIFORNIA'S WATER INFRASTRUCTURE NEEDS

William R. Gianelli Water Leaders Class of 2012

Water Education Foundation

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1. INTRODUCTION

Water and wastewater infrastructure is fundamental to human health, ecosystem services and habitat quality, and socioeconomic well-being, growth, and prosperity in California communities and those around the United States (U.S.). As noted by the American Society of Civil Engineers (ASCE) (ASCE, 2011), drinking-water systems collect source water from rivers, lakes, and groundwater, remove pollutants and distribute safe drinking water. Wastewater systems collect used water and sewage, remove contaminants, and discharge clean water back into rivers, lakes, and groundwater for future use. Wet-weather infrastructure, such as sanitary sewer overflows, prevent various types of pollutants like sewage, heavy metals, or fertilizers from lawns from reaching waterways. All sectors of society in California, from public to private, urban to rural, and industrial to agricultural depend on water and wastewater infrastructure.

However, in many parts of California, water and wastewater infrastructure is old, in need of replacement, and unable to meet the demands of a growing population. Failures in drinking-water infrastructure can result in water disruptions, impediments to emergency response, and damage to other types of essential infrastructure that could lead to unsanitary conditions and increase the likelihood of public health issues (ASCE, 2011). The condition of many of the State's wastewater systems is also poor, with aging pipes and inadequate capacity leading to discharge of untreated sewage to local surface and groundwater resources.

As a result of these and other related concerns, there is a growing list of questions that must be addressed by California's water planners and managers, officials, and stakeholders.

1.1. Purpose of this Report

The Water Leaders Class of 2012 was challenged with the complex issue of California's aging water and wastewater infrastructure. In approaching this topic, the Class researched infrastructure impediments including addressing questions regarding financing; governance, policy, and reform; green infrastructure, conservation, and climate change; and environmental justice. While researching this topic, the 21 Water Leaders interviewed their mentors (listed below) using a series of questions developed by the class in consultation with Rita Schmidt Sudman, Executive Director of the Water Education Foundation.

The purpose of this report is to present an analysis of aging water infrastructure in California that is largely based on a synthesis of the mentors' responses to the 13 specific questions. Because the mentors come from diverse backgrounds, we assume that their responses represent a range of viewpoints held by water-related stakeholders in California. We also acknowledge that the synthesis of responses may not reflect the opinions of all mentors or their employers or represented organizations.

1.2. Water Leaders Class of 2012

The Water Education Foundation's William R. Gianelli Water Leaders Class is a one-year program that identifies up-and-coming community leaders from diverse backgrounds, including members of minority and ethnic communities, and educates them about water issues. The program enhances individual leadership skills and prepares participants to take an active, cooperative approach to problem-solving and decision-making about water resources. Through the program, the Water Leaders have the opportunity to learn from other professionals with different backgrounds and expertise from their own to aid in developing a broad, holistic understanding of water-related issues. Leading stakeholders and policymakers serve as mentors to class members. In addition to the interview process, the Water Leaders spent a day shadowing their mentors and attended two water tours organized by the Water Education Foundation, including the Bay-Delta Tour, which helped the class to further understand the diverse array of water issues across California.

Water Leader	Mentor
Mary Akens Attorney III California Department of Water Resources	Tina Cannon Leahy Principal Consultant Assembly Water, Parks and Wildlife Committee
Rebecca Akroyd Attorney Kronick Moskovitz Tiedemann & Girard	Jonas Minton Water Policy Advisor Planning and Conservation League
Holly Alpert Program Manager Inyo-Mono Integrated Regional Water Management Program	Mark Norton Water Resources and Planning Manager Santa Ana Watershed Project Authority
Leonard Ash Engineer Alameda County Water District	Terry Erlewine General Manager State Water Contractors
Matt Brennan Senior Engineering Hydrologist Environmental Science Associates PWA	Jim Metropulos Senior Advocate Sierra Club of California
Courtney Davis Attorney Brownstein Hyatt Farber Schreck	Cindy Truelove Senior Policy Analyst California Public Utilities Commission
Kristal Davis Fadtke Staff Environmental Scientist Sacramento-San Joaquin Delta Conservancy	Curt Schmutte Principal Engineer Metropolitan Water District of Southern California/State and Federal Water Contractors Agency
Juliette De Campos Policy Advocate Community Water Center	Tim Quinn Executive Director ACWA

Anton Favorini-Csorba Fiscal and Policy Analyst Legislative Analyst's Office	Tim O'Halloran General Manager Yolo County Flood Control and Water Conservation District
Bill Fernandez Engineer CDM Smith	Tom Berliner Partner Duane Morris LLP
Tricia Geringer Director of Government Affairs Ag Council of California	Michelle Denning Regional Planning Officer, Division Chief Bureau of Reclamation
Jason Gurdak Assistant Professor San Francisco State University	Xavier Irias, P.E. Director of Engineering and Construction East Bay Municipal Utility District
Brian Lockwood Hydrologist Pajaro Valley Water Authority	John Woodling Executive Director Regional Water Authority & Sacramento Groundwater Authority
Mario Manzo Project Manager Bureau of Reclamation	Shauna Lorance General Manager San Juan Water District
Katharine Moore Consultant California Senate Natural Resources and Water Committee	Walt Wadlow General Manager Alameda County Water District
Mark Nordberg Engineering Geologist California Department of Water Resources	Joseph Countryman Board Member Private Consultant Central Valley Flood Protection Board
Brian Poulsen, Jr. Deputy General Counsel El Dorado Irrigation District	Martha Guzman-Aceves Deputy Legislative Secretary for Energy, Environmental Protection, Food and Agriculture, Natural Resources, and Water Governor's Office
Jesse Roseman Project Director The Nature Conservancy	Glen Grant Engineer, MWH Solano Irrigation District, Board Member
Samuel Sandoval Solis Assistant Professor University of California, Davis	Anson Moran President San Francisco Public Utility Commission
Alexandra Tollette Public Affairs Specialist and Water Resources Planner MWH Americas	Rob Roscoe General Manager Sacramento Suburban Water District

Peter Wijsman Program Manager Arcadis/Malcolm Pirnie	Anthony Saracino Chairman California Water Commission

Water Leader Biographies

The Water Leaders Class of 2012 is comprised of 21 water professionals from varying backgrounds and locations throughout California. The 2012 class includes professionals with careers in environmental planning and consulting; public and private water utilities; environmental and water law; legislative, agricultural, and state/federal agencies and organizations; environmental and water non-profit organizations; and higher education. Although the Water Leaders have varying backgrounds, they are each interested in California water issues. Brief biographies for the Water Leaders Class of 2012 are as follows.

Mary Akens

Mary Akens is an environmental and government lawyer. Since 2008, Mary has worked for the California Department of Water Resources (DWR) working on various issues including, but not limited to, matters under the California Environmental Quality Act (CEQA). In 2005, Ms. Akens was appointed by Governor Arnold Schwarzenegger to the position of Assistant General Counsel to the California Natural Resources Agency. Prior to her public service career, Ms. Akens also practiced in the private sector as an associate attorney for the Law Office of J. William Yeates in Sacramento, California. She primarily focused on CEQA matters representing non-profit environmental organizations and unincorporated citizen groups at the administrative and litigation level. Ms. Akens resides in Fair Oaks, California with her husband, John, and their two children, Bryce and Erin.

Rebecca Akroyd

Rebecca Akroyd is an associate attorney with the law firm of Kronick Moskovitz Tiedemann & Girard. Ms. Akroyd represents public and private sector clients in the areas of natural resources and water law. Her practice focuses on regulatory compliance, water rights, and compliance with state and federal water and environmental law. Specific areas of experience include the Federal and State Endangered Species Acts, National Environmental Policy Act, land-use matters, and the representation of homeowner associations. In addition to her legal work, Ms. Akroyd serves on the Board of Directors of the WarmLine Family Resources Center, a non-profit organization dedicated to providing resources and support to families of children with special needs.

Holly Alpert

Holly Alpert is the Program Manager for the Inyo-Mono Integrated Regional Water Management Program and lives in Mammoth Lakes, CA. In this position, she is responsible for the day-to-day operations of the Program, which include outreach, climate change analysis, and grant writing. Ms. Alpert is also serving on the California Department of Water Resources Climate Change Technical Advisory Group as well as various committees related to the California Water Plan Update 2013. She holds a B.A. in Environmental Science and American Studies from Wellesley College and a Ph.D. in Environmental Studies from the University of California, Santa Cruz. In her leisure time, Holly participates in the local community theatre and the Bristlecone Chapter of the California Native Plant Society.

Leonard Ash

Leonard Ash is an Engineer for the Alameda County Water District which provides water service to the cities of Fremont, Newark, and Union City. Mr. Ash served as a Peace Corps Volunteer in the West African country of Cote d'Ivoire and conducted research at the Cornell Local Roads Program in Ithaca, New York. Mr. Ash holds a Bachelor's degree in Agricultural and Biological Engineering from Cornell University and a Master's degree in Civil and Environmental Engineering from University of California, Berkeley.

Matt Brennan

Matt Brennan is an engineering hydrologist specializing in estuarine management and restoration. His strengths include evaluating management and restoration scenarios from hydrologic and geomorphic perspectives to support ecosystem sustainability. To implement these perspectives, Mr. Brennan has developed and applied a wide range of hydrodynamic and transport process numeric models. In conjunction with these technical skills, his project management experience includes active stakeholder communication and teaming with biologists.

Courtney Davis

Courtney is a natural resources attorney in the Santa Barbara office of Brownstein Hyatt Farber Schreck. She represents public and private sector clients in the water industry. Her practice covers a broad range of water issues, including water rights permitting, regulatory compliance, and basin management planning. She obtained her J.D. from The University of Texas at Austin and her bachelor's degree from the University of California, Berkeley. Prior to attending law school, Ms. Davis was an associate project manager for River Rock

Development Company in Sacramento, California where she worked with land developers, homebuilders, and public agencies on real estate and land use issues.

Juliette De Campos

Juliette de Campos serves as the Director of Operations for Community Water Center, a non-profit environmental justice organization committed to ensuring universal access to safe, affordable drinking water. She joined CWC as a Policy Analyst in 2011, and assumed her current role when the organization opened its second office in Sacramento in August 2012. She is responsible for internal operations, including fiscal administration, fundraising, and grant reporting related to CWC's ongoing efforts to inform, engage, and prepare residents of disadvantaged communities to participate in water policy discussions at the state and local levels. After graduating from the University of California, Los Angeles, Juliette went to work for the Tulare County Redevelopment Agency as a Community Development Specialist, focusing on finding solutions to challenges for water systems in the county's unincorporated areas. She then went on to serve as Central Valley District Director for U.S. Senator Dianne Feinstein, where she was an adviser to the senator on water issues. Juliette holds a B.A. in Political Science and an M.A. in applied psychology.

Kristal Davis Fadtke

Kristal Davis Fadtke is a Staff Environmental Scientist with the Sacramento-San Joaquin Delta Conservancy. In this position she coordinates with state, federal, and local stakeholders to implement Delta-related programs in areas including environmental restoration, habitat conservation, water quality, and climate change. Prior to joining the Conservancy, Ms. Fadtke worked in the private sector developing and implementing large-scale water quality monitoring programs and studied surface and groundwater contamination issues. She holds a Master of Science in Soil and Water Science and a Bachelor of Science in Environmental Science from University of California, Riverside.

Anton Favorini-Csorba

Anton is a Fiscal and Policy Analyst with the Legislative Analyst's Office, covering water, fish and wildlife, and agriculture. In that role he provides nonpartisan policy advice to the California Legislature on those subjects and analyzes the budgets of related state agencies. Prior to joining the LAO, Mr. Favorini-Csorba earned a master's degree in public policy from Duke University and worked on a variety of resources issues, including strategies to realize economic benefits from climate change mitigation, renewable energy development, and urban stormwater management.

Bill Fernandez

Bill Fernandez is a water resources engineer at CDM Smith with over 12 years of experience in water resources system analysis and planning. He has extensive experience performing hydrogeologic investigations, feasibility studies, remedial designs, and other environmental activities associated with groundwater flow and transport. He also has conducted long-term supply planning for numerous agencies including evaluating and optimizing water supply system operation including reservoirs, imported water, recycled water and groundwater as well as assessing these systems in the context of variable hydrology and climate change. Mr. Fernandez holds a bachelor's degree in engineering from Harvey Mudd College and a master's degree in water resources engineering from Tufts University and is a Registered Civil Engineer in the State of California.

Tricia Geringer

Tricia Geringer is Director of Government Affairs for Agricultural Council of California (Ag Council) based in Sacramento. She advocates on behalf of Ag Council members on key legislative issues in the state Capitol. Previously, she served as Legislative Director for Congressman George Radanovich in Washington, D.C. Ms. Geringer also worked as Director of Public Policy and Development for CONNECT in San Diego, which is a nonprofit that helps entrepreneurs launch companies. She holds a Bachelor's degree in Journalism from California State University, Fresno, a master's degree in Public Policy from George Mason University in Virginia, and a law degree from Thomas Jefferson School of Law in San Diego.

Jason Gurdak

Jason is an Assistant Professor of Hydrogeology in the Department of Geosciences at San Francisco State University where he leads the Hydrogeology and Water Resources Research Group. Prior to SFSU he was a Hydrologist for 11 years with the U.S. Geological Survey National Water Quality Assessment program. He has authored more than 30 peer-reviewed papers, books, and chapters on groundwater quality, vadose zone and soil-water processes, recharge and contaminant transport, groundwater vulnerability to contamination, including nonpoint-source nitrate, and climate variability and change effects on water resources. Mr. Gurdak also helps lead two international programs in UNESCO and INQUA on global groundwater, climate change, and paleoclimate signals that advance science, education, and awareness of the effects of climate change on global groundwater resources.

Brian Lockwood

Brian Lockwood is the Staff Hydrologist for the Pajaro Valley Water Management Agency, where he works to manage the groundwater basin in order to eliminate groundwater overdraft, halt seawater intrusion, and improve water quality. This work is accomplished by the collection and analysis of groundwater and surface water data, running hydrologic models, studying the effects of the agency's existing water supply facilities on the groundwater basin, and planning for new projects to solve the basin's problems. The existing facilities produce water for agricultural irrigation and include a managed aquifer recharge and recovery facility, a recycled water treatment plant, and twenty miles of distribution pipeline. Mr. Lockwood earned a B.S. and M.Sc. in the Earth Sciences, from the University of California, Santa Cruz, and is a licensed Professional Geologist.

Mario Manzo

Mario Manzo is a Project Manager for the Bureau of Reclamation, responsible for managing the Water Management Goal of the San Joaquin River Restoration Program. He began his career with Reclamation in 2007, as a Repayment Specialist and has led complex water projects for the Division of Planning. Mr. Manzo holds a Bachelor of Arts degree in Economics from the University of Arizona. He is also a licensed pilot.

Katharine Moore

Katharine initially joined the Natural Resources and Water Committee in 2009 as a science and technology fellow and works primarily in the area of natural resources policy for the committee or chair. She staffed the Senate Subcommittee on Urban Rivers in the most recent legislative session. She has an extensive research background in air quality and engineering with academic positions at USC, Caltech (the Jet Propulsion Laboratory) and the National Center for Atmospheric Research. Ms. Moore holds a Ph.D. in atmospheric science (Colorado State University) and MS (UC Berkeley) and BS (MIT) degrees in engineering.

Mark Nordberg

Mark Nordberg, P.G., is an Engineering Geologist with the California Department of Water Resources and has worked for the Geology and Groundwater Investigations Section in the Division of Integrated Regional Water Management since 2005. His primary responsibilities are assisting local agencies with the development of Groundwater Management Plans, performing field work and research associated with groundwater recharge and conjunctive management programs, and has worked with DWR's Drought Water Bank, CVFPP, IRWMP, CASGEM, and grants and loans efforts, as well as the

groundwater content in the California Water Plan Update 2013. Prior to coming to work at DWR, Mr. Nordberg worked for 8 years as a consultant with environmental and planning firms performing work related to groundwater and soil contamination, CEQA documentation, and water resource evaluations, and was also a Peace Corps Volunteer in the Philippines where he addressed Coastal Resource Management. Mr. Nordberg received his B.S. in Environmental Policy from Michigan State University and his M.S. in Hydrogeology from Sacramento State University.

Brian Poulsen, Jr.

Brian D. Poulsen Jr. is Deputy General Counsel for El Dorado Irrigation District (EID). Prior to joining EID, he was associate attorney at Somach Simmons & Dunn, where he specialized in water and environmental law. He also previously worked at Western States Water Council, and the United States Environmental Protection Agency in the Office of Enforcement and Compliance Assurance. Mr. Poulsen holds a B.S. in environmental studies and a J.D. with a certificate in environmental law, both from the University of Utah. He is a Regional Coordinator for the Access Fund, a national nonprofit rock climbing advocacy organization, and cofounded Climbing Resource Advocates for Greater Sacramento (CRAGS) and continues to serve on its board of directors.

Jesse Roseman

Jesse Roseman is Cosumnes and Delta Project Director for The Nature Conservancy, where he leads TNC's involvement at the 46,000 acre Cosumnes River Preserve. His previous work as an environmental planner has been focused on collaborative watershed planning, including research on transboundary peacebuilding projects around shared environmental resources in the Middle East. At the Cosumnes, Mr. Roseman is developing riparian and tidal habitat restoration projects, coordinating land use and water policy initiatives, and promoting wildlife friendly agriculture through TNC's Migratory Bird Initiative. He earned dual Masters in Landscape Architecture and City and Regional Planning from UC Berkeley, and received Bachelors of Arts in Environmental Studies and Anthropology from UC Santa Cruz.

Samuel Sandoval Solis

Samuel Sandoval Solis is an Assistant Professor at the University of California, Davis. He is the academic responsible for the water management and policy program at the Department of Land, Air, and Water Resources. He has explored strategies to improve the water management for anthropogenic and environmental requirements, as well as for

international agreements in the Rio Grande/Rio Bravo basin, a transboundary basin between the United States and Mexico. Currently, Mr. Solis is using his expertise to improve the water management in the complex California's water landscape, he has been involved in projects related to water use and irrigation efficiency in the central coast of California, and for the whole state.

Alexandra Tollette

Alexandra Tollette is a water resources planner and public affairs specialist for MWH, a global wet infrastructure consulting firm. Ms. Tollette conducts planning, policy analysis, and public and stakeholder engagement on complex, large-scale multidisciplinary water resources projects and studies throughout California and Nevada for a variety of federal, state, and local agencies, including the California Department of Water Resources, Bureau of Reclamation, and U.S. Army Corps of Engineers. Prior to joining MWH, she served in the administration of Governor Arnold Schwarzenegger, first in the Governor's Office as a staff assistant to the governor's economic advisor and then as the Assistant Director for Communications at the California Natural Resources Agency. Alex holds a bachelor's degree in philosophy from the University of San Francisco and a master's degree in public policy from Duke University.

Peter Wijsman

Mr. Wijsman is a program manager with ARCADIS with experience in both Europe and the U.S. focusing on the effects of climate change on the land and water environments. Currently, he is responsible for developing ARCADIS' water practice in Northern California focusing on water management, treatment and supply. His educational background is in flood management, urban water management, climate change adaptation and ecosystem restoration. Mr. Wijsman also forms a knowledge bridge between the Netherlands and the United States for expertise and experience in flood protection, coastal zone management, delta planning and climate change. In addition he is also involved in projects in the Houston/Galveston Area, New Orleans and the Mississippi Delta, New York and the Florida Everglades.

Mentor Biographies

Each Water Leader was partnered with a mentor who has a leading role in California water issues. Just as the group of Water Leaders represents a wide spectrum of interests in water, mentors also come from diverse backgrounds and provide a range of perspectives related to current water issues. Furthermore, Water Education Foundation staff aimed to partner Water Leaders with Mentors

having different backgrounds or working in different sectors than themselves. The mentors for the 2012 class include policy makers and advocates; public agency officials; consultants to the water industry; agricultural and urban water managers, users, scientists, and engineers; and habitat advocates. Brief biographies for the mentors are below.

Thomas Berliner

Thomas M. Berliner is a partner at Duane Morris LLP in San Francisco, California. He focuses his practice on water, environmental and governmental/municipal law. Mr. Berliner's practice includes advising public entities and private clients on all aspects of water supply, hydropower, energy development, renewable and sustainable energy practices, natural resources and environmental compliance and litigation. Prior to joining Duane Morris LLP in 1998, Mr. Berliner was the general counsel to the San Francisco Public Utilities Commission (PUC), where for nearly 20 years he advised the PUC and San Francisco's mayor and board of supervisors on matters pertaining to water and energy utilities and municipal affairs. He is a board member of the WEF and a member of the Association of California Water Agencies.

Joseph Countryman

Joseph Countryman currently serves as a board member for the Central Valley Flood Protection Board and is a water resources and flood control consultant. He recently retired from MBK Engineers (1988-2011) where he served as president since 1992. During that time, he also served as the Chief Engineer for the California Central Valley Flood Control Association. He was with the U.S. Army Corps of Engineers in the Sacramento District from 1966 to 1988 where he eventually became chief of Civil Design at the Sacramento District. He is a Life Member of ASCE and a Registered Engineer since 1971 in California and Nevada. Joseph graduated from San Jose State University in 1966. During his career, he was presented with the Commanders Award for Civilian Service from the Corps for his initiatives during the 1986 flood operation, the Award of Distinction in Civil Engineering from San Jose State in 2001, and has been recognized by ASCE and EWRI as a Diplomat of Water Resources Engineering.

Michelle Denning

Michelle Denning is Regional Planning Officer at the U.S. Bureau of Reclamation, Mid-Pacific Region. She has served in this capacity since January 2001. Prior to her work at the Bureau, Ms. Denning was a Forest Planner at the Mendocino National Forest for over nine years. She holds a degree in Forest Management from University of California, Berkeley.

Terry Erlewine

Mr. Erlewine is the General Manager of State Water Contractors. Prior to becoming General Manager, Mr. Erlewine was a Principal Engineer and the Assistant General Manager of the State Water Contractors, Supervising Engineer at Bookman-Edmonston Engineering, and an Engineer at the California Department of Water Resources. Mr. Erlewine earned a B.S. and a M.S. in Civil Engineering from University of California, Davis and is a Registered Civil Engineer in the State of California.

Martha Guzman-Aceves

Martha Guzman-Aceves is Deputy Legislative Affairs Secretary for Governor Brown, specializing in natural resources, environmental protection, energy and food and agriculture.

From 2004 to 2011, Martha represented the California Rural Legal Assistance Foundation on legislative and regulatory issues related to community health, farm worker health and safety, environmental justice, and education. In 2003, Martha served as Legislative Coordinator for the United Farm Workers AFL-CIO and before that, for five years in their political and research departments.

Martha co-founded Communities for a New California, a 501(c)(4), and Cultivo Consulting, a political consulting partnership. She is a board member of the Ag Innovations Network, bringing food and food production back to the core of people's lives, and Sierra Institute, building collaborations in resource-based rural communities.

Glen Grant

Glen has 38 years of experience as a registered civil engineer specializing in water and wastewater facilities. He received a master’s degree in sanitary engineering from Oregon State University in 1973 and a bachelor’s degree in physics from Washington State University in 1971. He works in the Sacramento office of MWH, a consulting engineering firm. He has managed numerous water and wastewater projects in Northern California, including projects at the City of Fairfield's two water treatment plants, the City of Vacaville's wastewater treatment plant, and the City of Vallejo's water treatment plant. Mr. Grant has experience in project management, budgeting, cost control, water system planning and design, rate studies, and financial planning. He has also been on the Board of Solano Irrigation District since 2004.

Xavier Irias, P.E.

Xavier Irias is the Director of Engineering and Construction for the East Bay Municipal Utility District (EBMUD), a water/wastewater utility, in Oakland, California, with over 1,300,000 customers. Mr. Irias has worked for over 26 years as a professional engineer in the water industry. His current responsibilities include planning, design, and construction of approximately $100 million per year in infrastructure improvements. Several projects done under Mr. Irias's direction have received industry awards. Mr. Irias is a registered professional engineer, and a member of the American Water Works Association and the American Society of Civil Engineers (ASCE). Recent professional papers by Mr. Irias cover the topics of seismic modeling and risk reduction through robustness theory.

Tina Cannon Leahy

Tina Cannon Leahy is the Principal Consultant for the California Assembly Water, Parks and Wildlife Committee where she serves as the Assembly's primary expert on water resource law and policy. The primary jurisdictions of the Committee are water resources, flood management, fish and game, parks and recreation, and wildlife. Before coming to the Assembly, Ms. Leahy was Senior Staff Counsel to the California Department of Fish and Game assigned to Sacramento-San Joaquin Delta water management and endangered species law and policy issues, including the CALFED Bay Delta Program and the Bay Delta Conservation Plan process. Prior to public service, Ms. Leahy was an associate attorney with the law firm of Somach, Simmons, and Dunn. She is an advisor to both the California State Bar Association's Environmental Law Section and the California Environmental Law and Policy Center at her alma mater King Hall, the University of California, Davis, School of Law.

Shauna Lorance

Shauna Lorance is the general manager for San Juan Water District. A degree in Mechanical Engineering from the University of California, Davis, Shauna has been with SJWD for 16 years, and has served as general manager for the last eight. Shauna is a registered civil engineer and a certified special district administrator. The SJWD is one organization, a community services district, originally established as a wholesale water agency by a popular vote in 1954, a year before completion of the Folsom Dam, which opened in 1956 on the American River. Today, the SJWD is comprised of two cost centers with separate budgets for users of retail and wholesale water.

Jim Metropulos

Jim Metropulous is a senior advocate with the Sierra Club of California. His advocacy, which focuses on the California Legislature, covers water quality, water supply, wetlands and flood control issues, as well as energy, parks and off-highway vehicles. Mr. Metropolous has worked on a variety of water-related efforts, including development of policies for water metering and volumetric pricing to encourage water conservation, opposition to efforts to dismantle CEQA, endorsement of rainwater capture programs, and preservation of water quality standards. Mr. Metropulos has been with the Sierra Club, California, since the beginning of 2002. Before coming to the Sierra Club, he was committee counsel to the Washington State Senate's Environment, Energy and Water Resources Committee.

Jonas Minton

Jonas Minton is the Water Policy Advisor for the Planning and Conservation League. He works on issues surrounding water use and water policy issues. Mr. Minton is the former Deputy Director of the California Department of Water Resources. As Deputy Director of DWR, he was responsible for overseeing the Divisions of Planning, Local Assistance, Flood Management, Dam Safety, Water Conservation, and Water Transfers. Mr. Minton managed the update to the State Water Plan, the Floodplain Management Task Force, the Recycled Water Task Force, and the Desalination Task Force. He previously has served as Executive Director of the Sacramento Water Forum and General Manager of the El Dorado County Water Agency.

Anson Moran

Anson Moran is President of the San Francisco Public Utility Commission (SFPUC). He has more than three decades of experience with the City and County of San Francisco and water, wastewater and power issues. From 1993 to 2000, he served as General Manager of the SFPUC, overseeing the reorganization of the agency that removed Muni and added the Clean Water Program to the agency's operations. From 1988-1993, he held the post of General Manager of Hetch Hetchy Water and Power and previously served as Assistant General Manager for Finance. President Moran has also served as Senior Policy Advisor to U.S. Senator Dianne Feinstein with a focus on San Francisco Bay-Delta issues. He currently runs his own consulting practice providing water resource development services. He holds a Bachelor of Science degree in Electrical Engineering from Worcester Polytechnic Institute and a Masters in Urban Studies from Occidental College.

Mark Norton

Mr. Norton holds a Bachelors of Science in Civil Engineering and a Masters in Public Administration. He is a registered civil engineer in California and Colorado and accredited LEED BD&C (Leadership in Energy and Environmental Design) professional under the US Green Building Council's LEED program. Mr. Norton's background includes 30 years of engineering experience in a broad range of civil engineering projects. Mr. Norton serves as the Water Resources and Planning Manager for the Santa Ana Watershed Project Authority (SAWPA), a joint powers agency organized to support water resources in the Santa Ana River Watershed. Concurrent, with his department management duties, Mr. Norton also serves as the Authority Administrator for the Lake Elsinore and San Jacinto Watersheds Authority (LESJWA), a joint powers agency created to enhance water quality for Lake Elsinore and San Jacinto River Watershed. His titles include Past President of the Inland Empire Council of Engineers and Scientists, Past President of the American Society of Civil Engineers (ASCE) San Bernardino/Riverside Branch and Los Angeles Section, 2004-05 ASCE Civil Engineer of the Year and the currently serves as a ASCE Region 9 (California) Governor and Chair of the ASCE Region 9 Water & Environment Committee.

Tim O'Halloran

Tim O'Halloran has been the General Manager of the Yolo County Flood Control & Water Conservation District for nearly ten years, during which time he has pursued a wide variety of wildlife conservation partnerships while ensuring reliable water deliveries to his primarily agricultural customers. Previously, he was watermaster for the Kings River Water Association (KWRA) where he was heavily involved in many Central Valley water issues, such as the Kings River Fisheries Management Program and the Southern San Joaquin Water Quality Coalition. Before his time with KRWA, he spent 10 years with Imperial Irrigation District. His background is in water engineering, with specialties in water system design and planning, agricultural conservation, and environmental program implementation.

Tim Quinn

Tim Quinn, who became ACWA executive director in July 2007, has more than 25 years of experience in California water issues. He has worked on several key policy initiatives, including the Bay-Delta Conservation Plan now under development to protect species and provide regulatory assurance to water users. Prior to joining ACWA, Quinn served as deputy general manager of the Metropolitan Water District of Southern California and represented the district on numerous statewide issues since 1994. He joined MWD in 1985 as principal economist, and became deputy general manager in 1994. Before coming to MWD, Quinn was

a project manager at the Rand Corporation, specializing in research on natural resources and environmental policy issues. He earned his bachelor's degree in economics from the University of Colorado in 1974 and his master's and doctorate degrees in economics from the University of California, Los Angeles in 1976 and 1983.

Rob Roscoe

Robert Roscoe, General Manager for Sacramento Suburban Water District, has nearly 30 years of experience in public and private utility systems. Previous to working for SSWD, Rob served as the Northern California Manager for the California-American Water Company and as General Manager for Citizens Water Resources California operations.

Prior to managing water utilities, he was employed for 13 years in consulting focusing on water resources engineering for public clients. Rob earned his Bachelor of Science degree in Civil Engineering at the University of California at Davis and a Master of Science in Civil Engineering with a dual focus in Sanitary Engineering and Water Resources Engineering from California State University, Sacramento. Rob is a Registered Civil Engineer and a Grade V Water Treatment Plant Operator in California.

Anthony Saracino

Anthony Saracino, Chair, of Sacramento, is a private consultant, advising clients on water resources management and policy issues. Previously, he served as director of the California Water Program at The Nature Conservancy from 2005 to 2011. Prior to The Nature Conservancy, he was director of Schlumberger Water Services from 2001 to 2005. Saracino was principal of the consulting firm Saracino, Kirby, Snow from 1995 to 2001 and was director of geologic and environmental services for Wallace Kuhl and Associates Geotechnical Engineering from 1984 to 1995.

Curt Schmutte

Mr. Schmutte is a civil engineer and manager specializing in water resources and environmental planning. He is currently a consultant for the Metropolitan Water District of Southern California and the State & Federal Contractors Water Agency. Prior to his association with MWD that began in 2006, he worked for the California Department of Water Resources for 21 years, the Regional Water Quality Control Board for 3 years and private engineering consulting firms for 4 years.

Since 1988, Mr. Schmutte has led multiple programs and projects involving the Sacramento–San Joaquin River Delta and Suisun Marsh, including levee improvement

programs, land subsidence research, economic risk analyses, dredged material reuse projects, water quality studies and environmental restoration projects.

Since joining the MWD and SFCWA efforts, he has been managing large scale ecosystem restoration projects, analyzing and implementing seismic flood risk mitigation strategies, planning emergency actions to protect Delta smelt and advancing new conceptual water conveyance alternatives to achieve a sustainable Delta for both water supplies and the ecosystem. Mr. Schmutte recently served as the State's lead expert witness on the Jones Tract levee failure litigation, successfully defending the State Water Project from a substantial liability.

Cindy Truelove

Dr. Truelove is currently Director/Visiting Scholar at Stanford University's Woods Institute for the Environment where she directs the Water in the West Water-Energy Research Initiative. Formerly, she was a Senior Water Policy Analyst at the California Public Utilities Commission, where she was actively engaged in enhancing the Commission's water policy initiatives on water conservation, the water-energy nexus, and water climate change and particularly worked to build collaborative water/water and energy policy and program efforts across the State's water management and regulatory agencies, as well as across both municipal and Investor Owned water and energy utility sectors. She has worked across North and South America in environmental and water and natural resource planning, as well as in the research interface between social, ecological, and global economic restructuring.

Walt Wadlow

Walt Wadlow serves as General Manager for the Alameda County Water District. The District provides water service to residents and businesses in the Bay Area cities of Fremont, Newark and Union City. Walt has over 29 years of experience in water resource issues working for Alameda County Water District and Santa Clara Valley Water District. His experience includes all aspects of water utility operations, flood control planning, water quality, and over 20 years of active participation in Sacramento and Washington, DC on California water policy issues. Walt is a past president of the State Water Contractors, and currently serves as a Board member for the California Urban Water Agencies and on the State Legislative Committee for the Association of California Water Agencies. Walt has a BS in Civil Engineering and a MS in Water Resources Engineering from Stanford University.

John Woodling

John Woodling became the executive director of both the Regional Water Authority and the Sacramento Groundwater Authority in June 2008. Before that he was acting chief of the California Department of Water Resources' Division of Planning and Local Assistance. Woodling was the state's point person on integrated regional water management planning. Through partnerships with local agencies such as RWA, he has provided technical support and overseen grant programs to support integrated regional water management plans and conjunctive use projects. In the Sacramento region, he has worked closely with stakeholders to support the American River Basin Conjunctive Use Program, facilitated partnerships with the U.S. Army Corps of Engineers, and supported negotiations to develop a regulatory framework for the City of Roseville's Aquifer Storage and Recovery Project.

1.3. Report Contents and Organization

This report provides a summary of the investigation conducted by the 2012 Water Leaders class through interviews with their mentors and use of independent sources that highlight the water infrastructure crisis that California, and the United States broadly, faces in the coming decades. It includes the following sections:

- **Section 1 (Introduction)** describes the purpose of the report and includes short biographies for the 2012 Water Leaders and their mentors.
- **Section 2 (Background)** characterizes the current problem with California's and the nation's aging water infrastructure and the consequences that may result if officials and communities fail to solve the water infrastructure financing puzzle.
- **Section 3 (Analysis)** contains summaries of the responses received from mentors during interviews, and related analysis.
- **Section 4 (Success Stories)** highlights examples in which the challenges for financing and constructing water infrastructure projects were overcome successfully and could serve as models for other undertakings in the future.
- **Section 5 (Report Recommendations)** contains the 2012 class recommendations for meeting the water infrstructure challenge.
- **Section 6 (References)** compiles a list of the reports, studies, and other supporting material used to develop this report.

Additionally, Appendix 1 to this report includes a full list of the questions Water Leaders used in interviews with their mentors.

2. BACKGROUND

2.1. Definition of Infrastructure

This report addresses the infrastructure necessary to capture, store, treat, and distribute drinking water, and to collect, treat and discharge wastewater (including storm water). This report does not address infrastructure necessary to generate hydroelectricity, to provide flood control, or to provide recreational opportunities, except when those purposes are incidental to providing water or wastewater services. The geographic scope of this report is mostly limited to the State of California.

2.2. Characterization of the Problem

As noted above, much of California's water and wastewater infrastructure is old, in need of repair or replacement, and unable to reliably meet the demands of the growing population. Failures in drinking-water infrastructure can result in water disruptions, impediments to emergency response, and unsanitary conditions that threaten public health (ASCE, 2011). Aging infrastructure also inhibits water use efficiency, as up to 25 percent of treated water that enters the nation's distribution systems is lost to leakage, resulting in an estimated 1.7 trillion gallons of water wasted every year (Miller *et al*., 2012). Water-main breaks, which occur approximately 240,000 times annually in the U.S., damage roadways, undermine buildings, and hinder fire control efforts, while the loss of potable water can also instantaneously shut down businesses and factories (Miller *et al*., 2012).

The condition of many wastewater systems is also poor, with aging pipes and inadequate capacity leading to discharges of untreated sewage to local surface and groundwater resources. Most of the nation's wastewater pipeline systems were installed in the years following World War II and have reached, or are reaching the end of the their useful lives. Nearly 75,000 sanitary sewer overflows occur in the U.S. annually, discharging approximately 900 billion gallons of untreated sewage into lakes, streams, and rivers. (Miller *et al*., 2011).

Notwithstanding critical infrastructure needs, maintaining and upgrading these systems has been largely ignored for decades, a trend which appears likely to continue. For example, the ASCE has estimated that the U.S. will need $126 billion in investments for water and wastewater treatment infrastructure by 2020, and $196 billion by 2040. However, based on current investment patterns, only about one-third of that amount is likely to be funded (ASCE, 2011).

Localities and states bear responsibility for almost all of the operation and maintenance costs and for the vast majority of repair, replacement, and expansion costs of drinking-water and wastewater systems. For example, the state's and local entities' share of investment in drinking water and wastewater systems now comprises roughly 95 percent (Miller *et al*., 2011). Although the federal

government does provide substantial aid in the form of grants to state-run revolving loan programs, typically, most water system improvements have to be funded by water customers. Some water agencies have attempted to increase rates to reflect the true cost of delivering water or wastewater services, including covering the costs of capital improvements. However, rate changes have often proven politically contentious and difficult to pass, especially given Proposition 218 requirements, which are described later in this report.

2.3. Consequences of Inaction

Failure to meet California's infrastructure needs will have significant consequences. Infrastructure failures pose serious health risks, may contaminate surface water and groundwater, and may destroy aquatic and riparian habitats. Such incidents can also shut down public open spaces, such as beaches, parks, and other water bodies, and kill fish and other aquatic wildlife, all leading to significant economic consequences. For example, the ASCE estimates that by 2020, the predicted $84 billion deficit for sustaining water delivery and wastewater treatment infrastructure will lead to $206 billion in increased costs for businesses and households, a loss of nearly 700,000 jobs, and over $400 billion lost from the nation's gross domestic product (ASCE, 2011).

It is within this context and with these challenges in mind that the Water Leaders set out to learn more about the problem and the possible solutions. The next chapter contains an analysis of the results of mentor interviews.

3. ANALYSIS

This chapter synthesizes responses from mentors to the thirteen questions posed by each Water Leader. The questions fall into four general topic areas: (1) Financing; (2) Governance, Policy and Reform; (3) Green Infrastructure, Conservation and Climate Change and (4) Environmental Justice. Within each category, each question is briefly described and the responses given by mentors are summarized. Where necessary to provide background for the question posed and/or mentor responses, the topic section contains a discussion of relevant financial, legal and regulatory concepts. Where possible, this chapter identifies and discusses themes and common trends among mentor responses.

3.1. Financing

Background on Funding for Water Infrastructure

There seems to be the belief that nowadays it is harder to obtain funding for water infrastructure projects than it has been in the past. However, at the same time the professionals in the water field indicate that there is a great amount of funding needed to meet service and regulatory requirements and create a more sustainable water infrastructure system in the state. A good example of this is the state water bond that did not make it on the 2010 ballot or the 2012 ballot, and will be deferred to (at least) 2014. The delay is caused in part by insufficient support to spend money on the state's water infrastructure at a time when the California economy is recovering slowly from recession.

Today, funding large-scale water supply and flood control projects seems to be less palatable to the general public than 50 or 80 years ago, with the State Water Project and Central Valley Project as examples. Also, in the 21st century, sustainability and ecological values are much more prominent, calling for a different type of infrastructure: less concrete and more ecosystem-friendly solutions.

On the water and wastewater side, residents have seen significant rate increases for water related services. Many water districts are unable to sufficiently fund operations and maintenance (O&M) requirements for the infrastructure that is in place and require additional funding. Previously, general population growth and/or economic growth largely funded O&M. The recent economic slow-down requires finding new alternatives to fund water infrastructure.

Prioritization of Investments

Mentors were asked to provide their thoughts on what factors should determine infrastructure need priorities, given limited funding for infrastructure. They were also asked to identify the type of incentives that might encourage higher prioritization and greater funding of infrastructure upgrades.

Mentor responses are discussed below and broken down by general responses, factors determining priorities, and incentives.

In general there was agreement among the mentors that it is harder to obtain funding for water infrastructure projects than in the past. Contributing factors are: limited economic growth, competing interests for public funding sources, and changing social and environmental priorities. Contrary to most respondents, one of the mentors provided the response below:

> *I'm not sure I agree with premise of question – that there is limited funding for water infrastructure needs. San Francisco's Public Utilities Commission Water System Improvement Program is a $4 billion project benefitting 2.5 million people. Southern California has 20 million people that would benefit from a Delta fix. One can make the argument that a Delta fix makes same financial sense. Main issue now is not funding. Political will is more important. If you could provide regulatory certainty to agencies/investors, in the form of guaranteed regulatory approval and certain timeline, there would be plenty of public and private money out there.*

Priorities

Mentors identified funding priorities for infrastructure projects in two main categories: 1) human health and safety and 2) balancing the co-equal goals of a more reliable water supply and a healthy ecosystem. No apparent link could be made between the background of the mentor and his or her response (e.g. water utility managers prioritizing human health and safety and resource managers the co-equal goals). Many mentors also called for developing a comprehensive plan that creates a baseline from which to work from in terms of what the state's priorities are. This way water agencies and utilities can align themselves and can base their policies and funding priorities on the plan.

One of the mentors shared a strong statement and important lesson on prevention versus mitigation: *"Risk to humans is the biggest factor—protection of human life is the number one priority. The incentive is that preventative maintenance upgrades are less costly to taxpayers than waiting until problems arise and then trying to fix problems after damage has occurred."*

By properly explaining and educating the benefits of prevention to rate payers or voters could incentivize them to approve infrastructure funding. A painful and tragic example is the cost of the disaster created by Hurricane Katrina versus what it would have cost to build a proper flood control system beforehand. A similar scenario could unfold in the Sacramento-San Joaquin Delta.

Most of the respondents indicated that human health and safety is a high priority. More specifically this means supplying safe and reliable potable water to our communities. In some instances mentors expressed a concern that California would not be able to maintain its current level of service and that especially disadvantaged communities are likely to see a drop in water quality that comes out

of the tap. This is a very concerning development, especially in the light of the wealth of the state compared to other states and nations.

Meeting the co-equal goals of a more reliable water supply and creating an enhanced and restored ecosystem was viewed by many mentors as a key priority as well. What it means is that existing and new development should be managed and created in such a way that it balances economic and ecologic interests that leads to a more sustainable way of how we use our resources. Infrastructure projects that don't contribute to this goal should not receive a high priority in obtaining funding.

Lastly, as an important tool for prioritization, mentors suggested a risk-based approach to how our infrastructure is managed. An example would be implementing an asset management strategy for wastewater, water supply and flood control infrastructure that allow for maintenance and upgrades to take place on life-cycle basis. Furthermore, acceptable risk levels to prioritize funding and provide clear insight into why infrastructure needs to be upgraded or renewed.

Incentives

Mentor responses to the question regarding incentives were highly varied. One frequent response was bond funding. Bond funding is often used for many water infrastructure capital improvements, but has seen difficult times recently as voters will not approve bonds.

Greater funding can also be achieved if projects serve multiple purposes. For example, as it currently stands, projects with multi-jurisdictional benefits, or projects addressing watershed-level issues will be more likely to attract state agency funding.

One of the mentors responded to the question with the following quote, which captures important elements to increased water infrastructure funding, such as public education, political will and being proactive.

> *Traditionally, prioritization of projects is based on a cost/benefit analysis where the highest priority projects have the greatest public benefit. Regarding incentives, the public needs to understand the consequences of delay. As a society we are reactive and not willing to press our elected officials to make these investments. We need to be more proactive as a society and that starts with educating the public about infrastructure needs and how it is more cost effective to build when we are not in a reactive mode.*

Engaging the Public on Infrastructure Needs

Mentors were asked how to better inform and engage the general public about water infrastructure needs and what would need to occur to change the collective mindset to prioritize investment in water infrastructure.

Overall, most mentors agreed with the need for more public outreach in a wide range of ways from mailings, ad campaigns, spokespersons, personal connections, and social media. In order to better engage the public about the need to spend on water infrastructure and to make this spending a priority in the public's mind, the message should:

- Provide a consistent, positive message
- Educate the public on consequences of deferred maintenance
- Show a link between infrastructure needs and daily lives
- Include public interaction that encourages dialogue, and
- Make use of more sophisticated marketing approaches.

Provide a consistent, positive message

Most mentors agreed that to provide a consistent message, agencies needed to educate their customers not only in times of drought, but also in times where water infrastructure may not necessarily be in the news. Most mentors also agreed that agencies should avoid "fear tactics" although some admitted that public's awareness is highest during droughts or outages. As one mentor put it, "the message has to be calm, logical and repeated."

Educate public on consequences of deferred maintenance

As one mentor noted, "we need to convince the public that they can either pay now or pay much more later, including the possible loss of life." The public understands the potential costs of deferred maintenance because they also deal with it in terms of the cars they drive and the houses they live in. The issue is that the general public is unaware of the sheer number of miles of pipeline, millions of gallons of storage, pumps, and other infrastructure required to keep water supply systems operating successfully. More focus needs to be placed on educating customers on where and how their money is being spent within their supply system and how these expenditures will help reduce the cost of failure down the road. In this instance, the message is often how we "learn from disasters and how to avoid them" as one mentor put it.

Show link between infrastructure needs and daily lives

Many mentors mentioned the need to craft a message that "hits home" and identifies a link between water infrastructure needs and the public's personal lives. As one mentor notes, agencies "need to show a link between water infrastructure and jobs and economic wellbeing of their place/home, to demonstrate the impact on individuals' survivability (i.e. quality of life, education, etc.)." Other linkages that could help illustrate the impact of water infrastructure failure are to link economic and homeland security to investment in water infrastructure.

One mentor suggests targeting business customers in any marketing campaign, stating "The opportunity to convince business customers [to support infrastructure needs] is greater than rural residential customers - so start with businesses."

Public interaction that encourages dialogue

Although the voting public has become more sophisticated in terms of water policy in the last decade because the far-reaching impact of recent droughts, as the mentors have noted, we still have a long way to go. "It is a long term effort to communicate the essential needs of a reliable, high quality water supply. The goal is to develop an appropriate level of awareness. The public right now just doesn't really have to think about water beyond it comes out of the tap." Mentors have noted that it is important to broaden the discussion by including more varied stakeholder groups and to create a dialogue with their constituents.

One mentor notes, "I think we need to listen much more to the public rather than tell them what these answers are and so forth, because that ain't working."

A second mentor continues that thought: "Most people understand the overall water infrastructure needs. [I am a] firm believer that the more you educate everyone in the community, the more they will get and truly understand the issues."

Make use of more sophisticated marketing approaches

Many mentors agreed that water agencies could do a better job of informing the public about water resources information in general and water supply infrastructure needs specifically. Many pointed to successful marketing by other utilities such as California's "Flex Your Power" statewide energy efficiency marketing and outreach campaign. Initiated in 2001, Flex Your Power is a partnership of California's utilities, residents, businesses, institutions, government agencies and nonprofit organizations working to save energy. The campaign includes a comprehensive website, an electronic newsletter and blog, and educational materials and is primarily funded by a public goods charge as approved by the California Public Utilities Commission (CPUC).

Programs such as Save Our Water (http://www.saveourh2o.org) have built on the success of the Flex Your Power marketing campaign and have been useful in educating the public on the benefits of conserving water.

The Flex Your Power logo is from www.fypower.org, and the Save Our Water logo is from www.saveourh2o.org.

Many mentors remarked on how successful marketing campaigns by bottled water companies have managed to influence the minds of consumers to drastically change their drinking habits in less than a decade. These marketing campaigns rely on a combination of sheer volume of ads and the promise of clean drinking water, available anywhere. Americans consumed 8.75 billion gallons of bottled water in 2010 (http://pffc-online.com/management/9491-us-bottled-water-volume-grows-0531).

Mentors have suggested that water agencies use a similar approach to "sell" the high quality water they serve and the infrastructure needed to support that service, with one mentor even suggesting that agencies bottle their water:

> *Presently, there are a lot of people, children in particular, that perceive tap water as not sufficiently clean to drink. Our children might be the first generation to rely on bottled water as their primary source of drinking water, simply because their perception of what constitutes potable water. Educating children is important. Local water suppliers should be marketing water in the same way that Nestle and Coca Cola do. Why aren't local water agencies bottling water and selling it?*

The Poland Spring water advertisement graphic is from http://www.mediapost.com/publications/article/117454/?print#axzz2D4MhFqfO.

Case Studies

Orange County Water District's Outreach Efforts for Groundwater Replenishment System

Orange County Water District public outreach efforts on its Groundwater Replenishment System (GWRS) are an example of an agency successfully engaging the public on infrastructure needs. Orange County Water District (OCWD) and Orange County Sanitation District's (OCSD) communications team received the top honor of 2004 Public Education "Program of the Year" from the WaterReuse Association for work the GWRS. The GWRS's public information program was recognized for its excellence in community relations and public information and outreach. A more detailed discussion of these efforts can be found in Section 4.2 of this report.

Alameda County Water District's School Education Program

For more than 17 years, Alameda County Water District (ACWD) has demonstrated its commitment to the wise use of our water resources by conducting a school outreach program whose primary goal is to prepare students to make informed decisions about state and local water resources. Each year, the outreach program touches more than 30,000 students through classroom presentations, field trips, assemblies, teacher training workshops, and water education materials and curricula.

Through a variety of media and activities, students learn about the critical role water conservation plays in ACWD's water supply picture, as well as issues relating to water supply reliability and water quality. Because the program targets the full spectrum of grade levels (K-12), many students "grow up" with it, experiencing a different facet of the program each year. Repeat contact such as this helps ACWD to achieve its educational objectives.


Photo courtesy of ACWD

Each year, ACWD's School Education Program helps ACWD accomplish its mission of providing a reliable supply of high quality water at a reasonable price by creating support for ACWD policies and programs. The program includes:

- Presenting water education programs to approximately 6,000 students in more than 200 classrooms.
- Distributing more than 85,000 pieces of printed educational material to teachers and students.

- Sponsoring 75 theatrical performance assemblies about water conservation which are viewed by more than 16,000 students at 36 schools.
- Offering mini-grants of up to $500 each to teachers for the development of water-related projects, activities, or field trips.
- Training teachers in the use of popular water education curriculum guides.
- Sponsoring its annual Water Conservation Poster and Slogan Contest in which more than 2,000 students vie for the opportunity to have their creations included in the annual ACWD Water Conservation Calendar.

Public Goods Charge and Beneficiary Pays Principle

Mentors were asked whether they support a public goods charge. Before analyzing their responses, the following provides background on the concept of a public goods charge and some of the notable recent proposals regarding such a charge.

Background on Beneficiary Pays and the Public Goods Charge

Beneficiary Pays Principle

The "beneficiary pays" principle is generally accepted as a reasonable way to allocate the costs of projects or programs. Broadly speaking, the beneficiary pays principle holds that the costs of a program or an infrastructure project should be paid for by those that benefit from it. Exceptions to this principle may be warranted, such as in the case of disadvantaged communities that cannot afford the water infrastructure to meet drinking water needs.

Applying the beneficiary pays principle creates two categories of benefits: private benefits and public benefits. Private benefits accrue to readily identifiable actors, such as ratepayers within the service area of a water district. Those actors should therefore be responsible for funding the project. Public benefits are more diffuse and accrue to a much larger group, such all California residents. If projects that deliver state-level public benefits are to be funded, the State of California should be responsible for the costs.

In practice, a benefit is often deemed public when it is impractical to determine the specific benefit that an individual receives from an activity or project. For instance, ecosystem restoration is often considered a public benefit. It may be theoretically possible to quantify the value that every Californian receives from an incremental improvement in the probability that an endangered species will survive through certain nonmarket valuation techniques. But that valuation is technically challenging and is more administratively costly than simply deeming ecosystem restoration a public benefit and having the state fund it.

Many Demands for State Funds

Because of its concrete nature and well-defined parameters, most infrastructure provides private benefits and is funded by beneficiaries. However, the state also faces a wide variety of funding demands to support infrastructure (with both public and private beneficiaries). These infrastructure expenditures include maintaining and improving state-owned levees, incentivizing the deployment of green infrastructure such as stormwater capture and reuse or water use efficiency measures, and financial assistance to help local governments fund infrastructure required to meet drinking water and wastewater standards. Ecosystem restoration may also be considered infrastructure, particularly where it is performed in conjunction with other infrastructure projects such as setback levees.

Limited Current Funding

Excluding the State Water Project (SWP), bonds fund the majority of spending on water infrastructure at the state level as state General Fund spending in this area has decreased. Nearly $20 billion in bonds have been approved by voters since 2000 for a variety of water-related purposes, but those funds are largely exhausted. Future bond funding appears less likely to materialize than in the past: a recent bond measure that would provide $11.1 billion for water has been moved from the ballot twice in the past two years because of concern that it would not be approved by voters. Some contend that the bond is simply too large and that we need an alternative way to fund water programs and infrastructure.

Alternative Funding Mechanisms May Be Necessary

If state expenditures on water are to continue at the current level or increase to meet new demands, funding sources must be identified. Future bond measures are an option to fund one-time capital expenditures. On-going expenditures such as levee maintenance or subsidies for green infrastructure may also be funded from bonds, but may also benefit a continuous funding source.

Defining the Public Goods Charge

Until recently, California levied a volumetric "public goods charge" (PGC) on electricity sold in the state to fund public benefits associated with energy efficiency, renewable energy projects, and energy research. A similar PGC on water sold in the state could raise money for water-related public benefits, although many questions remain.

Analysis of Public Goods Charge

Support for a Public Goods Charge

Several organizations have called for the establishment of a PGC to support water-related public benefits. For instance, the Public Policy Institute of California advocated for some sort of sustainable funding stream for water in a recent publication and the California Public Utilities Commission

recommended adoption of a PGC to fund certain legislative initiatives and water-related measures in recent climate change initiatives. In addition, groups with an environmental advocacy focus often recommend the establishment of a PGC.

Organizations that support a PGC share two common reasons. First, they consider bond funding to be an inadequate and unstable funding stream. The result, in their view, is underinvestment in water-related activities that provide public benefits, and even in cases where projects are slated for funding, they can be delayed because bond funds may not always be available when needed. Second, proponents often see a public goods charge as a means to address some of the negative externalities—costs associated with an activity that fall on others aside from the entity pursuing the activity—of the state's water system. They argue that raising the price of water through a public goods charge will result in a more economically efficient level of water use in the state by internalizing the external costs of the water system.

Previous Legislative Proposals

As part of Governor Schwarzenegger's 2006 Strategic Growth Plan, legislation to create a "water resources investment fund" was introduced (AB 1839, 2006 [Laird]). This proposal would have levied a set of flat charges on water connections. The revenues would then be distributed to regions throughout the state through the Integrated Regional Water Management process. Fifty percent of the revenues would have been reserved for statewide water management activities. More recently, Senator Simitian introduced a bill (SB 51, 2011 [Simitian]) that would have established a pair of charges on water retailers: a volumetric charge on water sold by urban water retailers and a flat charge per irrigated acre in the service areas of agricultural water districts, with a distribution of revenues similar to that of the Governor's Strategic Growth Plan proposal.

The Legislative Analyst's Office (LAO) also put forth a proposal in 2011 for how a PGC should be designed if the Legislature chose to implement one, although it stopped short of recommending for or against the adoption of that charge. That proposal contained many of the same elements as Senate Bill 51, although it would have directed all of the revenues to the state for expenditure. The LAO also laid out five categories of water-related activities that should be eligible for funding under a PGC, should it be adopted. Those included: planning and management of the state's water system; broadening access to necessary water services; ecosystem improvements; management of water-related risks, such as flood fighting; and recreational improvements.

Opposition to a Public Goods Charge

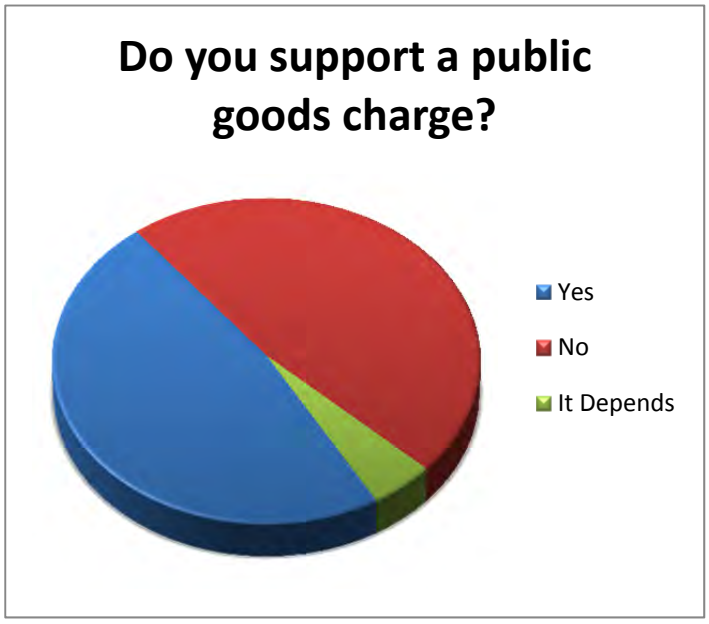
Opposition to a PGC centers around the water retailer community—the group on which the charge would be assessed under most proposals. Concern revolves around several issues. First, water retailers argue that they are already facing challenges to raising rates for funding their own capital

improvements, and an additional charge would make it even more difficult to adequately fund their own operations. Second, opponents argue that the definition of what constitutes a public good is too changeable, depending on the interests of the party defining the term. The result, in their view, would be that projects without any true statewide public benefit would be funded through this charge. Similarly, a funding stream like a PGC would create constituencies that would make it difficult to adjust the level of the fee to fund only expenditures that are truly needed and of a statewide benefit. Finally, there is skepticism among opponents that the state will efficiently collect, manage, and expend the funds, and that therefore the money is better left at the local level for expenditure.

Implementation Considerations

There are a number of other questions that must be considered when deciding how, if at all, to implement a PGC:

- How should the rate or rates be determined?
- How should the assessment be apportioned between agricultural and urban users?
- What distributional impacts would the charge have, e.g. on low-income water users?
- How should monies from an assessment be appropriated and allocated?
- What activities should be eligible for funding?
- Who should be eligible for funding?
- In what forms should the funding be provided?



Mentor Questions and Responses

Public Goods Charge

Mentors were asked whether they support a public goods charge and were evenly split in their responses to this question (see chart, left). Those in favor of a public goods charge generally cited a "beneficiary pays" link, where the people paying the charge would benefit from the improvements that charge would fund. One mentor, supportive of a public goods charge, used the Delta as an example of a water resource having a broad benefit to most Californians, when they stated:

> *The fact is that everybody in the state depends on reliability of Delta supply, even if they say they aren't. Everyone enjoys the fruit and vegetables grown in the Central Valley, everyone wants California to have a strong economy which depends on the Delta's health. A state tax that pays for water projects is a good thing. There are very few taxpayers that do not benefit from [the] Delta.*

Many of those who were not supportive of the PGC criticized possible inequalities of such a charge, the difficulties in clearly determining the projects and priorities the charge would fund, and the lack of accountability for how the revenue is spent. For example, one mentor said, "If public funds are to be collected for local infrastructure, they should be collected at the local level. If a group of water contractors wants to work together to pool money for infrastructure improvements, it should be through voluntary participation."

Mentors frequently raised this issue of local or regional control, responsibility, and benefit commonly as a point of apprehension of, if not downright opposition to, a PGC. Perhaps the mentors showed that there is consensus that local or regional projects are best financed by those local or regional beneficiary interests. However, this issue becomes more complicated when a local or regional project creates different groups of beneficiaries that cover different areas. However, determining the proportional benefit to each group and fairly assessing project costs among the various groups becomes more complicated.

Several mentors viewed a PGC as analogous to a tax. Where they disagreed was: 1) whether it is equitable to have this tax only assessed to water ratepayers or whether all Californians should pay this tax, and 2) whether all water ratepayers or all Californians would benefit from the water infrastructure projects funded by this tax revenue. Again, it appears that greater support for a PGC

hinges on whether the charge is equitably assessed and whether there is clearly defined benefit to the ratepayer.

Both sides cited potential concerns with issues such as accountability, prioritization, and governmental inefficiency. Much of the mentors' stated resistance to this concept resides in the details. If a PGC had a clearly defined purpose, it may be easier to identify the benefits. When ratepayers know how their money will be spent wisely, understand how they benefit from those projects, and see that the charge is being fairly assessed, they will be more likely to support such a charge. As one mentor acknowledged, "I could support a public goods charge if the purposes are well defined and the funds collected have a mechanism to be spent directly on the intended purpose without traveling through the state in a way that the funds are used to support a new bureaucracy."

Beneficiary Pays Principle

Mentors were asked how an assessment on water retailers for multi-benefit projects could adhere to the "beneficiary pays" principle. Mentors identified the importance of having a clear nexus between the proportional benefit to ratepayers and the charge amount, and their answers indicate unanimity that this is a complex issue.

In responding to this question, mentors frequently raised additional questions such as how to determine who are the beneficiaries, whether environmental improvements are benefits to the public rather than to the project proponents (as they are mitigations that serve to fulfill project proponent's obligations), and how to quantify the value of the benefits.

Not surprisingly, the Bay Delta Conservation Plan (BDCP) was a frequent example used to highlight these questions, as one mentor admitted:

> *[It is] hard to figure out what are benefits versus mitigation for a project since large water projects have impact to environment during construction and implementation. Construction mitigation should be funded by users and rate payers. BDCP as an NCCP is required to have public good portion paid by tax payers. But [it is] hard to quantify benefits to species for mitigation to increasing populations of endangered species.*

Another mentor highlighted a concern for clearly identifying beneficiary groups, determining the value of the benefits, and assessing charges accordingly:

> *General taxes should pay for general benefits, like ecosystem benefits. Fees on water should not be used for social justice. Water users should pay for the infrastructure they need and costs should be distributed to those that benefit. For example, the Delta Plan proposes a water tax to pay for Delta levees. The State Water Project Contractors know that certain levees are important to their operations and are willing to pay for*

those improvements. This should occur within the market system where those paying for the water decide where to invest their money. In our current system not all users pay. For example, some farmers in the Delta are causing ongoing subsidence and therefore negatively impacting water conveyance, water quality, ecosystem restoration, and carbon emissions. Yet, they pay no users fees. Likewise, boaters are having a negative impact on erosion of Delta waterways and are also are not paying. To the degree that we can identify benefits and impacts and assign corresponding costs, there is an incentive to reduce those impacts. As a society we can do more to identify all the benefits and costs.

Still another mentor seemed to summarize the need for a cooperative solution when they said, "This is a complex issue. We need to balance state 'public' benefits with some form of proportional financing."

Success in Balancing Environment and Economy

Mentors were asked to provide some examples of past water infrastructure projects that balanced environmental improvement and economic development and to identify any challenges associated with such projects.

Mentors offered a range of projects, from small local projects to larger-scale projects such as the Los Vaqueros Reservoir expansion. In general, past water infrastructure projects did not benefit the environment. Infrastructure was created with water supply alone as the goal. That approach has changed, starting with the passage of the Endangered Species Act. In some cases the environmental benefits of a project are only incorporated to meet mitigation requirements. However, there are several types of projects, such as recycled water, storm water recapture and groundwater banking projects, which promote environmental improvement and economic development through increasing water supply reliability.

The main challenges identified by mentors of developing water infrastructure projects that balance environmental improvement with economic development are getting buy-in from all stakeholders and the cost. The larger the environmental benefits, the more expensive the project.

Case Studies

Twitchell Island

Throughout the Sacramento-San Joaquin River Delta (Delta), oxidation of the soils from farming practices has resulted in land-surface subsidence – a steady loss of elevation. As a result, many of the farmed islands in the Delta are below sea level, some more than 20 feet, and are permanently protected by levees. The falling land surface threatens the stability of the region's levees, which in turn

protect the Delta's rich agricultural lands and the conveyance of much of California's water supplies. Water flowing through the Delta's levee-protected farmland provides fresh water to more than 25 million Californians and millions of acres of farmland in the Central Valley.

The California Department of Water Resources (DWR) and the U.S. Geological Survey (USGS) developed a project on Twitchell Island to assess the ability of re-established wetlands on Delta peat islands to sequester carbon, reverse subsidence and provide an economically sustainable land-use practice. This change in land use has stopped ongoing subsidence and, over time, will accrete soil and reverse past subsidence. Such subsidence reversal reduces the risk of Delta levee failures by reducing hydrostatic pressure on levees and reduces the effects of levee failures by decreasing the volume of water flooding breached islands. The increase in island surface elevations will also decrease the need for levee maintenance and repair and contribute to the protection of water quality and supply, property, wildlife habitat, and recreational uses.

This project has also demonstrated the potential of freshwater wetlands to sequester atmospheric carbon via wetland plant photosynthesis and net retention of carbon within the wetlands. The developing carbon market in California could provide sustainable farming opportunities for Delta farmers to "grow" wetlands and an economic incentive to sustain the existing Delta levee system.

Napa River and Creek Flood Control Project

Since the 1970s, Napa County residents have suffered $542 million in property damage alone. The floods of 1986, 1995, and 1997, coupled with the imminent expiration of federal funding under the Flood Control Act of 1965, finally brought the community together. Residents, businesses, more than 27 local/State/regional and federal government entities, the Chambers of Commerce, environmental organizations and the U.S. Army Corps of Engineers conducted a community-based planning process known as the Community Coalition for Napa Flood Management and spent thousands of hours in technical committees and town hall meetings to develop this comprehensive program. The Plan is a multi-objective and restorative approach to flood protection. The Project will restore more than 650 acres of high-value tidal wetlands of the San Francisco Bay Estuary while protecting 2,700 homes, 350 businesses, and over 50 public properties from 100-year flood levels, a savings of $26 million annually in flood damage costs. The end result is a Living River that can sustain migrating fish and wildlife and a system that will help protect all County residents from damages caused by regular flooding.

City of San Jose Water Recycling Program

In 1990, the City of San Jose developed the South Bay Action Plan (Action Plan). The Action Plan was designed to reduce flows from the San Jose/Santa Clara Water Pollution Control Plant (San Jose/Santa Clara Plant) into the San Francisco Bay to avoid converting the salt marsh habitat of two endangered species, the Salt Marsh Harvest Mouse and the California Clapper Rail. The Action Plan

was intended to satisfy the San Francisco Bay Regional Water Quality Control Board's (Regional Board) directive that the San Jose/Santa Clara Plant limit its discharge flows to 120 million gallons per day (MGD) Average Dry Weather Effluent Flow or to flows that would not further impact rare and endangered species habitat. The Action Plan had three main components: water recycling; marsh mitigation, and water conservation. In 1991, the Regional Board accepted the Action Plan in lieu of a 120 MGD cap and the Action Plan was adopted by the city later that year.

The Action Plan was the catalyst for the city's entry into the recycled water arena. Since the mid-1990s, the city, with assistance in the form of various loans, grants and subsidies from other agencies, has funded the construction of facilities to reclaim and recycle a significant portion of the San Jose/Santa Clara Plant effluent flow. The city now operates the recycled water facilities through the South Bay Water Recycling (SBWR) organization.

Recycled water operations began in 1997. Since 2001, the city has completed an $82.5 million expansion project. In 2002, SBWR delivered an average of 10 MGD to more than 350 customers during the three highest-use consecutive months. As of June 2008, the SBWR system provided more than 10,300 acre-feet of recycled water for industrial and irrigation use to over 550 customers through more than 105 miles, three reservoirs with a combined 9.5 million gallons of storage and four pump stations. Since its construction in 1997, over 22 billion gallons of recycled water have been delivered to customers in San Jose, Santa Clara and Milpitas. Since the late 1990s, flows from the San Jose/Santa Clara Plant have been consistently maintained at levels below 120 MGD due to implementation of the Action Plan, including recycled water service.

Recycled water use has resulted in lower discharge levels from the San Jose/Santa Clara Plant, which has in turn helped preserve habitat for the Salt Marsh Harvest Mouse and the California Clapper Rail. The availability of recycled water has also brought benefits for industrial and irrigation users in the SBWR service area. Depending on the type of use to which the recycled water will be put and the user's location, recycled water users receive between a 17 percent and 75 percent discount in rates as compared to the potable water rate. For many irrigation and industrial users, this represents significant savings that can be dedicated to further economic development in the Silicon Valley area. The increased water supply reliability created by the existence of a reliable, local recycled water source also generates economic development by providing business and local agencies greater security with respect to their water supply.

3.2. Governance, Policy, and Reform

Numerous statutes and regulations influence how and when water related infrastructure decisions are made. In their responses to questions relating to governance, policy, and reform,

mentors frequently cited Proposition 218 and the California Environmental Quality Act (CEQA). Before analyzing the mentors' responses, the following provides some background on these two laws.

Proposition 218: Approved by California voters on the statewide ballot in November 1996, Proposition 218 – the "Right to Vote on Taxes Act" – dramatically changed the requirements for raising revenue at the local level. Proposition 218 amended California's constitution to:

- Require majority voter approval for new or increased general taxes.
- Require that local governments submit all proposed new or increased assessments, charges, and user fees to a vote – which usually requires individual notices to be mailed to affected property owners – and a formal protest hearing.
- Permit voters to use the initiative process to reduce or repeal any existing local tax, assessment, or charge.
- Limit use of general taxes for general purpose governments (funding cities and counties).
- Require local governments to identify the specific benefits to individual parcels of property before a benefit assessment is initiated or increased.
- Prohibit local governments from imposing fees on property owners for services like garbage collection and sewer service, and cap other fees at the cost of providing a service to property owners.
- Include government agencies in benefits assessments if the agency's property receives a benefit from the project or service provided.

CEQA: The California Environmental Quality Act (CEQA) (Public Resources Code, § 21000, et seq.) [1] is California's counterpart to the federal National Environmental Policy Act (NEPA) and applies to state and local governmental agencies and to their discretionary decisions on proposed projects.

CEQA requires governmental agencies to identify the significant adverse environmental effects of their projects and to refrain from approving and carrying out their projects as proposed if there are feasible alternatives or mitigation measures available which would substantially lessen the significant adverse environmental effects of such projects.

The basic purposes of CEQA are to: 1) inform decision makers and the public of a proposed project's potentially significant environmental impacts; 2) identify ways in which adverse environmental impacts can be avoided or mitigated; 3) require feasible mitigation measures or alternatives to prevent

[1] The Guidelines Implementing the California Environmental Quality Act, Cal.Code Regs., tit. 14, § 15000, *et seq*. (hereafter CEQA Guidelines).

avoidable environmental damage; and, 4) disclose to the public why a governmental agency approved a project even if the project has significant adverse environmental effects.

Once the lead agency makes its final determination, a petitioner may, under certain requirements, bring a legal action challenging the agency's CEQA decision.

Overcoming Political Obstacles

Mentors were asked to identify the major political obstacles to building and improving water infrastructure in California and to suggest ways to overcome them.

Two of the political obstacles noted were a **low commitment among public officials to consensus-building** and **California's law that limits terms served by elected officials**. Term limits are viewed as a political obstacle because they tend to encourage elected officials to take a short-range view or myopic view of issues, which makes decision-making on long-term water infrastructure projects very difficult. Related political obstacles mentors mentioned were a **lack of leadership** among elected officials and a **lack of urgency** regarding the building and improving of water infrastructure are political obstacles.

One mentor summarized the challenge of overcoming these obstacles as follows: "…You know how you get a whole bunch of people to agree? It is extremely complex, you have to thread a needle while you're riding on the back of a camel racing across the desert with people shooting at you."

Additionally, echoing a refrain heard from many mentors throughout the interviews, improving water infrastructrure is also hindered by a lack of available funding and resistance to rate increases, which is related to Proposition 218 and overall comments about the challenges of the initiative and referrendum process.

Case Studies

Two examples provided by mentors serve as case studies illustrating how the political obstacles noted affect the ability of government at all levels to successfully plan, finance, and build water infrastructure projects in California.

City of Foresthill/Foresthill Public Utility District and Measure B

An anecdote about the City of Foresthill illustrates why the referendum process has been cited as one of the greatest political obstacles to funding water infrastructure projects successfully. Foresthill Public Utility District (PUD) met Proposition 218 requirements to implement a rate increase. Voters qualified the rate increase for a local referendum, Measure B. The referendum passed, which rolled back the higher rates to their previous levels. In 2012, concerned that the rate rollback would force them the end operations, the PUD sought to reinstate the rate increase by again placing it in front of

voters on the local ballot. If Measure C had not been approved by voters in June 2012, the district would have closed. Ironically, had this happened, it would have likely opened the door for an investor-owned utility to provide water service. As investor owned utilities' rates are governed by the California Public Utilities Commission (CPUC), the local community would have lost its ability to help set rates in the future.

Los Vaqueros Reservoir Expansion

As an example of the lack of leadership and urgency among public agencies and officials, one mentor highlighted the recent project to expand Los Vaqueros Reservoir. In this mentor's view, the project would not have been accomplished as a state effort, but local officials were able to move it forward to completion. State and federal governments are risk-adverse and not efficient due to legal and political challenges. Given this, the mentor said state and federal governments should move to a support-role for local governments by providing technical resources and funding for the implementation of water projects.

Mentor Recommendations or Solutions

1) Increased public education

By and large, the most prominent recommendation by mentors is greater public education. To summarize one mentor, the public does not "understand the consequences of rejecting rate increases" and the way to overcome this obstacle is through extensive outreach to educate the public about the "true cost of water."

2) Reforming or removing term limits

The elimination of term limits is another recommendation given by some mentors. Mentors believe this is a mechanism toward building consensus and the path toward more-informed elected leaders who are better able to make long-term decisions on water infrastructure. One mentor described the issue with term limits succintly:

> *State term limits are a hindrance because the turn-over means it will take time for the newly elected official to be educated on complex water issues. This leads to tough decisions either not being addressed or the decision-making process takes an extended period of time due to the constant turnover at the state level.*

Effective Reform

Mentors were asked to identify reforms to California's policymaking, financial or governance structures that would have the greatest effect on the state's ability to successfully plan and implement water infrastructure improvements. Trends in their answers include:

1) **Proposition 218 reform**: Described in the sections above, Proposition 218 is viewed as a substantial obstacle to water infrastructure improvements. Proposition 218 placed restrictions on how water rates, among other fees and taxes, could be raised or implemented by public entities. Among other provisions, Proposition 218 allows for a public initiative process to reject new water rates or increases. The threat of a fee rollback or rejection is perceived as inhibiting planning and budgeting.

2) **Instituting a "public goods charge" for water**: Also analyzed above, this concept is modeled on the public goods charge assessed on electricity ratepayers for many years to fund energy efficiency, research, renewable energy and other programs of state-wide benefit. The goal is to provide a reliable and sustainable funding source for water infrastructure projects through, for example, a volumetric fee on water usage. There are considerable technical and legal challenges to implementing a water public goods charge.

3) **Groundwater regulation**: Several mentors noted that failing to regulate groundwater use throughout the state has stymied efforts to plan and implement water infrastructure improvements. Groundwater is an important component of the overall water supply, and its use needs to be properly addressed.

4) **Improved leadership**: Although something of cliché, several mentors emphasized that improved personal leadership by governing boards, as well as staff, was needed:

> *You need institutional structures that allow good people to do good work. Having institutional structures that allow good people to do good work doesn't mean that good work gets done. You have to have some really good people. […] So, we need somebody that really gets how to work with people to get stuff done, how to bring out the best in them.*

   Additionally, institutional leadership was specifically mentioned, although it was insufficient by itself. Implicit in many of the mentors' responses is the need for good communication, public outreach and marketing to achieve infrastructure goals, as well as, in some instances, placing state-wide needs ahead of parochial interests.

5) **Improved government efficiencies**: Several mentors expressed the wish that government do a better job of at least facilitating planning and implementing water infrastructure improvements. Specific prescriptions varied – ranging from a preference for local or regional control to state

and federal action – to deliver the necessary efficiencies. A few mentioned funding incentives but differed on their efficacy in delivering efficiency.

Generalizing the responses with respect to policymaking, in particular, several mentors essentially recommended shifting some of the responsibility to the local level, where the needs of the community are better reflected and outside interests have potentially less ability to influence results.

Unsurprisingly, given the trends noted above and the responses to a number of other questions, financial reforms suggested focused primarily on providing a reliable funding source – such as through water-based public goods charge – and through Proposition 218 reform. While elements of Proposition 218 are still subject to litigation, it is important to note that a state-wide majority vote would be required to change the California constitution. Suggested governance structures varied widely, although the Integrated Regional Water Management Plan (IRWMP) process (highlighted below) was praised by many and the concept of forcing greater regional-level governance was mentioned.

One mentor stated:

> *At the state level in terms of policy making and governance there is, at present, a lack of leadership, particularly in regulatory agencies – realizing they are supposed to be partner in the solution of problems (not just an enforcer of regulations). For instance, the Department of Public Health should ensure people do get safe drinking water as much as they ensure people do not get unsafe drinking water.*

Case Studies

Two case studies provided by the mentors to illustrate their points show the challenges facing water infrastructure development: lowering the spillway gates at Folsom Dam and Integrated Regional Water Management Plans (IRWMP).

Folsom Dam Joint Federal Project

Several years ago, the Sacramento Area Flood Control Agency (SAFCA) wanted to lower the spillway gates in Folsom Dam. However, as in many situations, the authority to do so was not entirely theirs. The U.S. Army Corps of Engineers controlled flood operations at the dam, and the dam is owned by the U.S. Department of the Interior, Bureau of Reclamation. A preliminary design initially obtained by SAFCA did not work. After considerable effort and collaboration across institutional boundaries from the local to federal levels, a workable design was developed and additional – and new – sources of funding were identified to pay for the upgrade. Outreach to and involvement of political figures aided the effort. The Folsom Dam Joint Federal Project is currently underway with an expected completion date of 2015 at a cost of $848 million.

IRWMPs

The IRWMP process was instituted in 2002 by the California Legislature in an effort to "encourage local agencies to work cooperatively to manage local and imported water supplies to improve the quality, quantity, and reliability," as well as provide flood protection. The IRWM Program allows for regional and local stakeholders to collaborate and express the issues and concerns that are of high priority and importance to them. IRWMPs are periodically updated and typically represent hydrogeological boundaries instead of political ones. For example, the San Francisco Bay Area IRWMP encompasses parts of 9 counties, and numerous government agencies, as well as non-profits and community groups are involved in its development. California voters passed three bond measures – Propositions 50, 84, and 1E - to fund planning and projects that are detailed in IRWM Plans and to provide the financial incentive to complete and implement an IRWMP.

In both of these case studies, on-going sustained effort was and remains necessary to keep these moving forward and emphasize that governance, policy or financing improvements that could effectively benefit these would make achievements like these more widespread.

Navigating CEQA

Mentors were asked whether CEQA inhibits infrastructure projects or make them more expensive, and if so, how CEQA might be amended to incentivize infrastructure projects.

Contrary to the expectations of many, **most mentors did not believe that CEQA inhibits water and wastewater infrastructure projects from successful execution**. Additionally, many found that for the long term, CEQA compliance makes a project cheaper because governmental agencies analyze and adopt mitigation measures for impacts earlier rather than later once a problem is recognized.

Some of the mentors also found that, in their experience, **CEQA's public involvement requirements result in a better project overall**, as they provide citizens the opportunity to contribute additional alternatives that agencies may have not previously considered for their proposed projects.

On the other hand, several mentors opined that **CEQA litigation is problematic** because it is used merely as a tool to delay project implementation. As one mentor noted, "[Decision-makers] are often stuck making the strictest call to avoid getting sued, which doesn't make sense."

Case Studies

Two case studies provided by the mentors to both the challenges and benefits of the CEQA process when it comes to water infrastructure projects.

Capay Diversion Dam

As an example of the negative effects of CEQA, one mentor cited Capay Dam to demonstrate how public agencies sometimes take an overly strict or conservative approach to its decision making to avoid a legal challenge. Originally constructed in 1913, the Capay Diversion Dam is located in Yolo County approximately two miles above the town of Capay on Cache Creek. The Yolo County Flood Control and Water Conservation District is currently undertaking an apron repair project at the dam. The mentor pointed out that although the land had already been disturbed for a century, the agency still allocated money to environmental review and mitigation because the agency felt it would ultimately be required to do so.

Auburn Dam

As an example of the positive effects of CEQA, a different mentor utilized the proposed Auburn Dam project to demonstrate how CEQA ensures that the public has a say in identifying the project's objectives and has an opportunity to participate in alternatives formulation.

As pointed out by the mentor, the Auburn Dam was proposed in California as far back as the 1940's. The proposal was for a dam, reservoir and powerplant to be constructed at the North Fork of the American River adjacent to the City of Auburn. Construction of the dam stopped due to earthquake and safety concerns, as well as environmental concerns.

The mentor further explained that, "[r]ather than base the size of the proposed project on the hydrology of the area, or the geologic conditions, it was proposed to be one foot higher than the next biggest thin arched concrete dam in the world for no other reason than to have the biggest dam in the world." Without CEQA, "[t]he public would otherwise have no say in that."

Mentor Recommendations or Solutions

Given the mentors' general assessments that CEQA litigation, rather than CEQA itself, was problematic, a few of the several mentors believed that reducing the costs and delays associated with CEQA litigation would be beneficial and .made recommendations that might help reduce the costs and delays associated with CEQA litigation.

1) Establish an administrative/environmental law court to streamline legal proceedings related to CEQA

Like Colorado's Water Court, California might consider having an environmental court to be led by judges who have experience with CEQA cases. Another recommendation was to encourage expediting disputes without going to court.

2) Limit CEQA lawsuits

One mentor also suggested limiting CEQA lawsuits. Of note is a recent amendment to CEQA allowing a party to request the court to impose a sanction for a frivolous CEQA claim. If the court deems the CEQA action to have been frivolous, the court may impose a sanction in an amount up to ten thousand dollars ($10,000), upon the attorneys, law firms, or parties responsible for the violation. The section is due to sunset on January 1, 2016 unless a later enacted statute deletes or extends that date (Pub. Resources Code, § 21167.11).

3) Clarity, consistency, more rigorous science

Another mentor thought having more clarification or better definitions about what is considered appropriate in terms of CEQA review. As pointed out by the mentor, "there is a fair amount of discretion that the judge has, and the outcomes easily could have gone the other way. So getting more certainty in how CEQA is applied would be more helpful."

Elected Officials and Disincentives for Rate Increases

Mentors were asked whether public agency board members have a difficult time recommending rate increases for infrastructure improvements due to re-election concerns and whether there is a solution to avoid such a conflict if it exists.

Mentors almost universally recognized that **recommending rate increases is difficult for elected officials** of local water agencies. Increasing rates, however, is vital in order to maintain rates at a level sufficient to cover the rising costs of providing water related services. Several mentors shared anecdotes about how the failure to steadily raise water rates in small increments ultimately resulted in large and abrupt water rate increases that were politically very difficult to adopt. Although the question attributes this difficulty to re-election concerns, some mentors suggested that the primary difficulty is caused by Proposition 218's voter approval requirements and community pressure.

According to the mentors, Metropolitan Water District of Southern California, Sacramento-Suburban Water District, and many other water agencies across the state, declined to adopt small incremental rate increases for many years. This necessitated large, abrupt increases that were politically difficult for elected officials to support.

Case Study: El Dorado Irrigation District

El Dorado Irrigation District (EID) increased its water rates in only 6 of the 22 years between 1987 and 2009. At a Proposition 218 hearing in 2010, EID adopted an 18 percent increase for its 2010 water rates, a 15 percent increase for 2011, and a 5 percent increase for 2012. Nearly 22 percent of EID's rate payers protested the proposed increases. Although 22 percent is far from the majority

necessary to defeat the proposed increases, such a large number of protests had an impact. The following year, EID's board president lost his election. Thereafter, EID conducted a cost of services study that demonstrated a need for additional rate increases. In 2012, after engaging in a significant public outreach and education campaign, EID proposed additional incremental water rate increases of 6 percent in 2012, 11 percent in 2013, 11 percent in 2014, and 5 percent in 2015. The public outreach and education paid off, as EID received protests from only 2 percent of its rate payers.

Mentor Recommendations or Solutions

Almost across the board, mentors agreed that there is no easy answer to addressing this conflict, but suggested several recommendations.

1) Public outreach and education

Overwhelmingly, mentors recommended public education and outreach as a means for addressing the difficulties associated with recommending rate increases. Educating the public about the cost of providing water services and the need for infrastructure improvements, will, in theory, reduce opposition to rate increases, and correspondingly reduce pressure on elected officials to avoid recommending necessary increases.

2) De-couple rate structures

Another mentor suggested de-coupling rate structures, allowing agencies to adjust their rates mid-year, for example, depending on sales revenue. Acknowledging that this works better for investor-owned utilities, some version of this could be explored for public agencies.

3) Impose requirements for regular rate increases

Another recommendation included requiring local agencies to annually increase rates in accordance with the American Water Works Association's water rate manual. Requiring rate increases would take some of the pressure off of elected officials.

4) Change terms of service

Another recommendation included lengthening the terms of office, but restricting officials to service of only one term. Presumably, this would allow officials to take a longer view on rates without worrying about re-election.

5) Regional governance

Finally, one mentor recommended empowering IRWMP groups with some regulatory framework for requiring rate increases. This would make elected officials accountable to a regional regulatory authority and not just to customers.

Prioritizing Between Infrastructure versus Other Alternatives

Mentors were asked how, in making infrastructure investment decisions, policymakers and water managers should prioritize: (1) performing deferred maintenance on degraded infrastructure; (2) constructing new infrastructure; and (3) making changes to laws, regulations, or market conditions (such as rate structures) to promote alternatives that would reduce the need for new infrastructure.

Before offering their opinions on the correct order for the above-listed priorities, many mentors stressed that **prioritization should be completed on a regional or local basis**. In setting priorities, mentors recommended that decision-makers identify the regional water needs, issues, and drivers in relation to water. The infrastructure characteristics of a particular region, such as age, may also influence whether maintenance or repair to degraded infrastructure should occur prior to the construction of new infrastructure. Several of the mentors opined that prioritizing should be considered as a business decision.

The majority of mentors agreed that **deferred maintenance on degraded infrastructure should take priority over new infrastructure or policy reform**. As one mentor put it, you "must catch up to 2012 before you worry about 2040." The mentors generally agreed that public health and safety should be protected before financing new infrastructure for new development.

When choosing to construct new infrastructure, mentors recommended choosing the most cost-effective options first. It was also observed that deferred maintenance on degraded infrastructure should be paid for by current rates, while new construction can be paid for by growth.

Additionally, notwithstanding the above recommendation to prioritize on a regional or local basis, several mentors also recommended prioritizing infrastructure projects based on efficiency and vulnerability. That is, infrastructure should be spent to maintain water infrastructure that best maximize the use of each specific type of water supply (e.g. groundwater, recycled water, surface water, etc.) and, "Money should be allocated based on where the greatest vulnerabilities are and where we get the most efficient increase in reliability both now and into the future."

The mentors seemed less willing to prioritize making changes to laws, regulations, and/or markets, although at least one mentor believed that such changes were necessary as well as deferred maintenance and new construction. Although it provides good "optics," promoting conservation was noted to have a Catch-22 effect when it comes to raising revenue: "When rates are raised to conservation tiers, revenue drops – conservation is at odds with revenue." The need to focus first on infrastructure was emphasized by another mentor, who said "Conservation cannot do much to replace water mains."

Case Studies

In support of metering water and charging tiered rates, one mentor offered the following anecdote. The mentor has a neighbor that has a sprinkler head that she repeatedly runs over with her car. Because the water is not metered, the water runs down to the gutter, and the neighbor simply looks at the water and says: "Oh! I should fix that!" However, she would fix the broken sprinkler head if her water use was metered. It would be fixed immediately.

Mentor Recommendations or Solutions

Moving forward, the mentors offered recommendations for increasing the funding for maintaining degraded infrastructure that included:

1) **Metering water**
2) **Charging tiered rates**
3) **Reexamining rate structures**

For funding new construction, mentors suggested:

1) **Completing life-cycle planning at the time of construction and including it in the rates as part of overall project costs**
2) **Applying the "beneficiary pays" principle after analyzing the true cost of service**

3.3. Green Infrastructure, Conservation, and Climate Change

Background and Summary on Climate Variability and Change Effects on Water Resources and Related Infrastructure

Climate variability and change has and will continue to affect the global hydrologic cycle (Green et al., 2011) and will force water managers and policy makers in California and elsewhere to re-examine their best management practices for the availability and sustainability of the State's freshwater supplies. Climate change generally refers to human-induced and long-term changes in the Earth's climate that is largely due to the result of increased production of greenhouse gases by human activity (IPCC, 2007). Climate variability generally refers to inter-annual to multi-decadal changes in climate that is largely the result of naturally occurring oceanic-atmospheric phenomenon that includes the well-known El Niño /Southern Oscillation (ENSO) that has a characteristic 2- to 7-year quasiperiodic oscillation between the El Niño and La Niña phases of variability (Gurdak et al., 2009). In general, global circulation models (GCMs) forecast that many regions of California and the western U.S. will have higher air temperatures, which will likely lead to increased droughts and wildfires, and more intense rainfall events that are likely to produce greater volumes of runoff in shorter periods of times. The type

of precipitation at higher elevations is predicted to shift from less snowfall to more rainfall. These types of shifts in the weather patterns may have dramatic consequences for California.

Water-resource managers in California rely on the large-scale, state and federally-funded water-supply projects for the storage, transport, and treatment of water to meet the statewide demand. Roughly two thirds of the rainfall occurs in the northern portion of the state, while about two thirds of the population lives in the southern portion, much of which is classified as a semi-arid and arid (desert). The major state water projects rely on snowfall to store water during the winter months and then release the water as runoff in the spring. Many of the reservoirs in the state serve to both, protect against flood flows during times of peak snowmelt and to store water to be used as supply throughout the summer and fall. As the frequency, type, and intensity of precipitation events change, so too will the way water managers operate the reservoirs.

In California and elsewhere, freshwater resources in many urban and sub-urban environments are highly vulnerable to human pressures and climate variability and change (Treidel et al., 2012). Impervious surfaces such as buildings, roads, parking lots, and compacted soil prevent infiltration of urban stormwater flows and cause localized flooding, and increase contaminants in surface runoff that often overwhelm sewer systems and combined stormwater-sewer flows that are often untreated (US EPA, 2000; Cantone and Schmidt, 2011). To address these concerns, urban stormwater managers are increasingly using low impact development (LID) site planning to maintain or replicate the predevelopment hydrologic regime by using best management practices (BMPs) that decrease the impacts on stormwater drainage systems and help maintain surface water-quality (Newcomer, 2012; Ando and Freitas, 2011). BMPs are microscale and decentralized management techniques that include natural vegetated systems such as bioretention facilities, vegetated swales and roofs, pervious pavement, rain barrels, and infiltration basins and trenches to reduce, filter, and slow stormwater runoff (US EPA, 2000).

Additionally, groundwater will play an important role in society's adaptation to climate variability and change (Gurdak, 2012). Groundwater resources supply fresh drinking water to nearly half the world's population and support streams, lakes, wetlands, aquatic communities, economic development and growth, and agriculture worldwide (Alley et al., 2002; WWAP, 2009). The use of groundwater has particular importance for many potable-water supplies because groundwater has a capacity to balance large swings in precipitation and associated increased demands during drought and during periods when surface-water resources reach the limits of sustainability. Despite their importance, global groundwater resources are vulnerable to human activities and the uncertain consequences of climate change (Green et al., 2011; Treidel et al., 2012). In California, groundwater is the largest source of freshwater and a crucial socio-economic resource, but is pumped at rates (10,700 million gallons per day) that exceed use in all other States and threaten long-term sustainability for agricultural use (80 percent), public/domestic use (16 percent), and for other industry (4 percent)

(Maupin and Barber, 2005). Groundwater sustainability in California is threatened because of overuse and future uncertainty from climate variability and change (Treidel et al., 2012).

Incorporating Flexibility for Climate Change Adaptation

Mentors were asked how to incorporate the necessary flexibility to deal with climate change impacts into the existing or planned physical structures that store, convey, treat and deliver water.

In general, mentors agreed that climate change impacts will be a real problem and that increased hydrologic variability will require greater flexibility to operate existing water supply projects. However, it is clear from mentors' responses that water practitioners continue to struggle to understand climate change, its impacts, and potential adaptation and mitigation strategies. Few case studies exist that point to successful efforts to incorporate greater flexibility in water resources planning and management. Below are steps identified by mentors to achieve greater flexibility and increase adaptive capacity:

- Improve Hydrologic Understanding :
    - Work to develop more real-time data linked to operations, precipitation events and stream flow
    - Develop new and/or build on existing hydrologic and hydraulic models to simulate a range of possible future conditions
    - Perform risk analysis for potential natural disasters
- Infrastructure Design Actions:
    - Reassess present day reservoir operations
    - For supply, have capacity to convey and store more, build extra capacity
    - Improve existing infrastructure incrementally, with upgrades & retrofits
    - Design new infrastructure not based on past hydrologic conditions, but based on projected hydrologic conditions.
- Non-Structural/Institutional Actions:
    - Encourage and fund more regional planning, such as through the IRWM program
    - Reduce demand through improved water use efficiency, in part as a result of outreach and education
    - Streamline water transfers
    - Link to cap & trade for carbon to incentivize energy efficiency

Benefits of Local/Green Infrastructure as an Alternative

Mentors were asked whether smaller-scale and regionally- or locally-managed "green" infrastructure (e.g., low-impact development, detention/recharge basins, etc.) are a feasible

alternative to the comparatively high costs associated with long-term maintenance of large, centralized infrastructure systems.

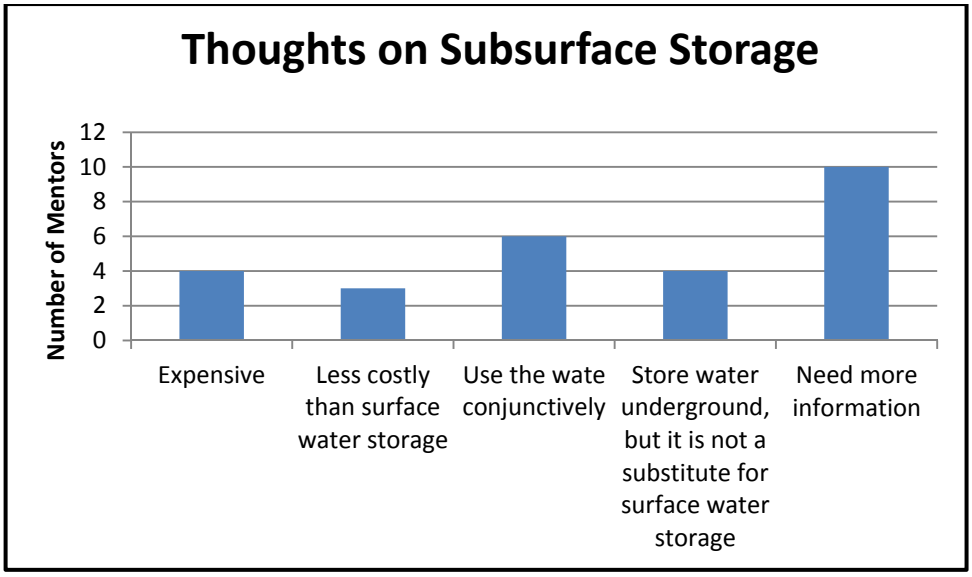
Several mentors commented that the ability to construct local projects depends on the area (geography). For example, if no source of surface water exists, then a surface water diversion project is not a possibility. Most answers trend toward having a "well-balanced portfolio" or diversity in the size of projects as well as whether projects are built locally or large scale. The recommendation is to start with small, local projects and then move to regional projects to meet demand. If local and regional projects fail to meet total demand, then the need to construct larger projects at the state / federal level will become apparent. Several mentors noted that there was a lack of good leadership at the state / federal level that put in context with increasing regulatory requirements, and that the days of building very large scale water supply projects may already be in the past. Is should also be noted here that one response was flat out "NO." "The notion that we can eliminate big infrastructure and go green is not realistic. We need to create new infrastructure that is designed with consideration of co-equal goals. The big environmental investment we need to make is to invest in local resources that increase reliability of supply."

Surface Storage versus Underground Storage

Mentors were asked to provide their thoughts on groundwater storage as an alternative to the costly expense of increasing reservoir storage (e.g., as a response to climate change impacts or other water storage balance issues).

Most mentors agreed that that laws governing groundwater are antiquated and that this poses a significant problem. Most also agreed that subsurface storage versus surface storage is not an "either/or" but that both are necessary. Runoff happens quickly, but infiltration and deep percolation occur slowly; therefore, surface water storage is required to temporarily hold the water until it can be routed to a recharge or spreading basin.

Of the mentors who thought that subsurface storage of water was a good idea, there were still concerns raised. The concerns centered on water quality, groundwater regulations, timing of water availability, and costs to recover water. One mentor noted that subsurface storage is not entirely "green" as the water would still need to be recovered (pumped) for later use, requiring electricity. The consensus on the topic was that a majority thought subsurface storage was a good idea, but that in practice it may be more difficult to accomplish on a large scale than many people think. The following table illustrates mentor responses on the subject:



3.4. Environmental Justice

Background and Summary on Right to Safe, Clean, Affordable, and Accessible Water Legislation (AB 684, 2012 [Eng])

On September 25, 2012, Governor Brown signed into law legislation declaring that it is policy of the state that every human being has the right to safe, clean, affordable, and accessible water adquate for human consumption, cooking, and sanitary purposes. The bill added section 106.3 to the Water Code requiring all relevant state agencies, including the Department of Water Resources, the State Water Resources Control Board and the State Department of Public Health to consider this policy when "revising, adopting, or establishing policies, regulations, and grant criteria when those policies, regulations, and criteria are pertinent to the uses of water described in [Water Code, § 106.3.]." (Stats. 2012, ch. 524, § 1, p. 91.)

Empowering Communities

Mentors were asked what can be done to empower community residents, especially those from disadvantaged communities without access to safe drinking water, to (1) influence water policy decisions, (2) hold decision makers accountable, and (3) fix, maintain, and upgrade their water systems. Answers to this question varied, but the following discusses answers which emerged as trends or seem to have the most promise in making an impact.

1) **Educate Residents:** The most common response by mentors was to educate residents of disadvantaged communities (DACs) on how to influence the political process in order to have their voices heard and to hold their representatives responsible. One limitation that several mentors noted was that often, resident with very low income, are more concerned about food and shelter than how to influence the political process.

2) **Address Externalities**: Several mentors noted that often the cause of unsafe drinking water is related to the over application of nitrogen-based fertilizer, which has contaminated groundwater – the most widely available source for drinking water in many DACs. Several mentors recommended addressing this problem by imposing a tax on either the manufacture or sale of nitrogen-based fertilizers and using the revenue generated to address water quality in DACs.

3) **Legislation enacting a Human Right to Water:** One mentor recommended that the California Legislature enact a human right to water. As noted above, the Governor signed such a law in September 2012. It remains to be seen, however, how this statute will affect DACs. Some water suppliers have questioned their recourse, in light of the new statute, such as whether the water supplier will be able to shut off a water connection when a water customer fails to pay for water services.

4) **Consolidation of Water Providers:** Several mentors suggested that in order to effectively help DACs, larger or more sophisticated water suppliers might have to incorporate, or consolidate with smaller, or less sophisticated suppliers. One mentor even suggested that bigger cities/districts be forced to consolidate with smaller entities in order to provide the level of expertise necessary to ensure adequate services for DACs. Another mentor suggested that IRWMPs are already an appropriate vehicle for more sophisticated entities to help provide expertise to their neighboring less sophisticated entities.

One potential challenge noted by several mentors in assisting residents of DACs is that Proposition 218 prohibits public water supply agencies from subsidizing services for lower income rate-payors. Investor-owned water suppliers are able to charge a “lifeline” rate, one that is significantly subsidized, to customers unable to pay normal rates. Public water suppliers, however are unable to do so. Consequently, mentors recommended that the California Legislature amend Proposition 218 to allow public water agencies to adopt a lifeline rate for qualified residents.

4. SUCCESS STORIES

Several projects identified by Water Leaders or mentors provide examples of the success that can be achieved when water agencies effectively leverage the various tools available to them to study, fund and build broad support for water infrastructure. Several such examples are discussed below.

4.1. Pajaro Valley Water Management Agency's Water Supply Reliability Efforts

The Pajaro Valley, adjacent to Monterey Bay, is one of the most productive agricultural regions in the United States; however it has aquifers suffering from long-term groundwater overdraft and seawater intrusion (Fig. 1a-c). Excessive saltwater contamination of a fresh water aquifer results in the loss of a usable water supply in addition to a loss of aquifer storage. The Pajaro Valley Water Management Agency (Agency) was established in 1984 to "efficiently and economically manage existing and supplemental water supplies in order to prevent further increase in, and to accomplish continuing reduction of, long-term overdraft and to provide and ensure sufficient water supplies for present and anticipated needs within its boundaries." Since its formation, the Agency has developed a Basin Management Plan (BMP), several regional-scale hydrologic models, constructed a managed aquifer recharge and recovery (MAR) project, a recycled water treatment facility, and more than 20 miles of underground pipeline. The success of the Agency in acquiring grant funds has led to nearly half of the constructed project costs being covered by grant money. This is of particular importance because the facilities were constructed in the areas of several disadvantaged communities. Presented below is the short story of one agency's efforts to

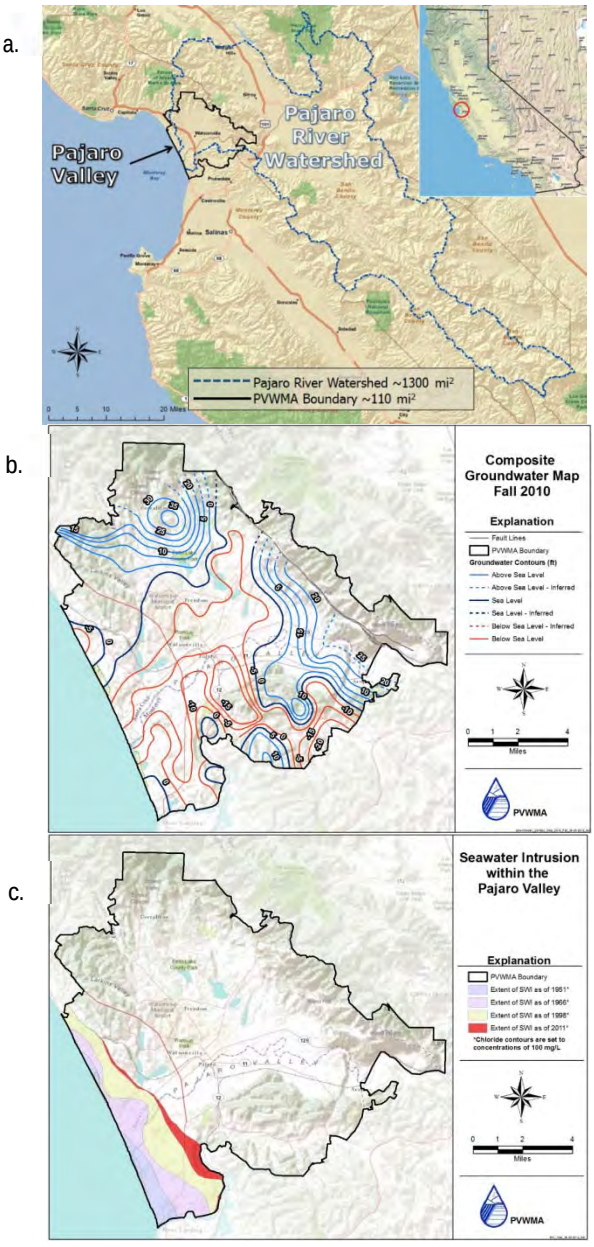
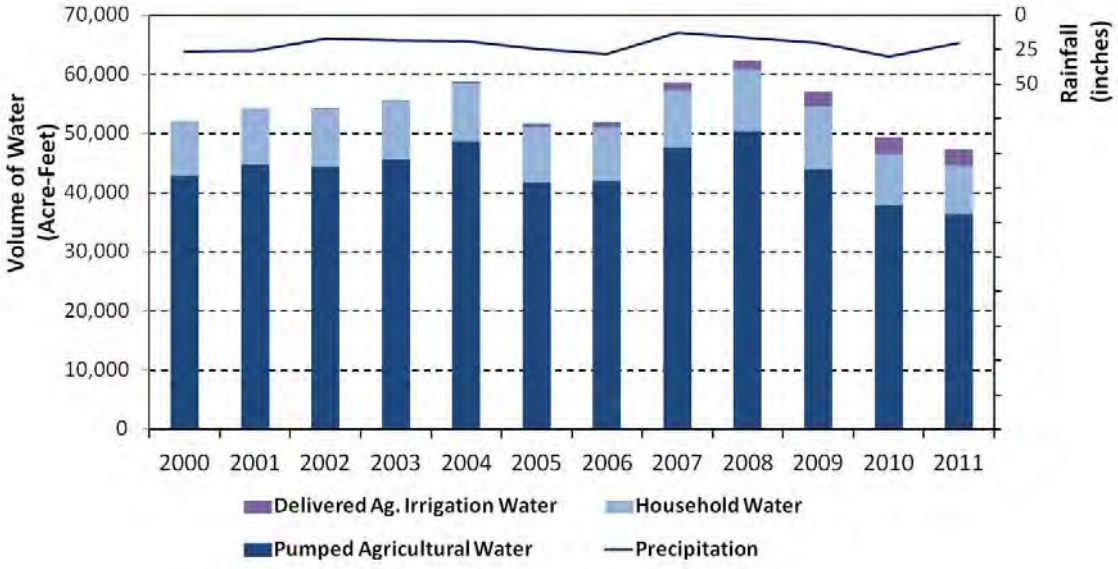


Figure 1: a) Location map; b) Groundwater contour map, 2010; and c) Extent of Seawater Intrusion

economically develop a sustainable and local water supply.

The Pajaro Valley groundwater basin is located within a coastal valley that straddles southern Santa Cruz County and northern Monterey County, adjacent to Monterey Bay. The Valley covers approximately 120 square miles and is bordered on the northeast by the coastal Santa Cruz Mountains and on the southwest by the Pacific Ocean. Groundwater is the primary source of water in the valley, accounting for over 95 percent of all water usage. Over the past several decades, groundwater pumping for agricultural and municipal uses has exceeded recharge, leading to overdraft of the aquifers. Groundwater surface elevations in the valley remain below sea level throughout the year, causing seawater to migrate inland into the freshwater aquifers.

Figure 2: Metered water usage



Agricultural water use represents the largest water use in the valley at roughly 85 percent of total groundwater use, or about 40,000 acre-feet (Fig. 2). In 2011, that water served to produce over $500 million in revenue from sales of mostly strawberries, raspberries and vegetables grown on less than 30,000 acres. The distribution of crops throughout the valley is shown on Fig. 3 (2012 Land Use Map). Following agricultural water use, municipalities represent the next biggest use.

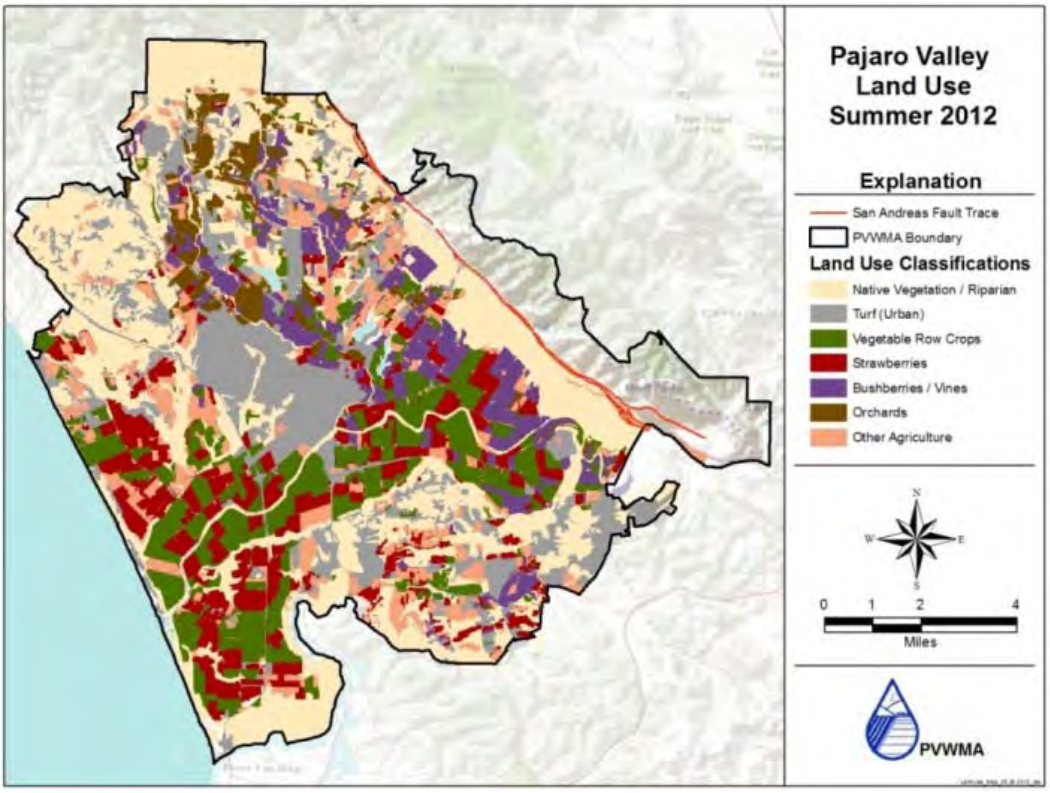


Figure 3. Land Use Map from Fall 2012

Hydrologic modeling has shown that eliminating coastal groundwater pumping has the most significant impact on the problem of seawater intrusion. The strategy of the Agency therefore has been to develop new, reliable water supplies that can be used for agricultural irrigation in lieu of groundwater production (Fig. 4). Such new supplies include the Harkins Slough Managed Aquifer Recharge and Recovery Facility, which commenced operations in 2002, and has recharged over 6,000 acre-feet since that time (Fig. 5a). In 2009, a newly constructed Recycled Water Facility began producing water for distribution. Also by 2009, the Coastal Distribution System (CDS), a water conveyance pipeline reached twenty miles long with the ability to provide water to over 7,000 acres of prime farmland centered in the middle of intruded zone. Nearly 13,000 acre-feet have been delivered through 2011 (Fig. 5b).

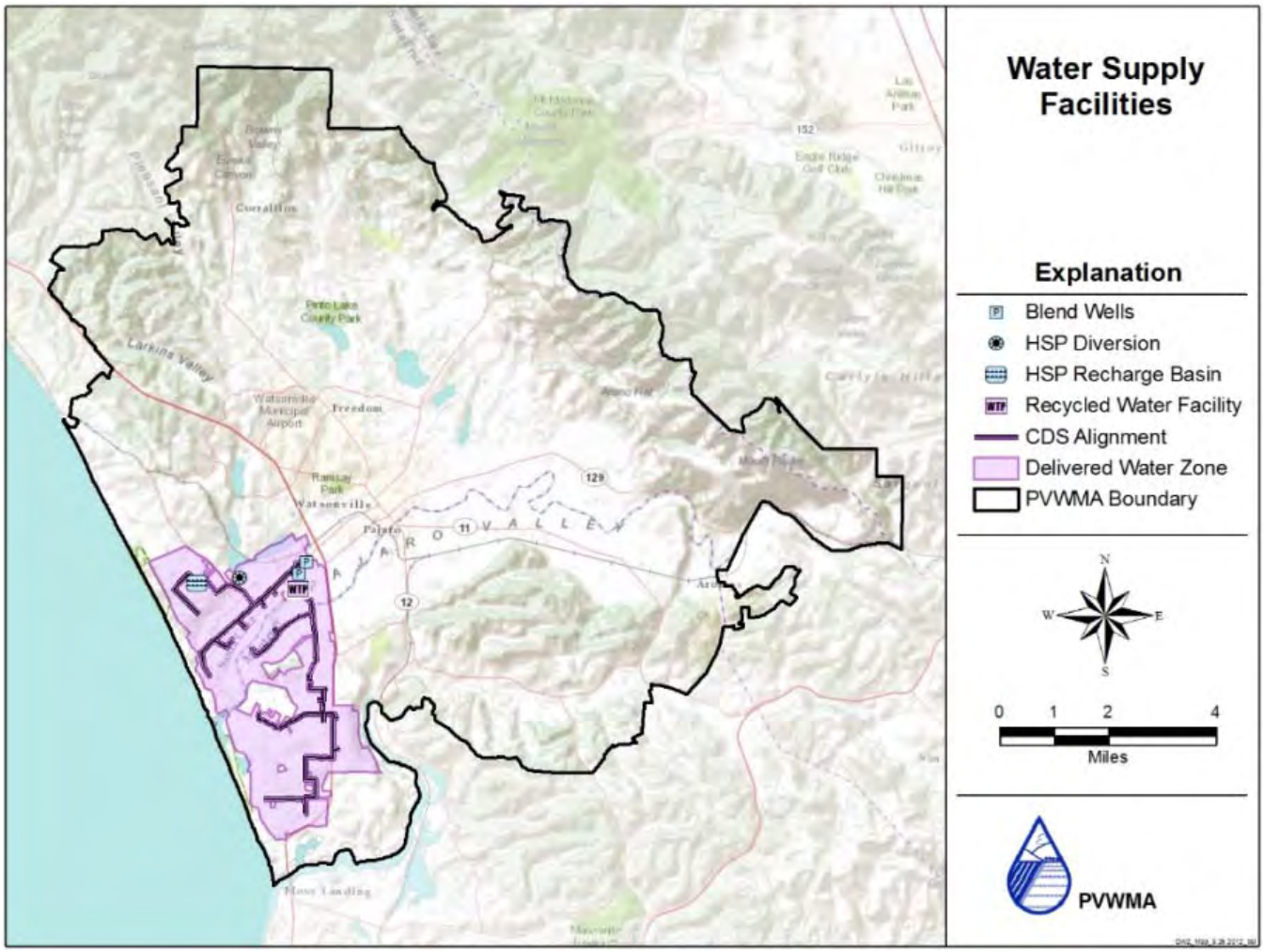


Figure 4. Delivered Water Zone and Water Supply Facilities

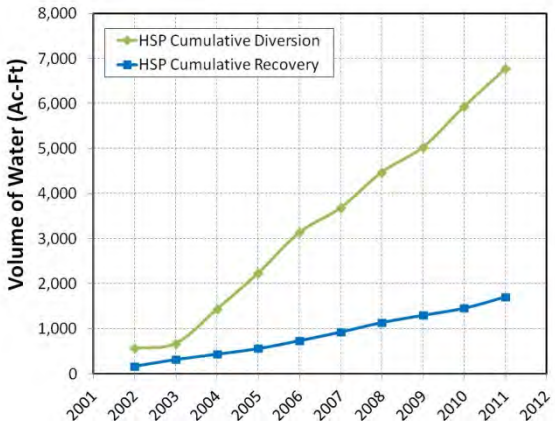


Figure 5a. Harkins Slough Managed Aquifer Recharge and Recovery Project: Cumulative diversion (recharge) and recovery

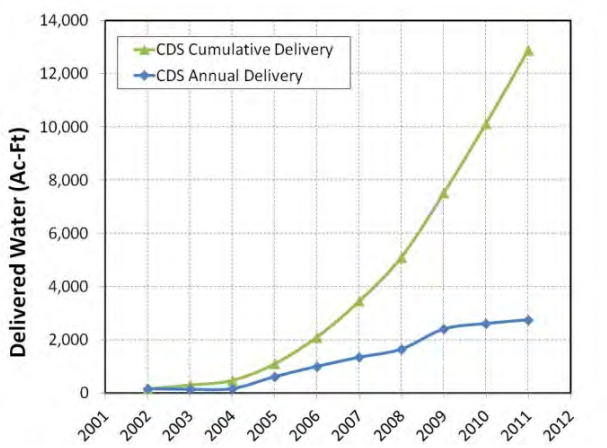


Figure 5b. Annual and cumulative volumes of water delivered through the Coastal Distribution System to growers

Planning, designing and constructing water supply facilities is expensive, and especially so for disadvantaged communities. The success of the Agency in acquiring federal and state grant funds made possible the ability to construct these facilities. Nearly $50,000,000 from Proposition 13, Proposition 50 and Title 16 (Fig. 6) paid for almost half of all construction costs. The Agency has been successful because its projects have focused on water conservation and optimizing use of local resources, which makes them very competitive for federal and state funding.

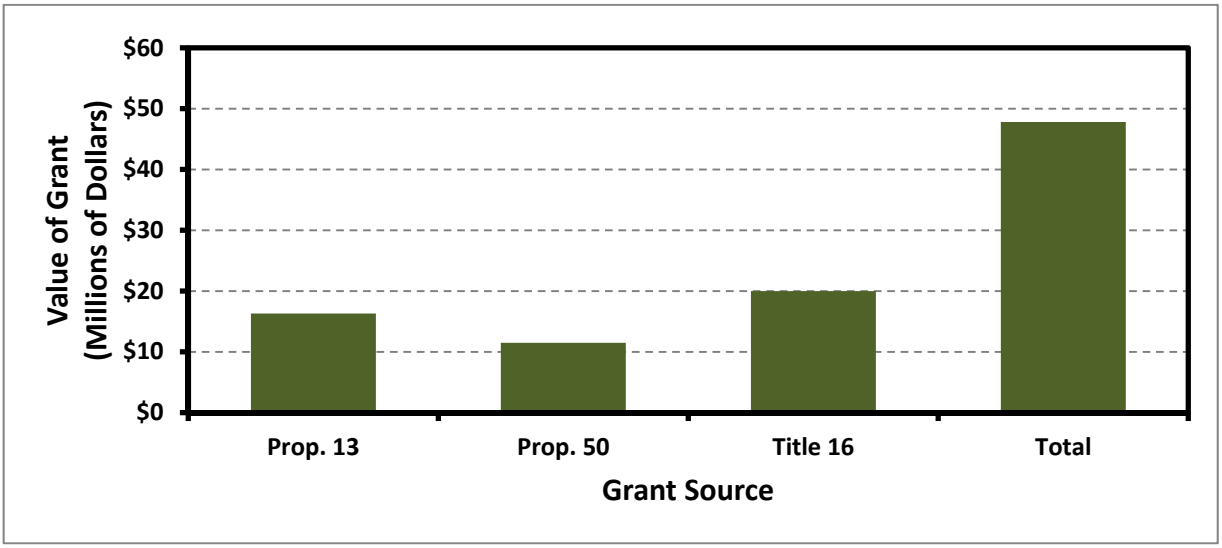


Figure 6. Sources of grant funding.

In order to continue its mission to manage the groundwater basin and operate existing water supply facilities, the Agency had to conduct a Proposition 218 rate election in August of 2010. Most revenue generated by the Agency comes from an augmentation charge based on groundwater production. Lesser amounts of revenue are generated by sales of delivered water and a parcel tax fee. The Proposition 218 process included two steps: First a protest hearing was held. A simple majority of

protests could have stopped the rate increase. After surviving the protest hearing, a confidential ballot vote took place as the second step. Each vote was weighted based on the five year average water usage of each parcel with a well. The rates approved by the successful Proposition 218 effort became effective October 1, 2010, and expire in 2015 due to a five year sunset clause added to the ordinance that made them effective.

The 2010 rate increase also included funding to develop an update to a decade-old groundwater management plan. As of fall 2012, the updated groundwater management plan is in review and the environmental documentation is being developed. New strategies include developing demand management programs, optimizing the use of existing facilities, and finally, the construction of new water supply facilities. Stakeholders will be asked to consider funding this updated groundwater management plan during the 2015 Proposition 218 election.

The updated groundwater management plan contains an outline on how to solve the long-term problems of groundwater overdraft and seawater intrusion. Progress often occurs in steps. With over 20,000 acre-feet delivered or recharged in the last ten years, this agency is taking steps in the right direction. The results of this effort are a sustainable water supply over the long term, local control of the water supply, and the preservation of the agricultural heritage of the valley.

4.2. Orange County Water District's Groundwater Replenishment System

Introduction

The development of Orange County Water District's Groundwater Replenishment System (GWRS) was identified by several mentors as an example of a highly successful public outreach campaign for a water supply infrastructure project.

Northern and central Orange County, in Southern California, rely on Lake Oroville, the San Francisco Bay-Delta, and the Colorado River to provide approximately 40 percent of the water supply needs for the region's 2.4 million people. Historically, OCWD has been able to purchase water from these sources to recharge the groundwater basin. These water supplies, however, have not been available for the past several years and will be more difficult to rely on in the future.

This region also overlies a very large groundwater basin that is managed by OCWD. The basin provides the remaining 60 percent of the potable water supply. Although the basin is vast, the average annual withdrawals must be balanced by recharge from a variety of sources. The primary sources of groundwater basin recharge include flows from the Santa Ana River, direct percolation of rainfall from local wintertime storms, and imported water from distant sources.

In the past few years, OCWD has seen significant decreases in water flow along the Santa Ana River. Much of this is a result of dry weather conditions and water conservation upstream. Faced with these challenges, and an expected population growth of more than 300,000 people by 2035 in north and central Orange County (Source: Cal State CDR), OCWD has had to find new ways to maximize the annual sustainable yield of the groundwater basin.

Groundwater Replenishment System Details

The GWRS was designed to take highly treated wastewater that would have previously been discharged into the Pacific Ocean and purify it using a three-step advanced treatment process consisting of microfiltration, reverse osmosis and ultraviolet light with hydrogen peroxide. The process produces high-quality water that exceeds all state and federal drinking water standards.

Operational since January 2008, this state-of-the-art water purification project can produce up to 70 million gallons (265,000 cubic meters) of high-quality water every day. This is enough water to meet the needs of nearly 600,000 residents in north and central Orange County, California.

After water is treated with the three-step process, approximately 35 million gallons (132,500 cubic meters) of GWRS water per day is pumped into injection wells where it serves as a seawater intrusion barrier. Another 35 million gallons (132,500 cubic meters) per day is pumped to recharge basins in Anaheim, California, where GWRS water filters through sand and gravel to blend with Santa Ana River and imported waters and to naturally filter into the groundwater basin, ultimately becoming part of north and central Orange County's drinking water supply.

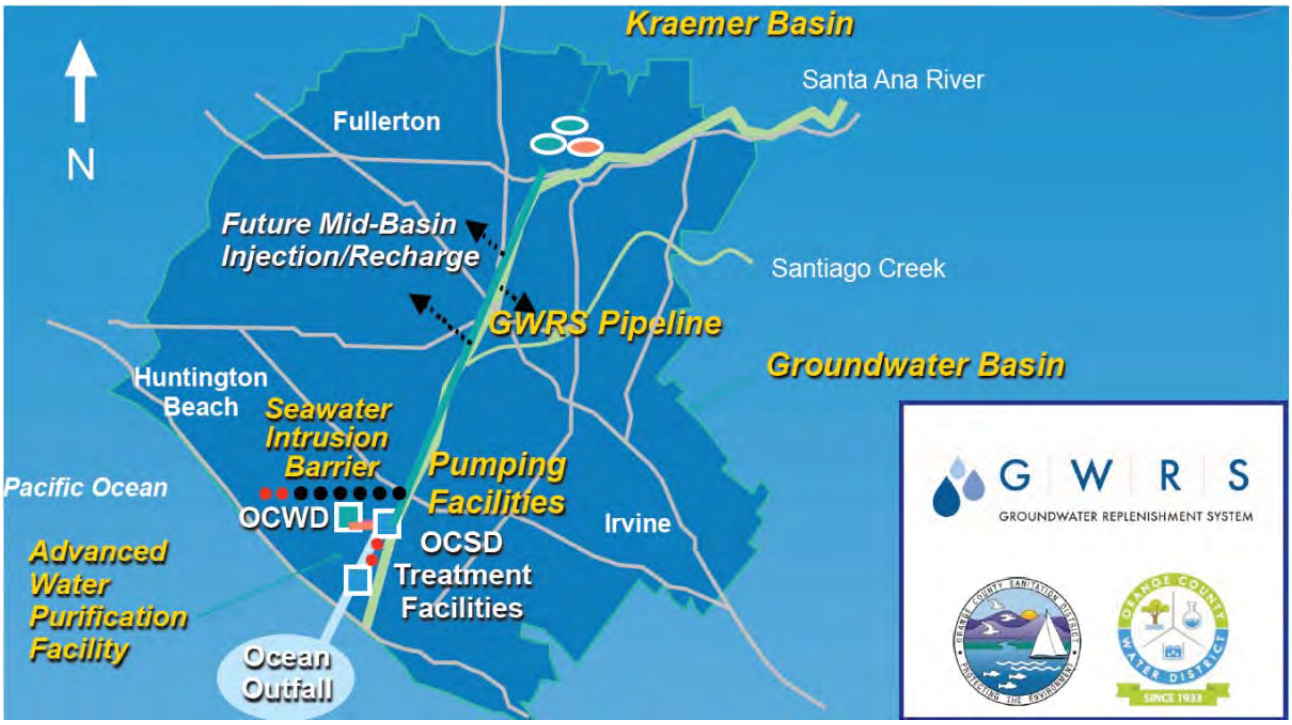


Figure 7 – Schematic of Groundwater Replenishment System

The design and construction of the GWRS was a project jointly-funded by the Orange County Water District and the Orange County Sanitation District. These two public agencies have worked together for more than 30 years. They are leading the way in water recycling and providing a locally-controlled, drought-proof and reliable supply of high-quality water in an environmentally sensitive and economical manner.

Award-Winning Public Outreach Program

Orange County Water District (OCWD) and Orange County Sanitation District's (OCSD) communications team received the top honor of 2004 Public Education "Program of the Year" from the WaterReuse Association for work on the GWR System. The GWR System's public information program was recognized for its excellence in community relations and public information and outreach.

"We are truly honored to be recognized for our efforts in public outreach," said Denis Bilodeau, president of the OCWD Board of Directors. "From the beginning, the boards of directors from both agencies have been committed to a comprehensive public outreach program to ensure all residents in our service areas are informed about the GWR System. We attribute much of our success in moving this project forward and gaining public support to our outreach efforts."

Photo: OCWD

"Based on our research, we know that once people are informed about the need for the project; the cost and energy savings; and understand that GWR System produced water will be as pure as bottled water, they are very supportive of the project," said Carol Beekman, OCSD director of communications and administrative services. "That's why we remain dedicated to informing the public about local water issues and the GWR System. Our goal is to talk to every group in Orange County and to reach each resident personally and give them the opportunity to have their questions answered."

GWR System public outreach accomplishments include:

- More than 700 presentations given to civic and community organizations
- Consistent media coverage including national news stories in The Wall Street Journal, ABC World News Tonight with Peter Jennings and MSNBC.com
- Comprehensive outreach to Orange County's diverse communities including project information provided in Spanish, Vietnamese and Korean.
- Development of project Web site, www.gwrsystem.com
- Project video produced by Huell Howser, host of "California's Gold"
- Received more than 300 letters of endorsement from environmental groups, public health/medical experts, elected officials, chambers of commerce, community organizations and parent teacher associations.

Lessons Learned from Outreach Effort

The public outreach program for OCWD's GWRS used focus groups and phone survey research to learn the opinions of target audiences and test key messages that those audiences would respond to. This research found the audiences wanted: 1) reliable water; 2) higher quality water; and, 3) more local control of their water. Survey research was also used to develop the project name - "Groundwater Replenishment System." Previous to that, the project was known as the Orange County Reclamation Project as named by the project engineers.

The public outreach program recognized the need to meet face-to-face with a wide range of stakeholder groups, as early in the process as possible. Therefore, it was necessary to communicate

with stakeholders without having complete information available on the project. Regarding the GWRS, the project name, costs, and completion date all changed over the course of the outreach effort, but stakeholders were educated on these changes and appreciated being part of the decision process. Because of limited time and budget, it was impossible to meet with all of OCWD's customers, so the team employed "focused outreach" which meant identifying area elected officials, community leaders (Kiwanis, School Board, Planning Commission, Rotary, etc.), and environmental and business groups to meet with. In Orange County and Coastal LA, these leaders are effective conduits down to the rest of the less active community. By talking directly to a few thousand people, the team would eventually reach millions of constituents.

Lastly, to make a strong, compelling case for the need of the GWRS project, the public outreach team educated the stakeholders about the specific project benefits to each of them, with a message that spoke in terms of things they cared about like "providing water for their children and grandchildren" and "using the same technology as bottled water companies." The team also communicated the different alternatives that the supply need problem could be addressed with and why the GWRS project was the best solution because the solution must be publicly defendable to gain sufficient support. This type of justification builds trust and credibility, encourages transparency, and displays confidence in the project.

4.3. Los Vaqueros Reservoir Expansion (Contra Costa Water District)

Contra Costa Water District's (CCWD) recent expansion of its Los Vaqueros Reservoir provides yet another example of successful outreach efforts associated with construction of water infrastructure. With the expansion project, the reservoir's capacity grew from 100,000 acre-feet to 160,000 acre-feet and increased the dam height by 34 feet to a total height of 226 feet. The additional water storage will help ensure high-quality deliveries to CCWD customers, reliability during drought and protections for Delta fisheries and the environment. CCWD is particularly proud of the expansion project because it meets the co-equal goals of providing reliable water supply and protecting, restoring, and enhancing the Delta ecosystem.

The Los Vaqueros reservoir expansion proposal was part of the CALFED Bay-Delta Program, a comprehensive state-federal program to improve the Delta ecosystem and to improve drought water supplies and water quality. The expansion project cost $120 million. The Bureau of Reclamation and the California Department of Water Resources (DWR) funded the planning phase of the project. CCWD debt-funded the design and construction costs. The costs for design and construction are passed along in the form of rate increase to customers receiving water from the reservoir.

In order to gauge and build customer support for reservoir expansion, CCWD engaged in extensive public outreach efforts beginning in 2003 to educate their ratepayers about the expansion

and its benefits. After completion of the CALFED Los Vaqueros Reservoir Expansion Studies, CCWD conducted 36 public workshops on those studies, which culminated in a local public advisory vote conducted by CCWD on the proposed expansion in March 2004. The advisory vote was conducted pursuant to a commitment that CCWD go to voters first before authorizing the expansion. The vote did several things: 1) ensured that alternatives considered in the formal environmental process were consistent with the voter-approved assurances; 2) allowed CCWD voters to confirm specific conditions on an expansion project; and 3) allowed project partners to begin negotiations on expansion with a clear understanding of the requirements to protect the interests of CCWD's customers. A negative vote would have stopped the project. However, CCWD voters demonstrated strong support for the expansion on March 2, 2004, approving Measure N, allowing CCWD to continue working with its partners in completing the feasibility and environmental studies.

Even after construction commenced, CCWD continued to provide the public with updates on the progress of reservoir construction by periodically posting videos on its website regarding progress of construction and other issues related to the expansion. CCWD also installed a "dam cam" with streaming video of construction activities that was accessible through its website.

The success of CCWD's public outreach efforts was reflected in the fact that there was no significant opposition to the selected project alternative for the expansion and no legal challenges were filed against the project's joint environmental impact report/environmental impact statement.

5. REPORT RECOMMENDATIONS

After analyzing the responses from mentors and further researching certain infrastructure sub-topics, the Water Leaders propose the following recommendations:

Engaging the Public on Infrastructure Needs

Recommendation: Once a comprehensive, prioritized investment plan is created, water managers must achieve public support through proactive outreach and education. Recommended public outreach methods include direct mailings, ad campaigns, spokespersons, personal connections, websites, social media and town hall-type meetings. In order to better inform the public about the need to fund water infrastructure investments, and to make this funding a priority in the public's mind, the message should:

- ✓ Provide a consistent, positive message, and avoid fear tactics;
- ✓ Educate public on consequences of deferred maintenance;
- ✓ Show link between infrastructure needs and daily lives;
- ✓ Include public interaction that encourages dialogue; and
- ✓ Make use of more sophisticated marketing approaches.

Reexamine Rate Structures

Recommendation: Rate Increases. Maintaining water rates that correspond to the actual costs of providing water related services requires rate increases. Increasing rates, however, is politically unpopular. Consequently, elected officials of local water agencies tend to "kick the can down the road," by deferring maintenance on critical infrastructure and not including depreciation costs into their rate structures. This creates inequities between those that benefit from low water rates and reliable service, and those that must pay increased water rates at a later date to compensate for the deferred maintenance, replacement costs, and in some cases, civil or administrative liability for assessed fines resulting from failed infrastructure. To address this disparity, the State Legislature should enact a law that requires regular rate increases, creates incentives for local agencies to maintain rates consistent with the costs of providing actual services (including the costs of maintaining and replacing infrastructure), or creates disincentives to "kicking the can down the road." A modest example might be to require agencies to annually raise rates to keep pace with inflation and/or the rising cost of living index.

Recommendation: Conservation and Tiered Pricing. Promoting water conservation and increased water efficiency is a benefit to the public at large. To promote conservation, water suppliers commonly install meters on residential and commercial connections and adopt tiered pricing mechanisms, where the cost per unit of water increases with corresponding increases in consumption.

Conservation, however, translates into losses of revenue for local water agencies with the responsibility to maintain infrastructure. The less water one uses, the less one pays, and the less revenue the water provider collects. The problem is that the majority of costs for providing water related services are fixed costs (i.e. storage facilities, treatment plants, collection and distribution networks, etc.); whereas costs associated with volumetric consumption (i.e. treatment chemicals) are small in comparison. To address this problem, local water agencies should adopt rate structures that include base charges that correspond to the fixed costs associated with installing, maintaining, and replacing infrastructure, and variable costs that correspond with the costs of volumetric consumption. In this way, the agencies would be able to recoup their fixed costs, while still promoting conservation and water-use efficiency.

Reexamine Term Limits for State Officials, Local Officials and Utility Board Members

Recommendation: California voters imposed term limits on the California Legislature in 1990, through an initiative constitutional amendment, when they voted in favor of Proposition 140. The voter-approved measure limited Assembly members to six years of service and state Senators to eight years of service for a total of 14 years if a legislator served full terms in both bodies.

In June, 2012, California voters approved Proposition 28 to change the previous term limits to 12-year term limits that can be served in the Assembly, state Senate or a combination of both. Proposition 28 only applies to new legislators who are elected beginning in November, 2012.The Water Leaders do not recommend another constitutional amendment on term limits at this time given that California voters recently approved such a change. Rather, the Water Leaders recommend that the water community give the newly approved changes to California's term limits some time to be implemented and then evaluate the impact Proposition 28 has on the Legislature and on decisions relating to water infrastructure. Perhaps the current challenges to term limits will be alleviated with passage of Proposition 28. However, it will likely take several years before we understand any positive effect on decisions relating to the improvement of water infrastructure.

At the local level, we encourage local leaders to examine whether the term limits in place are helping or hindering elected officials from achieving water infrastructure objectives and take steps to adjust accordingly. As one mentor suggested, "One way to deal with it {term limits} is to make longer appointments with only one term, presumably you would be able to take a longer view on things without being worried about being reelected."

Public Goods Charge and Beneficiary Pays Principle

Recommendation: Identify and Charge All Beneficiaries and Polluters. Before considering a Public Goods Charge (PGC), beneficiaries should be identified through a thorough search. Making a more concerted effort to identify private or non-state beneficiaries of activities—or polluters that

create a need for actions on the part of others—can reduce the need for state funding related to infrastructure and may eliminate any need for alternative funding sources, including the PGC. It should be noted that when attempting to identify beneficiaries, all participants have an incentive to "free-ride" by minimizing what they consider to be their benefit from a given project. Similarly, polluters will minimize the harm that they consider attributable to their actions. Strong state leadership on identification of beneficiaries and polluters can reduce free-ridership.

Recommendation: Consider Non-Funding Alternatives. Changes in policies can reduce the demand for public funding by changing behavior or reallocating costs. For example, changes to water quality regulations can shift costs from the public to specific actors that degrade water quality, or changes in water pricing may decrease water use, which could reduce the need for expenditures on new infrastructure. Implementing these policy changes may also reduce or eliminate the need for new funding sources.

Recommendation: Public Goods Charge Should Fund Only Public Benefits, Strictly Defined. If demand for public expenditures continues after identifying and charging beneficiaries and polluters and after implementing policy changes to reduce funding needs, a PGC may be considered as a funding mechanism. If a PGC is pursued, a strict definition of the specific eligible uses is crucial. Defining uses of the funds that are specifically ineligible is also important.

Recommendation: Implementation Considerations. A number of other questions exist that must be considered when deciding how, if at all, to implement a PGC:

- Who should be eligible for funding?
- In what form(s) should the funding be provided?
- How should the rate or rates be determined?
- How should the assessment be apportioned between agricultural, industrial and urban users?
- What distributional impacts would the charge have, e.g. on low-income water users?

Public/Private Partnerships for Funding of Infrastructure Planning and Contstruction

Public/private partnerships will become an increasingly important tool to achieve financing goals within the dual context of an increasing need for funding to address the growing water infrastructure project needs, and a decreasing availability of funding under current economic conditions.

Recommendation: Utilize public-private partnership funding mechanism to leverage private capital sources for financing public water infrastructure and to achieve lower overall costs for infrastructure construction and operation. As communities face infrastructure challenges across the

United States, many are looking to public-private partnerships (P3s) as a valuable tool to gain access to private capital and deliver projects in an efficient and timely manner.

P3s are a method of alternative procurement for government infrastructure projects. (W. Strickland, Private Water Law Blog, *Public-Private Partnerships Using the California Infrastructure Finance Act,* Sept. 11, 2011). Rather than following the traditional design-bid-build process in which each procurement step is separately contracted for by a government agency, two or more of those steps are combined for improved efficiency and risk transfer. (*Id.*) The result is a procurement method that is generally faster and less expensive for delivery of infrastructure projects. (*Id.*) Access to new funding sources, lower costs over the life of the project for water infrastructure, and shifting risk away from the local agency make P3s an attractive financing mechanism for local government agencies.

Recommendation: Leverage resources of academic institutions to study water system needs and conduct water infrastructure planning. One particularly successful example of such public/private partnerships has been the cooperation between water management districts and the University of California (UC) and California State University (CSU) systems. Small water management districts often face budgetary and/or personnel constraints which prevent them from properly addressing water infrastructure planning or other project needs. UC and CSU researchers are eligible for some funding sources, such as National Science Foundation funding, that are not directly available to water management districts. However, academic researchers often lack access to real-world and applied settings to test and modify their basic research ideas. Therefore, we make the following recommendations:

- ✓ Partnerships between water managers and academic researchers can address financing and personnel needs of the water districts while simultaneously helping to further the natural/social science and engineering advancements that are ultimately needed to help solve water and wastewater infrastructure problems. Such partnerships should be considered high-priority for funding agencies.
- ✓ Public-private partnerships are incredibly valuable for providing the types of problem solving and real-world learning environments that help students succeed both while in school and upon graduation.
- ✓ Creating successful public-private partnerships entails the need for new incentives and structures that promote productive, ongoing, collaborative relationships among managers, decision makers, and scientists.

Prioritization of Investments

Recommendation: Prioritization of investments should be based on a comprehensive plan which should focus on human health and safety and, to the extent possible, balancing the co-equal goals of a more reliable water supply and ecosystem sustainability. The comprehensive plan should

also consider a risk-based approach to how our infrastructure is managed to allow for maintenance and upgrades to take place on a life-cycle basis. Bond funding has been proven to be an effective method of financing infrastructure projects, and greater funding support could be achieved if projects serve multiple purposes.

Pursue Multi-Benefit Projects to Balance Economic Growth and Environmental Needs

Recommendation: There are many opportunities to incorporate environmental benefits into existing and planned water infrastructure projects, which could in turn create an added economic and social benefit by providing jobs and creating more reliable local and regional water supplies. Historically, large public works and infrastructure projects have been constructed and operated with single purposes in mind – flood control projects have safely dispersed flood waters, while water supply projects have delivered high-quality water from hundreds of miles away. In general, these projects have been effective. However, as environmental, economic, and political landscapes change, so too must the manner in which new or replacement infrastructure is planned, financed, and constructed. Multi-benefit projects have the potential to enhance the environment and stimulate economic growth, while meeting regulatory or public health needs.

Recommendations for addressing both environmental and economic interests as part of multi-benefit projects include:

- ✓ Bring stakeholders into the planning process early to ensure as many needs as possible are being addressed, and to solicit creative ideas for balancing environmental and economic interests.
- ✓ Match economic opportunity with water resource opportunity.
- ✓ Integrate water supply reliability, flood hazard reduction, and ecosystem protection and restoration with existing and planned infrastructure.
- ✓ Integrate municipal stormwater, wastewater, and drinking water planning and providers (e.g. EPA Integrated Municipal Stormwater and Wastewater Planning Approach Framework and closed-loop designs for buildings and neighborhoods) through such efforts as Integrated Regional Water Management.

Incorporate Flexibility for Planning for Infrastructure to Deal with Climate Change

Recommendation: The anticipated hydrological, ecological, and societal impacts from climate change challenge a number of long-held assumptions in water resource management (McNeeley et al., 2012). Water resources planning and management can no longer rely solely on the past as a predictor of future conditions because the assumption of stationarity—the idea that natural systems fluctuate

within an unchanging envelope of variability—is no longer valid given the likely effects of increased climate variability on the hydrologic system (Milly et al., 2008). The nature of water–climate–society problems is dynamic, and so water managers, policy makers, and scientists must also evolve to respond to the challenge. Therefore, we recommend the following:

- ✓ Adaptation of the planning, management, operation, and maintenance of water and wastewater infrastructure will require innovative and flexible institutional and organizational structures to meet the challenges presented by complex patterns of climate change.
- ✓ As much as budgetary constraints allow, water and wastewater managers must continue to develop flexibility within the planning, implementation, operation, and maintenance of water and wastewater infrastructure. Well-balanced portfolios include a diversity of projects with respect to size and scope (i.e., local and large scale).
- ✓ As an example of a flexible portfolio, the use of low impact development (LID) site planning and related best management practices (BMPs) will continue to help water and wastewater managers reduce the impacts on stormwater drainage systems and help maintain surface water quality. Although LID will not replace the role of centralized wastewater conveyance and treatment, LID-related BMPs are sometimes more cost effective than traditional and centralized stormwater infrastructure in the case of new development (Ando and Freitas, 2011). However, there is an urgent research need to ensure that LID BMPs are not inadvertently enhancing the transport of stormwater contaminants to groundwater resources that subsequently supply water for human consumption or ecosystems (Newcomer, 2012).
- ✓ Groundwater will play an important role in society's adaptation to climate change and will help to mitigate some water infrastructure impacts. For example, managed aquifer recharge and recovery projects can help local water managers store valuable water supplies while using considerably less infrastructure than with more conventional surface-water storage projects.
- ✓ Short-term datasets and/or lack of data prevent water managers from making informed decisions about current and future conditions. Identifying data gaps, improving data collection, and developing long-term datasets will help water managers improve their planning efforts.
- ✓ Similarly, it is necessary to develop information related to climate change and its impacts at the regional/local level, as this is the scale at which resource managers must make decisions and take action. Large-scale climate information, such as at the state level, does not provide enough detail or resolution to understand what will happen at the scale of a town or valley particularly in topographically-complex regions like the Sierra Nevada.

Improve Access to Funding and Resources for Disadvantaged Communities

Recommendation: Economically disadvantaged communities (DACs), as defined by the California Legislature, are those whose median household income is less than 80 percent of the state's median household income. DACs occur all over California, in both rural and urban areas. With respect to water resources, there are varying degrees of "disadvantaged", from communities that have clean drinking water but cannot afford to maintain or upgrade infrastructure, to communities that lack any potable water source or the resources to develop one. While some in the state dismiss residents of DACs as lacking the knowledge and/or willingness to participate in the management and planning of their communities' water resources, those who work closely with DACs understand that these communities often lack the resources (financial, technical, human) to participate in these efforts. We therefore make the following recommendations:

- ✓ Continue to set aside funding for water infrastructure projects that specifically benefit DACs. For example, Proposition 84 stipulates that 10 percent of the funding distributed through the IRWM Program must be used to benefit DACs. In addition to directly funding infrastructure projects, resource agencies and community organizations should investigate possibilities of building capacity within DACs to develop skills such as grant writing, water operator certification, environmental review, etc.
- ✓ Tailor water management and planning outreach and engagement so that DAC residents can be involved. For example, hold meetings at night; provide childcare; employ a translator if necessary; and be prepared to listen.
- ✓ In many parts of California, DACs are rural, small towns situated high in their watershed. Their region serves as the headwaters for larger rivers downstream, many of which are then fed into the major state water transportation infrastructure. For the most part, the downstream consumers of this water are unaware of their water's source or history. Educating such water users will help to build connection between the water's source and endpoint and may ultimately lead to securing additional resources for upstream communities and their watersheds.

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7. APPENDIX: MENTOR INTERVIEW QUESTIONS

Question 1: With limited funding to meet infrastructure needs, what factors should determine infrastructure need priorities? What type of incentives could encourage higher prioritization and greater funding of infrastructure upgrades?

Question 2: How do we better inform and engage the general public about water infrastructure needs? What would have to change in the collective (voter) mindset to make investing in water infrastructure a priority?

Question 3: Do you support a public goods charge? How could an assessment on water retailers for multi-benefit projects adhere to the "beneficiary pays" principle?

Question 4: What are some examples and challenges of past water infrastructure projects that balanced environmental improvement and economic development?

Question 5: What are the major political obstacles to building/improving water infrastructure in California? How do we overcome them?

Question 6: Which reforms to California's policymaking, financial, or governance structures would have the greatest effect on the state's ability to successfully plan and implement water infrastructure improvements?

Question 7: In your opinion, how does CEQA impact water/wastewater infrastructure projects? Does it inhibit these projects or make them more expensive, and if so, how might CEQA be amended to incentivize infrastructure projects?

Question 8: Do elected board members have a difficult time recommending rate increases for infrastructure improvement due to re-election concerns? Is there a way to avoid this conflict, if it exists?

Question 9: In addressing infrastructure needs, how should policymakers and water managers prioritize: (1) performing deferred maintenance on degraded infrastructure; (2) constructing new infrastructure; and (3) making changes to laws, regulations, or market conditions (such as rate structures) to promote alternatives that would reduce the need for new infrastructure?

Question 10: How do we incorporate the needed flexibility to deal with climate change impacts into the existing or planned physical structures that store, convey, treat and deliver water?

Question 11: Is smaller-scale and regionally- or locally-managed "green" infrastructure (e.g., low-impact development, detention/recharge basins, etc.) a feasible alternative to the comparatively high costs associated with long-term maintenance of large, centralized infrastructure systems?

Question 12: What are your thoughts on groundwater storage as an alternative to the costly expense of increasing reservoir storage (e.g., as a response to climate change impacts or other water storage balance issues)?

Question 13: How can we empower community residents, especially those from disadvantaged communities without access to safe drinking water, to (1) influence water policy decisions, (2) hold decision makers accountable, and (3) fix, maintain, and upgrade their water systems?