



WILLIAM W. WADE

Energy & Water Economics
39 Public Square, Suite 304
Columbia Tn 38401
931-490-0060/931-490-0057

wade@energyandwatereconomics.com

Previous Positions:

Senior Vice President, Foster Associates, Inc.
Vice President/Partner, Spectrum Economics, Inc.
Vice President/Partner, QED Research, Inc.
Manager of Economics, Dames and Moore Consulting Engineers
Corporate Economist/Financial Analyst, Standard Oil of California (Chevron)

Key Qualifications: Water and Natural Resources

Dr. Wade specializes in issues related to environmental resources and water policy working with executives, lawyers, engineers and scientists on multi-discipline regulation, litigation, and planning projects. He has 30 years experience managing and conducting financial and economic evaluations of policies and decisions bearing on natural resources and infrastructure. Since 1986 he has conducted dozens of studies on various aspects of water supply and demand problems, including tradeoffs between protection of instream fisheries, habitat and recreation values versus consumptive use and residential reliability values. Dr. Wade has worked on significant natural resource policy issues related to conflicts among multiple uses of several watersheds:

- Sacramento-San Joaquin Delta, California;
- ACT/ACF: GA-FL-AL;
- Tennessee Valley
 - Harpeth River
 - Duck River
 - Buffalo River
 - Piney River
- Republican River, Nebraska and Kansas;
- Missouri River, Upper Midwest.
- Memphis Sands Aquifer

Current ongoing work includes state of the art water demand elasticity estimation for large urban water agencies, including the effect of water rates on outdoor water use. In two litigation cases, he has estimated the values of groundwater supplies. Dr. Wade is also working on various policy alternatives to assure reliable water supplies for the San Francisco Bay Area. He worked with a team of inside and outside TVA economists throughout much of 2002-2003 on TVA's Reservoir Operations Study, conducting the economic analysis of alternative operations. From 1998 - 2001, he worked on issues related to the ACF/ACT Water Supply disagreement developing NED and RED benefit estimates for Atlanta water supply reliability and Lake Lanier recreation usage. From 1995 to 1999 he led a team of economists forecasting visitation and

evaluating amenity mixes to implement the recreation master plan for Diamond Valley Reservoir, Riverside County, California. Dr. Wade's Cost of Industrial Water Shortage remains a seminal report on the value of water to water intensive industry. In California he presented testimony at SWRCB Bay-Delta Hearings on supply shortage costs and before CPUC and CA Legislative Committee on water rates to induce conservation by private water agencies, and presented information on drought impacts to California economy to Associated California Water Agencies Drought Hearings, and other forums. Other water agency clients include: San Francisco Bay Area Water Supply and Conservation Association, TVA, Santa Clara Valley Water District, California Urban Water Agencies, California Water Association, Metropolitan Water District of Southern CA., Los Angeles Department of Water and Power, USBR, CDWR, Army Corps of Engineers, Nebraska DNR, Harpeth River Watershed Association and Duck River Development Agency.

Recent Resource Economics Publications & Reports:

Water Supply Planning and Reliability Valuation

- "Valuation of Mississippi-owned groundwater used in MLGW service area," ongoing.
- "Valuation of contaminated groundwater supplies for residential use," ongoing.
- "SB 3 - Environmental Flows Protection Requires Balancing with all Water Use Values at Stake," Presentation to Texas Water Summit, San Antonio, December 3, 2007.
- "Evaluation of water supply alternatives in view of valuation of supply reliability and instream flow values at risk," 2007.
- "Demand estimation in view of heterogeneous water agency residential user profiles," 2007.
- "Time series demand modeling of City of Memphis residential and commercial end user classes," June 2007.
- "Final critique of engineering economics and financial feasibility of City of Franklin proposed water treatment plant," June 2007.
- "Evaluation of anticipated economic impacts of 2007 drought-induced water shortages in the San Francisco Bay Area," 2006-2007.
- "Evaluation of practicable alternatives to Harpeth River water supply," presentation to TNAWRA Water Resource Symposium, April, 2007.
- "Economic criteria for regional water supply planning in Tennessee," April, 2007.
- "Water Supply Planning for City of Franklin: Comparison of Expanded Water Supply Plant v. Instream Flow Values for Wastewater Dilution and other Resource Values," October 2006.
- "Evaluation of water supply alternatives to meet City of Franklin future demand," August 2006.
- "Estimation of indoor and outdoor water demand, price elasticities and estimated future water use for alternative rate structures, Western U.S." 2006.
- "ARAP and the economics of Piney River Water Supply Planning," presentation to TNAWRA Water Resource Symposium, April, 2006.

- "Effect of increasing Hispanic population on California outdoor water recreation preferences and facility needs," 2005.
- "Evaluation of Environmental Benefits of Hetch Hetchy Dam Removal," 2005.
- "Achieving Reliability and Sustainability in Water Supply Planning," *California Law and Water Policy Reporter*, October 2005.
- "Evaluation of Effect of SFPUC Water Supply Improvement Plan on San Francisco Bay Area Water Supply Reliability," 2005.
- "Evaluation of Piney River Economic Alternatives to Meet Water District Demand," 2005.
- Lake Lanier National Economic Development Update: Water Supply, Hydropower & Recreation Benefits, Final, 2004.
- "Evaluation of Missouri River Master Water Control Plan," 2004.
- "Effect of Water Supply Cutbacks of Midwest Irrigated Agriculture," 2002-2003.
- "Economic Analysis of TVA Alternative Operating Regimes to enhance power supply, navigation, recreation and flood control: Reservoir Re-Operations Study," 2002-2003.
- "Effect of Water Supply Allocations on Value of Republican River Watershed Agricultural Production and Recreation," 2002 & revised in 2003.
- "Alternative Water Supply Sources and Recreation values," 2002.
- "Comparison of Irrigated Agricultural Economics Research Dealing with Crop Water Use," January 2002.
- "IRP Approach To Water Supply Alternatives for Duck River Watershed," presentation to Tennessee AWRA Conference, April 2002.
- "Lake Lanier National Economic Development Update: Evaluation of Water Supply, Hydropower and Recreation Benefits," draft report, November 2001.
- "Economic Value of Municipal and Industrial Water Supply Reliability for Metropolitan Atlanta," draft, May 2001.
- "Evaluation of Water Supply Alternatives for Duck River Watershed," 2001.
- "Reliability Values for Least Cost Planning," 2001.
- "The Value of Reliable Urban Water Supply," 2001.
- "Recreation Values at Risk to Water Delivery Shortfalls," 2001.
- "TN Regulations Balance the Beneficial Uses of Water," 2001.
- "Economic Benefits of Recreational Boating on the Buffalo River," 2001.
- "Least Cost Water Supply Reliability Planning," Tennessee Water Resources Symposium, April 2001.
- "Predicted Recreation Visitation to Sacramento-San Joaquin Delta for Boating and Fishing," 2001.

- “Water Supply Planning in the Duck River Watershed After the Fleecing,” TN Water Resources Symposium, April 2000.
- “Economic Shortcomings of ACF EIS Water Supply, Recreation & Regional Impacts Appendices,” Atlanta Regional Commission, 1999.
- “Forecasting & Evaluating Reservoir Recreation Financial Feasibility and Regional Economic effects,” 1994 - 1999.
- “Economic Considerations of Regulatory Takings,” Presentation, *Restructuring in California: The Morning After*, Law Seminars International Conference, Sacramento, CA, September 1998.
- “California Water Supplies: Problem Solving through the 20th Century,” Presentation, Southeast Water Resources: Management and Supply Conference, Chattanooga, Tennessee, August 1998.
- “Planning for Revenue Positive Freshwater-Related Recreation Projects,” Presentation, American Water Resources Association Annual Conference, Mobile, AL, 1998.
- “Problems with Bay-Delta Recreation Visitation Estimates – Revisited,” 1998.
- “Estimating Potential Demand for Freshwater Recreation Activities, Southern California: 1997-2020,” 1998.
- “Freshwater Recreation Demand Forecasting in Southern California,” 1998.
- “Evaluation of Private/Public Alternatives for Municipal Reservoir Recreation Planning,” 1997.
- “Financial Feasibility of Bass Fishery Enhancement in Southern California,” 1997.
- “Economic Impacts, “The Bennett Decision and Investment-Backed Expectations,” *California Land Use Law Reporter*, July 1997.
- “Evaluation of Recreation Revenue Shortfalls at Lake Skinner,” 1996.
- “Status of Efforts to Resolve California's Water Problems,” 1995.
- “Economic Considerations of Regulatory Takings Reform: Judicial Precedent and Administrative Law v. Legislative Intent,” *BNA Environmental Reporter*, August 4, 1995.
- “The Role of Economics in Regulatory Takings Cases,” with Robert Trout, *Litigation Economics Digest*, 1, 1, fall 1995.
- “California's Dual Water Crises: Add Fish and Feds and Shake Thoroughly,” *California Water Law and Policy Reporter*, March 1994.
- “Economic Costs of EPA Bay Delta Water Quality Standards,” Presentation to California Water Resource Agencies, March 1994.
- “California Water Supplies in the 1990's: Add Fish and Feds and Shake Thoroughly – or, The Increasing Unreliability of Consumer Supplies in the Environmental Age,” Presentation to Conference of California Public Utility Counsel, November 1993.
- “Water Supply Planning Simulation and Estimated Shortage Costs Related to Mono Lake Diversion Alternatives,” August 1993. Testimony before SWRCB November, 1993.

- "The Economic Effects of Implementing the Central Valley Project Improvement Act," *California Water Reporter*, February, 1993.
- "Water Supply Reliability Epochs: Revenue Instability for Retail Water Utilities," Testimony to CPUC, November 1992.
- "Drought Impacts on California Green Industries," January, 1992; Submitted to SWRCB as State Water Contractors Exhibit 20, June, 1992.
- Presentation to California Legislature, Assembly Utilities and Commerce Committee, "Investor Owned Water Utilities: Rates, Reliability, Regulation," February 1992.
- "Financial Impacts of Decreasing Wholesale Water Supply Reliability on Class A Water Utilities," 1992.
- Cost of Industrial Water Shortages, November, 1991.
- "The Cost of Water Shortages: Case Study of Santa Barbara," 1991.
- "Planning for Reliability for California's Urban Water Agencies," 1991.
- "Impacts of Drought on California Economy, Testimony to ACWA Drought Conference," October, 1990.
- "Financial Partnerships to Assure Conservation's Role in California Water Supply Resource Planning," Testimony to CPUC, June 1989.
- "Supply Reliability Planning for Water Utilities," 1989.
- "Economic Value of Reliable Water Supplies for Industrial Water Users," SWC Exhibit 57, 1987.

Environmental Values and Trade-offs

- "Average Reciprocity of Advantage: 'Magic Words or Economic Reality: Lessons from Palazzolo," 39 The Urban Lawyer 319, spring, 2007.
- "Evaluation of Environmental Benefits of Hetch Hetchy Dam Removal," 2006.
- "Advances in Measurement of *Penn Central's* Economic Prongs and Estimation of Economic Damages in Federal Claims and Circuit Courts," 38 *The Urban Lawyer*, 337 spring, 2006.
- "Policy Evaluation of Natural Resource Injuries using Habitat Equivalency Analysis," *Ecological Economics*, 2005 w/Brian Roach.
- "Advances in Measurement of *Penn Central's* Economic Prongs and Estimation of Damages in Federal Claims and Circuit Courts," Paper for fall ALI-ABA Takings Conference, 2005.
- "Guidelines for Conducting the *Penn Central* Test," Conf. Litigation, 2004.
- "Policy Evaluation of Natural Resource Injuries Using Habitat Equivalency Analysis," presented (by co-author Brian Roach) at the U.S. Society for Ecological Economics Conference, Saratoga Springs, NY, May, 2003.
- "Middle Tennessee Land Use Decisions Ignore Tourism Values at Stake to Poor Planning," May, 2002.
- "Economic Backbone of the *Penn Central* test post *Florida Rock V, K & K* and *Palazzolo*," 32 ELR 11,221, October, 2002.

- "Franklin fails to see tourism dollars in battlefield site," 2002.
- "Spring Hill Land Use Planning Needs a Vision," 2001.
- "Lake Lanier Recreation NED and RED Benefit Values: A Random Utility Model Approach," 2001.
- "Estimating Environmental Externalities related to MMS 5-Year Lease Program," 2001.
- "Penn Central Test Criteria and Damage Estimates in Takings Case," confidential litigation, 2000.
- "Forecast of Freshwater Recreation Demand for Southern California Reservoirs," 1999.
- "Review of Issues Related to Divestiture of Dams and Related Hydroelectric Facilities," 1999.
- "Penn Central's Economic Failings Confounded Takings Jurisprudence," *The Urban Lawyer*, spring 1999.
- "Environmental Damages Related to Gulf of Mexico Coastal Sediment Contamination," confidential litigation, 1995.
- "Role of Economics in Regulatory Takings Cases," *Litigation Economics Digest*, 1,1, fall, 1995.
- "Economic Considerations of Regulatory Takings Reform: Judicial Precedent and Administrative Law v. Legislative Intent," *BNA, Environmental Reporter*, August 4, 1995.
- "The Role of the Economist in a Regulatory Taking Claim," *California Land Use Law and Policy Reporter*, March, 1995.
- "Environmental Damages Related to Groundwater Contamination," confidential litigation, 1994.
- "Colorado River Critical Habitat Studies: Environmental Benefits v. Consumptive Losses," 1994.
- "Approach to Incorporate Existence and Option Values for Southwestern Native American Water Rights," 1992 - 1994.
- "Critique of Mono Lake Contingent Valuation Survey," December 1993. Testified at SWRCB Dec. 1993.
- "Natural Resource Damage Assessment: A Path Through the Pitfalls of Evolving Regulations," *Contemporary Studies in Financial Analysis*, Vol. 74, ed. Thronton, R. and Aronson, R.J., Jai Press, New York, New York, 1993.
- "Recreation Forecasts and Benefit Estimates for California Reservoirs: Recalibrating the California Travel Cost Travel," 1991.
- "Potential Freshwater Recreation Demand Forecast by California County - 1990 to 2035," 1990.
- "Recreation Benefits for California Reservoirs: A Multisite Facilities-Augmented Gravity Travel Cost Models," April, 1989.
- "Estimating Instream Flow Recreation Benefits on the American and Sacramento Rivers," 1988.
- "Trends in Fresh Water Recreation Demand in Southern California," 1988.

- “Critique of Contingent Valuation Studies Related to Bay Delta,” State Water Contractors Exhibit 90, 1987.
- “Economic Evaluation of the Recreation Resources of California's State Water Project and the Sacramento-San Joaquin Delta,” State Water Contractors Exhibits 64 and 66, June and September 1987.
- “Methods to Value Benefits to Natural Resources Associated with Bay-Delta Water Diversions,” 1987.

Education:

Ph.D., Resource and Applied Economics, University of Minnesota

M.S., Agricultural Economics, University of Minnesota

B.S., English/Journalism, Spring Hill College

Professional Activities:

TN Water Supply Planning Panel; Former Treasurer, TN AWRA; Former Member of Economic Advisory Council, California Chamber of Commerce; Past President of San Francisco Chapter of National Association of Business Economists; American Economics Association; American Agricultural Economics Association; Association of Environmental and Resource Economics.

Honors:

Award for Professional Excellence for Quality of Published Research, 1979; (with others)
American Agricultural Economics Association.