

Curriculum Vitae for
TIMOTHY K. GATES
Water Resources Systems Analyst
Civil and Environmental Engineering Department
Colorado State University
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Summary of Experience and Qualifications

Timothy K. Gates is a water resources systems analyst and a Professor of Civil and Environmental Engineering at Colorado State University. His research has focused on how water resources systems impact and are impacted by irrigated agriculture and has included field monitoring, modeling, and analysis of shallow groundwater flow and salt transport; management of water quality (especially salinity, selenium, and nutrients) for irrigated agriculture; drainage of salinity-affected regions; multi-objective river basin planning; stochastic simulation and optimization of water resources systems; and field monitoring and evaluation of irrigation and drainage systems. Dr. Gates has directed or co-directed research and training projects with total funding of about \$11 million over the last 27 years. He has taught academic courses in open-channel flow, fluid mechanics, hydraulic engineering, hydraulic structures/systems, hydrology, groundwater engineering, and solid dynamics. In addition, he has served as an independent consulting engineer with the United States Agency for International Development; the United Nations Development Program; Camp, Dresser & McKee, Inc.; Keller-Bliesner Engineering; D'Appolonia Environmental Services; the Denver Water Dept., the Governance Committee of the Platte River Cooperative Agreement, Devon Energy, Pennaco, the Riverside Ditch Company, ARCADIS & GM, Greg Lewicki and Associates, Pueblo Wastewater, Boxelder Sanitation District, and Central Mutual Insurance Co. on projects related to irrigation-and-drainage hydraulics, river hydraulics, seepage from earthen channels, salinization of irrigated agricultural regions, water quality for irrigated agriculture, irrigation-induced pollutant loading to rivers, modeling of open-channel flow, and river-basin modeling. He has designed and conducted numerous short courses and special training programs in open-channel flow, irrigation and drainage engineering, and groundwater. Dr. Gates spent a total of about four years in Egypt working on various irrigation projects. He also has consulted in India, Sri Lanka, Australia, and Pakistan on irrigation and water resources projects and has presented visiting lectures on these subjects in China at Wuhan University and at the Beijing Institute of Technology and on hydraulic structures and systems at the Water Resources University of Vietnam.

Education

PhD	Civil Engineering, University of California, Davis, California 1988
MS	Agricultural Engineering, Colorado State University 1980
BS	Agricultural Engineering, Louisiana Tech Univ. 1978 (<i>Summa Cum Laude</i>)

Employment Summary

<i>July 2001 -Present</i> Professor	Teach courses in hydraulic engineering, fluid mechanics and solid mechanics. Conduct research in design and operation of open-channel water-delivery systems, stochastic simulation and optimization of water resources systems, multiobjective river basin planning, irrigation and drainag in salinity-affected regions, and water quality for irrigated agriculture. Advise PhD and MS students. Consult in water resources and irrigation projects.
<i>July 1994 – July 2001</i> Associate Professor	
<i>February 1988 - July 1994</i> Assistant Professor	
Civil and Environ. Engineering Department Colorado State University	

July 1993 – December 2004

Co-Director
Colorado Institute
for Irrigation Management
The Water Center
Colorado State University

Developed and directed short courses in irrigation and drainage management for foreign professionals. Conduct international training and development projects in irrigation management.

August 1991 – December 1998

Associate Director
International School for
Water Resources
The Water Center
Colorado State University

Directed non-degree technical training programs in water resources and related fields for foreign professionals.

August 1997 - January 1998

Visiting Scientist
Charles Sturt University
Wagga Wagga, New South Wales,
Australia
Division of Water Resources, CSIRO
Griffith, New South Wales, Australia

Conducted research and consulted on simulation and optimization of water and salinity management in irrigated areas of the Murray-Darling river basin in southeast Australia.

June 1985 - February 1988

Post Grad Res. & Teaching Asst.
Dept. of Land, Air, and Water
Resour. UC-Davis

Developed and applied numerical models for stochastic simulation and optimization of irrigation and drainage management in salinity-affected regions. Assisted with field and modeling studies of seepage from evaporation basins for containment of subsurface drainage effluent.

May 1984 - August 1984

Research Associate and Trainer
Civil Engineering Department
Colorado State University

Instructed professionals from India in an interdisciplinary training course on diagnostic analysis of irrigation systems. Presented field and analytical methods for engineering analysis of water-delivery systems for irrigation

January 1981 - May 1984

Hydraulic and Irrigation Engineer
Egypt Water Use & Management
Project, Cairo

Directed collection and analysis of hydrologic data for three irrigated regions in the Nile Valley and Delta. Developed models for hydraulic design and evaluation of water-delivery systems. Designed and supervised construction of an improved open-channel water delivery network. Played major role in organizing and synthesizing six years of research results into summary findings and recommendations to Egypt.

February 1980 - December 1980

Research Associate
Dept. of Agricultural & Chem. Eng.
Colorado State University

Prepared technical manuals for use in field study, evaluation & improvement of surface irrigation systems. Acted as a technical editor in the development of video tapes for training in evaluation of on-farm irrigation systems.

Funded Research at Colorado State University

Projects as Principal Investigator (Active Grants in **Bold**)

Finding Ways to Mitigate Irrigation-Induced Uranium Contamination in Colorado's Lower Arkansas River Valley, Sponsor: Colorado Department of Public Health and Environment through Colorado Geological Survey, 2016 – 2017, \$87,500.

US-Pakistan Center for Advanced Studies in Water, Sponsor: US Agency for International Development through University of Utah, 2015 – 2020, \$1,599,136.

Water Quality and Productivity Enhancement in an Irrigated River Basin through Participatory Conservation Planning and Analysis, Sponsor: United States Department of Agriculture, 2014 – 2017, \$659,954.

Data Collection and Analysis in Support of Improved Water Management in the Arkansas River Basin, *Sponsor: Colorado Water Institute, United States Geological Survey, 2014 – 2016, \$100,000.*

Reconnaissance and Scoping for Assessing the Impact of Current and Altered Irrigation Practices on Groundwater Conditions and Return Flows to the Yampa and White Rivers, Colorado, *Sponsor: Yampa/White Basin Roundtable, 2015, \$12,249.*

Identifying Arkansas River Selenium and Nitrogen Best Management, *Sponsor: Colorado Department of Public Health and Environment (Nonpoint Source Program and Water Quality Improvement Fund), 2013 – 2015, \$316,082.*

Building and Assessing an Accounting Tool for Water from Lease-Fallowing in Colorado's Lower Arkansas River Valley, *Sponsor: Upper Arkansas Valley Water Conservancy District, 2012 – 2015, \$227,551.*

Describing and Developing Plans to Mitigate Selenium and Salinity Contamination in an Irrigated River Valley. *Sponsor: Colorado Agricultural Experiment Station, 2008- 2015, \$193,500.*

Identification, Public Awareness, and Solution of Waterlogging and Salinity in the Arkansas River Valley. *Sponsor: United States Bureau of Reclamation. 1999-2014, \$751,630.*

Data Assessment and Collection in Support of Improved Water Management in the Arkansas River Basin, *Sponsor: Colorado Water Conservation Board, 2009 – 2013, \$599,900.*

Assessment of the Impacts of the Arkansas Valley Conduit and Excess Capacity Master Contract on Ground Water, Return Flow and Solute Loads, and Crop Productivity in the Irrigated Stream-Aquifer System of Colorado's Lower Arkansas River Valley, *Sponsor: MWH, 2010 – 2013, \$24,438.*

Monitoring and Modeling Toward Optimal Management of the Lower Arkansas River, Part I. *Sponsor: Lower Arkansas Valley Water Conservancy District, 2004 – 2011, \$175,000.*

Data and Models for Planning of Nonpoint Source Selenium Management in the Lower Arkansas River Basin, Colorado. *Sponsor: Colorado Department of Public Health and Environment, 2009 – 2012, \$502,000*

Subregional- and Basin-Scale Technical Assessment of Irrigation-Induced Salinity and Pollutant Loading in the Arkansas River Valley (Multidisciplinary Initiative). *Sponsor: Colorado Agricultural Experiment Station, 2002 – 2012, \$140,000.*

Data Analysis and Final Report of State of Colorado-Funded CSU 2004-2008 Irrigation Studies in Colorado's Lower Arkansas River Valley." *Sponsor:* Colorado Water Conservation Board, 2009 – 2010, \$48,477.

Late Season Monitoring of Irrigation Practices Under Conventional and Improved Technologies in Colorado's Lower Arkansas River Valley. *Sponsor:* Colorado Water Conservation Board, 2008, \$96,700.

Early Season Monitoring of Irrigation Practices Under Conventional and Improved Technologies in Colorado's Lower Arkansas River Valley. *Sponsor:* Colorado Division of Water Resources, 2008, \$74,200.

Evaluation of the Use of Polyacrylamide to Reduce Seepage Losses from Earthen Irrigation Canals in the Lower Arkansas River Valley, Colorado. *Sponsor:* Desert Research Institute, Las Vegas, NV, 2006 – 2008, \$46,600.

Evaluation of the Impact of Best Management Practices on Ground Water and River Water Quality in an Irrigated Valley. *Sponsor:* Colorado Department of Public Health and Environment, 2005 – 2008, \$100,000.

Defining and Engineering Solutions for Agroecological Threats from Salinity and Selenium in an Irrigated River Valley. *Sponsor:* Colorado Agricultural Experiment Station, 2005 - 2008, \$100,500.

Assessing Irrigation-Induced Selenium and Iron in the Stream-Aquifer System of the Lower Arkansas River Basin, Colorado. *Sponsor:* Colorado Department of Public Health and Environment, 2003 – 2008, \$457,000.

Monitoring and Modeling Toward Optimal Management of the Lower Arkansas River, Part II. *Sponsor:* Southeastern Colorado Water Conservancy District, 2005 - 2008, \$400,000.

Evaluating Strategies to Mitigate Waterlogging and Salinization in Colorado's Lower Arkansas River Valley, Phase III. *Sponsor:* Colorado Water Resources Research Institute, 2004 - 2005, \$52,000

Evaluating Strategies to Mitigate Waterlogging and Salinization in Colorado's Lower Arkansas River Valley, Phase II. *Sponsor:* Colorado Water Resources Research Institute, 2003 - 2004, \$52,000

Evaluation of Soil Salinity on Irrigated Lands in the Arkansas River Valley. *Sponsor:* United States Bureau of Reclamation, 2002-2003, \$12,000.

Evaluating Strategies to Mitigate Waterlogging and Salinization in Colorado's Lower Arkansas River Valley, Phase I. *Sponsor:* Colorado Water Resources Research Institute, 2002 - 2003, \$50,000

Managing Irrigation-Induced Salinity and Pollutant Loading to Enhance the Agroecosystem of the Lower Arkansas River Basin. *Sponsor:* Colorado Agricultural Experiment Station, 2002 – 2005, \$126,000.

Evaluation of Seepage Losses from the Fort Lyon Canal. *Sponsor:* Fort Lyon Canal Company, 2001, \$14,800.

Hierarchical Strategies for Recovery of a Salinity-Affected Irrigated Valley. *Sponsor:* United States Department of Agriculture, 2001-2004, \$363,000.

Analytical and Organizational Support for Strategies to Solve Saline Shallow Groundwater Problems in the Arkansas River Valley. *Sponsor:* Colorado Agricultural Experiment Station, 1999-2002, \$220,000.

Identification and Solution of Waterlogging and Salinity Problems in the Lower Arkansas River Valley, Colorado. *Sponsor:* Colorado Agricultural Experiment Station, 1999-2002, \$143,000.

Description and Interpretation of Salinization in the Lower Arkansas River Valley, Colorado. *Sponsors:* Colorado Water Resources Research Institute, U. S. Geological Survey. 1999-2002, \$158,900.

Analysis of Soil and Water Salinity in Bent County, Colorado. *Sponsor:* Colorado State Soil Conservation Board, 1999-2000, \$16,200.

Development of Recommended Water Quality Criteria for the South Platte Water Conservation Project. *Sponsor:* Northern Colorado Water Conservancy District, 1998, \$33,500.

Decision Support System for Regional Water Quantity/Quality Evaluation of Best Management Practices in Irrigated Agriculture. *Sponsor:* Colorado Agricultural Experiment Station, 1996-1999, \$150,000.

Stochastic Analysis of Parameters for Dam Safety Evaluation. *Sponsor:* United States Bureau of Reclamation, 1996-1997, \$10,000.

Impact of Urban-Water Transfer and Return-Flow Quality on Irrigated Agricultural Systems. *Sponsor:* Colorado Agricultural Experiment Station, 1992-1996, \$53,500.

Cooperative Regional Water Management through a Federated-Distributed Database. *Sponsor:* Colorado Water Resources Research Institute, 1992-1992, \$14,000.

Data Collection and Organization in Support of an Assessment of the Water Situation in the United States. *Sponsor:* USDA Forest Service, 1991-1992, \$20,000.

Impact Assessment of Urban Return Flow Quality on Agricultural Water Use. *Sponsors:* Colorado Agricultural Experiment Station, Central Colorado Water Conservancy District, Consolidated Ditch Company, Farmers Reservoir and Irrigation Company, and Northern Colorado Water Conservancy District, 1990-1992, \$38,500.

Prototype Federated Water Database System. *Sponsor:* Colorado Water Resources Res. Inst., 1991-1992, \$15,000.

Feasibility of a Water Database for the South Platte River Basin. *Sponsor:* Colorado Water Resources Research Institute, 1990-1991, \$15,000.

Assessment and Enhancement of Computer-Aided Management of Irrigation-Water Distribution. *Sponsor:* Colorado Agricultural Experiment Station, 1989-1992, \$52,000.

Projects as Co-Principal Investigator

Improved Assessment of Nitrogen and Phosphorus Fate and Transport for Irrigated Agricultural Watersheds in Semi-Arid Regions. *Sponsor:* USDA NIFA AFRI, 2013 – 2017, \$489,180.

Observing and Modeling Non-Beneficial Evaporative Upflux from Shallow Ground Water under Uncultivated Land in an Irrigated River Valley. *Sponsor:* Colorado Water Resources Research Institute and U. S. Geological Survey, 2008, \$40,000.

Characterizing Non-Beneficial Evaporative Upflux from Shallow Groundwater Under Uncultivated Land in an Irrigated River Valley. *Sponsor:* Colorado Water Resour. Research Institute and U. S. Geol. Survey, 2007, \$49,900.

Toward Successful Pilot Implementation of Strategies for Remediation of a Salinity-Threatened Irrigated Watershed. *Sponsor:* United States Department of Agriculture, 2004-2007, \$495,000.

Monitoring of Irrigation Amount, Timing, and Crop Yield in the Arkansas River Valley. *Sponsor:* Colorado Water Conservation Board, 2004 – 2007, \$270,000

Meeting Time-Dependent Instream Flow Requirements in a Fully Appropriated Multi-State River Basin. *Sponsor:* U. S. Geological Survey, 1998-2000, \$292,000.

Effects of Irrigation with Urban Exchange Waters on Soil and Water Quality. *Sponsor:* Colorado Agricultural Experiment Station, 1997-1999, \$77,600.

Middle East Water: Efficiency of Use in the Agricultural Sector. *Sponsor:* Office of Transnational Security and Technology Issues, 1994-1996, \$66,000.

Initiating a Water Management Decision Support System for the Platte river Basin. *Sponsor:* Colorado Water Resources Research Institute, 1993-1995, \$29,000.

Development of a Resource Management Support System for Irrigated Agriculture. *Sponsor:* National Science Foundation, 1991-1996, \$522,800.

Development of a Dam Safety Database Manag. System. *Sponsor:* U.S. Bureau of Recl., 1990 -1994, \$80,000.

Sediment and Microbial Fouling of Groundwater Recharge Facilities. *Sponsor:* Waterways Experiment Station, U.S. Army Corps of Engineers, 1989-1991, \$250,000.

Consulting Experience (Outside of Colorado State University Contracts)

July 2008 – February 2009

Consultant

**Central Mutual Insurance Co. via
Levy, Morse, & Wheeler, PC**
Englewood, Colorado

Provided expert testimony on impact of deep percolation from an irrigated field near Golden, Colorado on high ground water, contributing to drainage problems on adjacent developed property.

June 2008

Consultant

Boxelder Sanitation District
Fort Collins, Colorado

Reviewed selenium concentrations and loads in Boxelder Creek and the Cache la Poudre River related to irrigation practices as affecting compliance with regulatory standards.

March – June 2007

Consultant

Pueblo Wastewater
Pueblo, Colorado

Reviewed and evaluated selenium and sulfate loading to the Arkansas River for City of Pueblo testimony to Colorado Water Quality Control Commission Triennial Review.

August – September 2006

Consultant

Greg Lewicki and Assoc.
Parker, Colorado

Reviewed and evaluated computed water surface profiles on the Colorado River for flood plain assessment near Rifle, Colorado.

September 2004 – November 2006

Consultant

ARCADIS & GM, Inc.
Highlands Ranch, Colorado

Advised on monitoring and modeling of irrigation-induced Selenium concentrations in the Arkansas River, in Fountain Creek, and in their alluvial aquifers.

February 2005 – July 2005

Consultant

Riverside Ditch Co.
Buena Vista, Colorado

Advised on estimation of seepage losses and management of irrigation flow deliveries along the Riverside Ditch diverting from the Arkansas River.

April – September 2003

Expert Witness Consultant
Devon Energy, Pennaco

Reviewed appeal of NPDES permit for discharge of coal bed methane well effluent to Wildcat Creek, Wyoming. Advised regarding salinity of the effluent in comparison to salinity of natural flows in the creek and impacts on irrigation diversions.

October 1998 – January 1999

Engineering Consultant
Denver Water Department
Denver, Colorado

Consulted on the suitability of the quality of Denver's exchange waters for agricultural use along the South Platte River.

September 1999

Engineering Consultant
Governance Committee of the Platte River Coop. Agreement
Cheyenne, Wyoming

Reviewed the Draft Water Conser./Supply Report and evaluated strategic plans for meeting in-stream flow requirements in the Platte River using water reuse, groundwater, and reservoir projects.

October - November 1995

Engineering Consultant
Subcontract to **D'Appolonia Environmental Services**
Monroeville, Pennsylvania

Consulted on sediment-affected seepage and salinization in the Mendoza River (Argentina) and its serviced irrigation canals. (Executed in Fort Collins, Colorado)

November 1994 - June 1995

Engineering Consultant
Subcontract to **Keller-Bliesner Engrg.**

Consulted on strategic planning for water conservation operations, and integrated water use and efficiency in Egypt's Nile Valley. (Executed in Fresno, Calif. and Fort Collins, Colorado)

December 1993 - January 1994

Engineering Consultant and Trainer
UNDP Project on Automated Oper. of Irrigation Canal Systems
Central Water & Power Research Station
Pune, India

Provided training and technical advice regarding modeling, regulation, and monitoring of irrigation canal systems.

August - December 1993

Engineering Consultant
Subcontract to **Camp, Dresser & McKee**, Denver, CO

Consulted on assessment of water quality requirements for agricultural reuse of effluent from Metro Wastewater Reclamation District plant.

July 1991

Engineering Consultant
Subcontract to **USAID**, India
(Executed in Fort Collins, Colorado)

Prepared documents on reconnaissance and data collection for planning and design of subsurface drainage systems for controlling waterlogging and salinization in irrigated agricultural regions.

October - December 1986

Engineering Consultant
USAID Sri Lanka Irrigation Systems Diagnostic Analysis Project
Colombo, Sri Lanka

Summarized and analyzed data regarding the performance of irrigation-water-delivery systems at project sites and prepared two associated technical reports.

Honors and Awards

Civil and Environmental Engineering Outstanding Faculty Service Award 2017
Best Research Paper Award, *Journal of Irrigation and Drainage Engineering*, ASCE 2015
Borland Chair in Water Resources, Dept. Civil and Environmental Engrg, Colorado State Univ. 2013 – 2016
Civil and Environmental Engineering Outstanding Faculty Performance Award 2014
Civil and Environmental Engineering Award for Excellence in Research 2008
Civil Engineering Outstanding Faculty Performance Award 2006
James M. Robbins Excellence in Teaching Award, Chi Epsilon Rocky Mountain District 2004
Civil Engineering Faculty Award for Excellence in Teaching 2002
Chi Epsilon Gold Key Award for Best Civil Engineering Professor 2001
Best Research Paper Award, *Journal of Irrigation and Drainage Engineering*, ASCE 1996
Engineering Dean's Council Award for Outstanding Civil Engineering Faculty, Colorado State University 1995
Member of Tau Beta Pi, Chi Epsilon, Sigma Xi, Alpha Epsilon, Phi Kappa Phi, Mortar Board
Recipient of International Research Fellowship (1984-1985, 1985-1986)
United States Agency for International Development/Colorado State University
Summa Cum Laude Graduate, Louisiana Tech University 1978

Professional Affiliation and Activities

Advisor, Tau Beta Pi, Colorado State University (2013 – Present)
Member, American Society of Civil Engineers (1980 - Present)
Member and Past Chairman, Technical Committee on Planning and Management of Irrigation and Drainage Systems, Water Resources Engineering Division, American Society of Civil Engineers (1990 - 2000)
Member, U.S. Committee on Irrigation and Drainage (1992 - 2001)
Member and Past Chairman, Technical Committee on Probabilistic Approaches in Water Resources Engineering, Water Resources Engineering Division, American Society of Civil Engineers (1994 - 2000)
Assoc. Editor, *Journal of Irrigation and Drainage Engineering*, Am. Soc. of Civil Engineers (1994 - 1998)

Teaching and Advising Experience (Colorado State University)

Graduate Courses Taught

CE 514 Hydraulic Structures/Systems
CE 612 Open-Channel Flow
CE 635 Quantitative Hydrogeology

Undergraduate Courses Taught

EG 101 Engineering Principles I
CE 261 Engineering Mechanics: Dynamics
CE 262 Engineering Mechanics
CE 300 Fluid Mechanics
CE 358 Mechanics of Materials for Nonengineers
CE 401 Hydraulic Engineering
CE 422 Engineering Hydrology
CE 423 Groundwater Engineering

Graduate Research Advised and Co-Advised (Thesis Option only listed)

PhD

Saman Tavakoli, Ph.D.
Expected Spring 2018
(Co-Adviser)

Eric D. Morway, Ph.D.
Spring 2014

Regional-Scale Groundwater Flow and Salt Transport Models
for Exploring Agro-Environmental Remediation Strategies in an
Irrigated River Valley

Ryan T. Bailey, Ph.D. Summer 2012	Regional Selenium Cycling in an Irrigated Agricultural Groundwater System: Conceptualization, Modeling, and Remediation
Alzraiee, A. H., Ph.D. Spring 2012 (Co-Adviser)	Stochastic Analysis of Flow and Salt Transport in Irrigation-Drainage Systems
Enrique Triana, Ph.D. Spring 2008 (Co-Adviser)	A Spatial Decision Support System for Basin Scale Assessment of Improved Management of Water Quantity and Quality in Stream-Aquifer Systems
J. Philip Burkhalter, Ph.D. Fall 2005	Defining and Engineering Solutions for Agroecological Impacts of Salinity and Waterlogging in an Irrigated River Valley
Pei-Chih Chiang, Ph.D. Summer 2003	Calibrated Stochastic Simulation of River Pollution Control Strategies
Enrique Moncada, Ph.D. Spring 1999	Planning Reservoir Operations with Imprecise Objectives
Muhammad A. Alzahrani, Ph.D. Fall 1995	Stochastic Modeling of Unsteady Open-Channel Flow
L. Gabriel T. de Azevedo, Ph.D. Summer 1994	Integration of Water Quantity and Quality in Multi-Sector River Basin Planning
Samir I. Ahmed, Ph.D. Fall 1992	Hydraulic and Hydrologic Uncertainty in Analysis of Irrigation Delivery System Performance
Abdelmohsen, A. Alshaikh, Ph.D. Fall 1992	Stochastic Optimal Design of Hydraulic Structures in Irrigation-Water-Delivery Systems
Farida A. El-Hessy, Ph.D. Spring 1991	Irrigation and Drainage Management in the Presence of a Saline Shallow Water Table
MS	
Christopher D. Shultz, M. S. Fall 2017	Finding Land and Water Management Practices to Reduce Selenium and Nitrate Concentrations in an Agricultural River Valley Applying a Regional-Scale Stream-Aquifer Model
Miles B. Daly, M. S. Spring 2017 (Co-Adviser)	Occurrence and Transport of Salinity and Selenium in a Irrigated Agricultural System with Subsurface Drainage
Erica C. Romero, M. S. Fall 2016	Analysis of Selenium Cycling and Remediation in the Lower Arkansas River Valley, Colorado Using Field Methods and Numerical Modeling

Brent E. Heesemann, M. S. Fall 2016	Assessing Best Management Practices for the Remediation of Selenium in Surface Water in an Irrigated Agricultural River Valley: Sampling, Modeling, and Multi-Criteria Decision Analysis
David A. Criswell, M. S. Fall 2016	Assessing Irrigation-Influenced Groundwater Flow and Transport Pathways Along a Reach of the Arkansas River in Colorado
Chad A. Martin, M. S. Spring 2015	Uncertainty in Measuring Seepage from Earthen Irrigation Canals Using the Inflow-Outflow Method and in Evaluating the Effectiveness of Polyacrylamide Applications for Seepage Reduction
Alexander P. Huizenga Spring 2015 (Co-Adviser)	Monitoring Groundwater-Surface Water Interaction and Nutrient Mass Exchange in the Riparian Corridor of the Lower Arkansas River Valley, Colorado
Cale A. Mages, M. S. Fall 2014	Comparison of the Glover-Balmer Solution with a Calibrated Groundwater Model to Estimate Aquifer-Stream Interactions in an Irrigated Alluvial Valley
Brent M. Cody, M.S. Fall 2010	Sources, Occurrence, and Mobilization of Selenium in Colorado's Lower Arkansas River Valley
Joseph P. Donnelly, M.S. Spring 2005	Assessing Irrigation-Induced Selenium and Iron in the Lower Arkansas River Valley in Colorado
Daniel J. Gillham, M.S. Spring 2004 (Co-Adviser)	Data and Modeling of Irrigated Fields with Saline High Water Tables
Daniel L. Buhman, M.S. Spring 2001	Stochastic Variability in Fluvial Hydraulic Geometry and Correspondence with Geomorphologic Variables
William J. Owen, M.S. Spring 1996	Uncertainty in Assessment of Subjective Reservoir Management Objectives
Lisa Poppenga, M.S. Fall 1994	Statistical and Expert System Components of a Decision Support System for Dam Safety Evaluation
William C. Haskell, M.S. Fall 1994	Statistical Characterization of Seepage Losses in Open Channels
Perry Eisenach, M.S. Spring 1994	Strategies to Monitor Water Quality in Irrigated Agricultural Systems in Colorado
Essam A. Khalifa, M.S. Spring 1992	Enhancement of Hydraulic Analysis and User Interface for an Irrigation Canal Network Model

Walter E. Heyder, M.S.
Summer 1991

Multicriterion Strategic Planning for Irrigation Water
Delivery System Improvement

Special Training Courses Conducted

Administrative Director and Trainer

Short course on Automated Control of Irrigation Canals, Colorado Institute for Irrigation Management -- April - June, 1996

Training Director

Short course on Hydraulic Modeling of Irrigation Canal Systems, Colorado Institute for Irrigation Management -- April - May, 1996

Administrative Director and Trainer

Short course on Performance and Evaluation of Irrigation Systems, Colorado Institute for Irrigation Management -- September, 1995

Administrative Director

Short course on Water Treatment Management, International School for Water Resources -- March, 1995

Training Co-Director

Short course on Modeling, Regulation and Monitoring of Irrigation Canal Systems, Central Water and Power Research Station -- Pune, India, January, 1994

Training Director

Short course on Rehabilitation of Irrigation-Water-Delivery Systems, International School for Water Resources -- May, 1993

Training Director

Short course on Modeling, Regulation and Monitoring of Irrigation-Water-Delivery Systems, Colorado Institute for Irrigation Management -- February, 1993

Training Director

Short course on Drainage and Salinity Control of Irrigated Lands, Colorado Institute for Irrigation Management -- September, 1992

Training Director

Short course on Modeling and Evaluation of Irrigation-Water-Delivery Systems, Colorado Institute for Irrigation Management -- June - July, 1991

Training Director

Special Course on Analysis and Modeling of Groundwater Flow, International School for Water Resources -- January - May, 1989

Instructor

USDA International Short Course on Irrigation Systems Management -- June, 1988; June, 1989

Instructor

Short course on Conjunctive Use of Groundwater and Surface Water for Irrigation Systems,
Colorado Institute for Irrigation Management -- May, 1988; May, 1989

Timothy K. Gates

Professional Publications

Refereed Articles (in order of publication)

*** indicates graduate student advisee of T. K. Gates where subject of paper is based upon graduate work

1. **Gates, T.K.**, and Clyma, W. 1984. "Designing furrow-irrigation systems for improved seasonal performance". *Transactions of the American Society of Agricultural Engineers*, 27(6): 1817-1824.
2. **Gates, T.K.**, and Grismer, M.E. 1987. "Optimal management of saline water tables in irrigated regions". *California Agriculture*, 41(3): 20-21.
3. Grismer, M.E., and **Gates, T.K.** 1988. "Estimating saline water table contributions to crop water use". *California Agriculture*, 42(2): 23-24.
4. Grismer, M.E., **Gates, T.K.**, and Hanson, B.R. 1988. "Irrigation and drainage strategies in salinity problem areas". *California Agriculture*, 42(5): 23-24.
5. **Gates, T.K.**, and Grismer, M.E. 1989. "Irrigation and drainage strategies in salinity-affected regions". *Journal of Irrigation and Drainage Engineering*, 115(2): 255-284.
6. **Gates, T.K.**, Wets, R. J-B, and Grismer, M.E. 1989. "Stochastic approximation applied to optimal irrigation and drainage planning". *Journal of Irrigation and Drainage Engineering*, 115(3): 488-502.
7. Molden, D.J., and **Gates, T.K.** 1990. "Performance measures for evaluation of irrigation-water - delivery systems". *Journal of Irrigation and Drainage Engineering*, 116(6): 804-823.
8. Mankarious, W.F., **Gates, T.K.**, and Rady, M.A.H. 1991. "Irrigation of small-level basins in Egypt". *Journal of Irrigation and Drainage Engineering*, 117(3): 361-376.
9. Warner, J.W., **Gates, T.K.**, Attia, F.A.R., and Mankarious, W.F. 1991. "Vertical leakage in Egypt's Nile Valley: Estimation and implications". *Journal of Irrigation and Drainage Engineering*, 117(4): 515-533.
10. **Gates, T.K.**, Heyder, W.E.* , Fontane, D.G., and Salas, J.D. 1991. "Multicriterion strategic planning for improved irrigation delivery. I: Approach". *Journal of Irrigation and Drainage Engineering*, 117(6): 897-913.
11. Heyder, W.E.* , **Gates, T.K.**, Fontane, D.G., and Salas, J.D. 1991. "Multicriterion strategic planning for improved irrigation delivery. II: Application". *Journal of Irrigation and Drainage Engineering*, 117(6): 914-934.
12. Bakry, M.F., **Gates, T.K.**, and Khattab, A.F. 1992. "Field-measured hydraulic resistance characteristics in vegetation-infested canals". *Journal of Irrigation and Drainage Engineering*, 118(2): 256-274.
13. **Gates, T.K.**, Alshaikh, A.A.* , Ahmed, S.I.* , and Molden, D.J. 1992. "Optimal irrigation delivery system design under uncertainty." *Journal of Irrigation and Drainage Engineering*, 118(3): 433-449.

14. **Gates, T.K.**, and Alshaikh, A.A.* 1993. "Stochastic design of hydraulic structures in irrigation canal networks". *Journal of Irrigation and Drainage Engineering*, 119(2): 346-363.
15. Warner, J.W., **Gates, T.K.**, Namvargolian, R., Miller P. and Comes, G. 1994. "Sediment and microbial fouling of experimental groundwater recharge trenches". *Journal of Contaminant Hydrology*, 15(4): 321-344.
16. Garcia, L.A., Manguerra, H.B., and **Gates, T.K.** 1995. "Irrigation-drainage design and management model: Development." *Journal of Irrigation and Drainage Engineering*, 121(1): 71-82 (1996 ASCE Best Research Paper Award, *Journal of Irrigation and Drainage Engineering*).
17. **Gates, T.K.**, and Ahmed, S.I.* 1995. "Sensitivity of predicted irrigation-delivery performance to hydraulic and hydrologic uncertainty". *Agricultural Water Management*, 27(3-4): 267-282.
18. **Gates, T.K.**, and Al-Zahrani, M.A.* 1996. "Spatiotemporal stochastic open-channel flow. I: Model, and its parameter data". *Journal of Hydraulic Engineering*, 122(11): 641-651.
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