KARA L. NELSON

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EDUCATION

Ph.D.	Environmental Engineering, University of California at Davis, September 2001 Dissertation: Wastewater stabilization pond sludge: accumulation, characteristics, and pathogen inactivation
M.S.E.	Environmental Engineering, University of Washington, 1996 Thesis: Two-stage and two-phase thermophilic-mesophilic anaerobic sludge digestion
B.A.	Biophysics, University of California at Berkeley, 1992

WORK EXPERIENCE

7/01-present	*Assistant Professor*, Department of Civil and Environmental Engineering, University of California, Berkeley, CA. Teach and conduct research on water and wastewater treatment processes and the control of water-related pathogens.
9/99-6/01, 9/96-8/98	*Research Assistant/Teaching Assistant*, University of California at Davis, Davis, CA Conducted research on the characteristics of wastewater stabilization pond sludge. Taught laboratory and discussion sessions for undergraduate courses in civil and environmental engineering.
9/98-8/99	*Fulbright Fellow*, Fulbright Garcia-Robles Program, US Information Agency Conducted research at the National Autonomous University of Mexico (UNAM) on methods for helminth egg detection and determination of viability. Collected field data on the characteristics of wastewater stabilization pond sludge.
9/94-6/96	*Research Assistant*, University of Washington, Seattle, WA Conducted research on improving pathogen destruction in anaerobic sludge digestion.
6/92-6/94	*Research Associate*, Lawrence Berkeley Laboratory, Berkeley, CA Conducted research on environmental issues in developing countries (global climate change impacts, energy use and conservation, forestry practices).

HONORS AND AWARDS

2004, 2005	P3 Award from U.S. EPA, Phase I and II (faculty advisor to winning student team)
2003	Presidential Early Career Award for Scientists and Engineers (PECASE), Office of Science and Technology Policy, Executive Office of the President
2003	CAREER Award, National Science Foundation
2001	Academic Enrichment Program Award, University of California, Berkeley, CA
1999	Dissertation Grant, University of California Institute for Mexico and the United States
1999	GAAAN Fellowship, University of California, Davis, CA
1998	Fulbright Fellowship (Mexico), Fulbright Program, US Information Agency
1997	Research Mentorship Fellowship, University of California, Davis, CA
1997	TOPS Fellowship, University of California, Davis, CA
1994, 1995	King Country Metro Graduate Fellowship, University of Washington, Seattle, WA
1988, 1989	NSF Research Experience for Undergraduates (REU) Summer Fellowship, Oregon State University, Corvallis, OR

LANGUAGES

Spanish: Good (comprehension, speaking, reading), Fair (writing)

PROFESSIONAL ACTIVITIES

Research Thrust Area Leader, Safe Water and Sanitation, Berkeley Water Center (2006 – present)
Peer reviewer, Unsolicited proposal review panel for National Science Foundation, Biological and Environmental Systems Division (January 2006 and December 2006)
Invited participant to National Science Foundation Workshop on Chemistry and Sustainability, Pacific Northwest National Lab, November 2005
Invited participant to National Academy of Science Joint Iranian-United States Symposium on Water Resources, Tunis, Tunisia, December 2003
Invited to National Academy of Engineering Frontiers of Engineering Symposium, September 2005
Peer reviewer for 38 manuscripts in last five years
Peer reviewer for California Environmental Protection Agency, Total Maximum Daily Load for Bacteria Impaired Waters (2006 and 2007)
Peer reviewer for California Department of Health Services, Proposition 50 proposals
Conference organizing committee for IWA Specialist Group on Waste Stabilization Ponds (2006, 2008)
Scientific and advisory committee for IWA Specialist Group on Water Reuse and Recycling (2002 – present)
Curriculum Committee for Blum Center for Developing Economies, UC Berkeley (2006 – present)
Strawberry Creek Environmental Quality Committee, UC Berkeley (2006 – present)
Space Committee for Center for Information Technology and Research in the Interest of Society (CITRIS), UC Berkeley College of Engineering (2006 – present)
Curriculum Committee, CEE Department (2001 – present)
Faculty advisor, Engineers for a Sustainable World, UC Berkeley chapter (2002 – present)
Search committee for new faculty hire, Civil and Environmental Engineering, UC Berkeley (2004 and 2005)
Memberships: American Chemical Society, American Society of Microbiology, Water Environment Federation, American Water Works Association, American Ecological Engineering Society, Association of Environmental Engineering and Science Professors, American Association of University Women, Inter-American Association of Sanitary Engineering and Environmental Sciences

COURSES TAUGHT

E11 “Engineered systems and sustainability”
CE113N “Ecological engineering for water quality improvement” (developed as new course)
CE211A “Environmental physical-chemical processes”
CE210A “Control of water-related pathogens” (developed as new course)
One-day workshop on “Water and sanitation in the urban environment”, UC Berkeley Beahrs Environmental Leadership Program (developed as new workshop)

SUPERVISION OF STUDENTS AND POST-DOCTORAL RESEARCHERS

Post-doctoral researchers (former): Tamar Kohn (2004-2006; Ecole Polytéchnique Fédérale de Lausanne); Jose Antonio Barrios (2005; Universidad National Autonoma de México)
Ph.D. theses:
Brian Pecson “Improving methods for the control of *Ascaris* eggs in wastewater sludge,” Fall 2006 (École Polytéchnique Fédérale de Lausanne)
Tryg Lundquist “A reduction pond for denitrification of agricultural drainage,” Fall 2006 (Cal State San Luis Obispo)
Former M.S. students: Forest Kaser, Micah Lang, Fermin Reygadas, Sarah Brownell, Hans Schwing, Amy Pickering, Alicia Chakrabati, IlJoo Yang, Matthew Tolcher
Former B.S. students: Rachel Peletz, April Wong, Sonia Lopez, Ali Kattan, Senem Surelli
Current post-doctoral researchers: Maria Raynal, Dave Love
Current Ph.D. students: Sarah Silkie, Khalid Kadir, Gordon Williams, Mike Fisher, Ashley Murray, Jeff Dahm, Alejandro Guido

PUBLICATIONS

Co-authors noted as (s) for student under my direction, (p) for post-doctoral researcher under my direction, (o) for students or post-docs under the direction of others, (a) for my former research advisors, (f) for faculty or research staff collaborators, and (n) for non-academic collaborators.

PEER-REVIEWED PUBLICATIONS

Murray, A.[(s)], A. Horvath[(f)], and **K.L. Nelson**. "Hybrid life-cycle environmental and cost inventory of sewage sludge treatment and end use scenarios: A case study from China." *Environmental Science & Technology,* (in press).

Silkie, S.S.[(s)], Tolcher, M.P.[(s)], and **K.L. Nelson**. "Reagent decontamination to eliminate false positives in *E. coli* qPCR." *Journal of Microbiological Methods*, (in press).

Brownell, S.A.[(s)], A.R. Chakrabarti[(s)], F.M. Kaser[(s)], L.G. Connelly[(o)], R.L. Peletz[(s)], F. Reygadas[(s)], M.J. Lang[(s)], D. Kammen[(f)], and **K.L. Nelson** (2008). "Assessment of a low-cost, point-of-use, ultraviolet water disinfection technology." *Journal of Water and Health*, 6(1):53-65.

Fisher, M.B.[(s) (o)], C. Keenan[(o)], **K.L. Nelson,** and B.M Voelker[(f)] (2008) "Speeding up solar disinfection (SODIS): Effects of hydrogen peroxide, temperature, pH, and copper plus ascorbate on the photoinactivation of *E.coli*" *Journal of Water and Health*, 6(1):35-51.

Williams, G.J.[(s)], B. Sheikh[(n)], R.B. Holden[(n)], T.J. Kouretas[(n)], and **K.L. Nelson** (2007) "The impact of increased loading rate on granular media, rapid depth filtration of wastewater" *Water Research*, 41(19):4535-4545.

Kohn, T.[(p)], M. Grandbois[(o)], K. McNeill[(f)], and **K.L. Nelson** (2007) "Association with natural organic matter enhances the sunlight-mediated inactivation of MS2 coliphage by singlet oxygen" *Environmental Science & Technology*, 41(13); 4626-4632.

Pecson, B.M.[(s)], J.A. Barrios[(p)], B.E. Jimenez[(a)], and **K.L. Nelson**. (2007). "The effects of temperature, pH, and ammonia concentration on the inactivation of *Ascaris* eggs in sewage sludge." *Water Research*, 41:2893-2902.

Kohn, T.[(p)] and **K.L. Nelson** (2007) "Sunlight-mediated inactivation of MS2 coliphage via exogenous singlet oxygen produced by sensitizers in natural waters" *Environmental Science & Technology*, 41(1): 192-197.

Pecson, B.M.[(s)], J.A. Barrios[(p)], D.R. Johnson[(o)], and **K.L. Nelson**. (2006) "A real-time PCR method for quantifying viable *Ascaris* eggs using the first internally-transcribed spacer region of rDNA". *Applied and Environmental Microbiology*, 72(12): 7864-7872.

Brownell, S.A.[(s)], and **K.L. Nelson** (2006). "Inactivation of single-celled *Ascaris suum* eggs by low-pressure ultraviolet radiation." *Applied and Environmental Microbiology*, 72(3): 2178-2184.

Pecson, B.M.[(s)], and **K.L. Nelson**. (2005). "Inactivation of *Ascaris suum* eggs by ammonia." *Environmental Science & Technology*, 39:7909-7914.

Nelson, K.L., B. Jiménez[(a)], G. Tchobanoglous[(a)], and J.L. Darby[(a)]. (2004). "Sludge accumulation, characteristics, and pathogen inactivation in four primary wastewater stabilization ponds in central Mexico." *Water Research*, 38(1):111-127.

Nelson, K.L. (2003). "Concentrations and inactivation of *Ascaris* eggs and pathogen indicator organisms in wastewater stabilization pond sludge." *Water Science and Technology*, 48(2):89-95.

Huffman, D.E. [(f)], **K.L. Nelson**, and J.B. Rose[(f)]. (2003). "Calicivirus – An emerging contaminant in water: State of the art." *Environmental Engineering Science*, 20(5):503-515.

Nelson, K.L., and J. L. Darby[(a)]. (2002). "Determination of the inactivation rate of *Ascaris* eggs in wastewater stabilization pond sludge using dialysis chambers and sludge cores." *Water Environment Research*, 74(4):362-369.

Nelson, K.L., and J. L. Darby[(a)]. (2001). "Inactivation of viable *Ascaris* eggs by reagents during enumeration." *Applied and Environmental Microbiology*, 67(12):5453-5459.

Nelson, K.L. (2000) "Ultraviolet light disinfection of wastewater stabilization pond effluents and the impact of particles with embedded coliform bacteria." *Water Science and Technology* **42**(10-11):165-170.

Nelson, K.L. and B. Jiménez[(a)] (2000) "Sludge accumulation, properties, and degradation in a Mexican wastewater stabilization pond." *Water Science and Technology* **42**(10-11):231-236.

REPORTS AND BOOK CHAPTERS

M. Lang[(s)], F. Kaser[(s)], F. Reygada[(s)], **K. Nelson**, D.M. Kammen[(f)]. (2006). "Meeting the need for safe drinking water in rural Mexico through point-of-use treatment." Policy Paper Series, Center for Latin American Studies, U.C. Berkeley, Berkeley.

Nelson, K.L. (2005). "Small and Decentralized Systems for Wastewater Treatment and Reuse." in Water Conservation, Reuse and Recycling: Proceedings of an Iranian-American Workshop, National Research Council, The National Academies Press, Washington, D.C., 54-66.

PRESENTATIONS

Nelson, K.L., G.J. Williams[(s)]. "Virus removal by coagulation and filtration of wastewater – The role of particle association," 14th International Symposium on Health-related Water Microbiology, Tokyo, Japan, September 9-15, 2007.

Nelson, K.L., S.A. Brownell[(s)], A.R. Chakrabarti[(s)], L.G. Connelly[(o)], F.M. Kaser[(s)], D. Kammen[(f)], M.J. Lang[(s)], R.L. Peletz[(s)], A.J. Pickering[(s)], F. Reygadas[(s)]. "The UV Tube: Low-cost, point-of-use disinfection of drinking water with ultraviolet light", Association of Environmental Engineering and Science Professors Conference: Interactions at the Interface – Making the Connections Between Environments, Disciplines and Nations, Blacksburg, VA, July 28-Aug 1, 2007.

Kadir, K.[(s)] and **K.L. Nelson** "Waste Stabilization Ponds: Technical Functions and Institutional Limitations," The First Joint Egypt-United States Workshop on Innovative Treatment Technologies for Water, Wastewater, Sludge and Other Contaminated Waters, Cairo, Egypt, May 22-24, 2007.

Nelson, K.L. "Sunlight-mediated inactivation of pathogens in water", Invited seminar, WaterCampws (NSF STC), University of Illinois, Champagn-Urbana, April 13, 2007.

Nelson, K.L. "Sunlight-mediated inactivation of pathogens in water", Invited seminar, Environmental Engineering, Yale University, April 11, 2007.

Nelson, K.L. "Sunlight-mediated inactivation of pathogens in water", Invited seminar, Environmental Sciences and Engineering, University of North Carolina, Chapel Hill, April 10, 2007.

Kohn, T.[(p)], and **K.L. Nelson** "Association with natural organic matter enhances the photoinactivation of MS2 by singlet oxygen" Oral presentation at the American Chemical Society Spring Meeting, Chicago, IL, March 26, 2007.

Kohn, T.[(p)], and **K.L. Nelson** "The role of singlet oxygen in the sunlight-mediated inactivation of MS2 coliphage in water." Poster presentation at Gordon Research Conference on Environmental Sciences: Water, Plymouth, NH, June 25-30, 2006.

K.L. Nelson "Sunlight-mediated inactivation of pathogens in water", Invited seminar, Environmental Engineering, Stanford University, May 12, 2006.

Williams, G. [(s)], **K. Nelson,**, R. Holden[(n)], T. Kouretas[(n)], B. Sheikh[(n)], J. Crook[(n)], and R. Cooper[(n)]. "Effect of increased loading rate on particles and pathogen indicators in tertiary filters." Oral presentation at 10th Annual Water Reuse Research Conference, Phoenix, AZ, May 14-16, 2006.

Nelson, K.L. "Real-time, quantitative, PCR detection of *E.coli* and *Ascaris* eggs." Oral presentation at International Symposium on Waterborne Pathogens, Athens, GA, March 16-18, 2006.

Kadir, K.[(s)] and **K.L. Nelson** "Sunlight-mediated inactivation of pathogens in natural systems." Oral presentation at 6th Annual Meeting of the American Ecological Engineering Society, U.C. Berkeley, April 13-15, 2006.

Kohn, T.[(p)], and **K.L. Nelson** "The role of reactive oxygen species in the sunlight-mediated inactivation of viruses in water." Oral presentation at Pacifichem, Honolulu, HI, December 15-20, 2005.

Kadir, K.[(s)] and **K.L. Nelson** "Mechanisms of sunlight-mediated inactivation of *Enterococcus faecalis* in surface waters." Poster presentation at Pacifichem, Honolulu, HI, December 15-20, 2005. *(Award for best student poster).*

Fisher, M.B.[(s)], Voelker , B.M. [(f)], and **K.L. Nelson** "Solar disinfection: Effects of hydrogen peroxide, temperature, and copper plus ascorbate on the photoinactivation of E.coli." Poster presentation at Pacifichem, Honolulu, HI, December 15-20, 2005.

Nelson, K.L. and I.J. Yang[(s)] "The effects of degradation and consolidation on sludge accumulation in primary waste stabilization ponds" Oral presentation at 6th International Conference on Waste Stabilization Ponds, Avignon, France, October 1, 2004.

Pecson, B.M.[(s)] and **K.L. Nelson** "The Effects of Exposure Time, Temperature, pH, and ammonia concentration on the inactivation rate of Ascaris eggs" Oral presentation at XXIX Conference of the Inter-American Association of Sanitary and Environmental Engineering (AIDIS), San Juan, Puerto Rico, August 22-27, 2004.

Nelson, K.L., B. Sheik[(n)], R.C. Cooper[(n)], R. Holden[(n)], and K. Israel[(n)] "Efficacy of pathogen removal during full-scale operation of water reuse facilities in Monterey, California." Oral presentation at International Water Association 4th International Symposium on Wastewater Reclamation and Reuse, Mexico City, Mexico, November 12-14, 2003.

Pecson, B.[(s)] and **K.L. Nelson** "Inactivation of *Ascaris* eggs by pH, temperature, and ammonia" Oral presentation at WEFTEC 03, Los Angeles, CA, October 6-8, 2003.

Nelson, K.L. "Inactivation of waterborne pathogens in engineered and natural systems." Oral presentation at the 3rd American Ecological Engineering Society, College Park, MD, May 28-30, 2003.

Nelson, K.L. "Challenges in water and biosolids reuse", Invited seminar, Civil and Environmental Engineering, U.C. Davis, March 3, 2003.

Nelson, K.L. "El UV Tube: Una tecnologia de disinfection de bajo costo" (The UV Tube: A low-cost water disinfection technology), Invited seminar at the Mexican Institute for Water Technology, Juitepec, Mexico, January 8, 2003.

Nelson, K.L. "Small and decentralized treatment systems in water conservation and reuse" Invited lecture at National Academy of Science Joint Iranian-United States Symposium on Water Resources, Tunis, Tunisia, December 10, 2003.

Nelson, K.L. "Concentrations and inactivation of *Ascaris* eggs and pathogen indicator organisms in wastewater stabilization pond sludge." Oral presentation at the 5th International Specialist Group Conference on Waste Stabilization Ponds, Auckland, NZ, April 2-5, 2002.

Nelson, K.L. "Development of a mechanistic model of sludge accumulation in primary wastewater stabilization ponds." Oral presentation at the 5th International Specialist Group Conference on Waste Stabilization Ponds, Auckland, NZ, April 2-5, 2002.

Nelson, K. L., G. Tchobanoglous[(a)], and D.O. Cliver[(a)] "Inactivation of helminth eggs in wastewater stabilization pond sludges." Oral presentation at the WEF/AWWA/CWEA Joint Residuals and Biosolids Management Conference, San Diego, CA, February 21-24, 2001.

Nelson, K. L., and B. Jiménez[(a)] "Acumulación, degradación, y características del lodo en varios lagunas de estabilización en México" (Accumulation, degradation, and characteristics of sludge in several wastewater stabilization ponds in Mexico.) Oral presentation at the First Latin American Conference on Waste Stabilization Ponds and Reuse, Cali, Colombia, October 24-27, 2000.

Nelson, K. L., and B. Jiménez[(a)] "Concentración e inactivación de patógenos en los lodos de las lagunas de estabilizción en México" (Concentration and inactivation of pathogens in the sludge of wastewater stabilization lagoons in Mexico.) Oral presentation at the XII Congreso Nacional de Ingeniería Sanitaria y Ciencias, Michoacán, Mexico, April 20-24, 2000.

Nelson, K. L. "Inactivation of *Ascaris* eggs in wastewater stabilization pond sludges." Poster presentation at WEF Disinfection 2000: Disinfection of Wastes in the New Millennium, New Orleans, March 15-18, 2000.

Nelson, K. L. "Remoción e Inactivación de Huevos de Helmintos en Lagunas de Estabilización," (Removal and Inactivation of Helminth Eggs in Stabilization Ponds). Invited lecture at Course on the Determination and Quantification of Helminth Eggs in Water, Institute of Engineering (UNAM), Academy of Environmental Engineers, and the Interdisciplinary Professional Center for Biotechnology (IPN), Mexico, November 18, 1999.

Nelson, K. L. (1999) "Ultraviolet light disinfection of wastewater stabilization pond effluents and the impact of particles with embedded coliform bacteria." Oral presentation at the 4th IAWQ Specialist Conference on Wastewater Stabilization Ponds: Technology and the Environment, Marrakesh, Morocco, April 20-24.

Nelson, K. L., and B. Jiménez[(a)], (1999) "Sludge accumulation, properties, and degradation in a Mexican wastewater stabilization pond." Oral presentation at the 4th IAWQ Specialist Conference on Wastewater Stabilization Ponds: Technology and the Environment, Marrakesh, Morocco, April 20-24.

Nelson, K. L., B. Jiménez[(a)], A. Chávez, and C. Maya, (1998) "The use of total suspended solids as an indicator of helminth egg removal from wastewater," Poster presentation at WEFTEC '98, Water Environment Federation, Orlando, Florida, October 3-7.

FUNDING

"Understanding sunlight-mediated inactivation of pathogens in water" Faculty Early Career Development (CAREER) Program, Presidential Early Career Award for Scientists and Engineers (PECASE), National Science Foundation, 2003-2008, $400,000.

"Optimization of filtration flux rate for production of Title-22 disinfected tertiary recycled water" National Water Research Institute and WateReuse Foundation, 2003-2008, $244,000. (Subcontract from Monterey Regional Water Pollution Control Agency).

"Development of a quantitative detection method for enumerating host-specific fecal bacteria based on real-time, quantitative polymerase chain reaction" Center for Water Resources, University of California, 2003-2005, $60,000.

"Improving methods for the control of helminth eggs in wastewater and sludge" UC Mexus-Conacyt Collaborative Grant, 2004-2006, $25,000. Co-PI: Blanca Jimenez.

"UV-Tube design concept for sustainable, point-of-use water disinfection," P3 Award, U.S. Environmental Protection Agency, 2004-2006, $10,000 (Phase I), $75,000 (Phase II). Co-PI: Daniel Kammen.

"Assessment of nutrient enrichment in Rodeo and Tennessee Valley watersheds" U.S. Park Service, 2005-2007, $39,781.

"Sustainable urban sanitation in developing countries" (component of the Urban Sustainability Initiative, Berkeley Institute for the Environment) Moore Foundation, 2006-2008, $70,000. Co-PIs: Isha Ray, Jennifer Davis.

"Understanding the causes and effects of toxic cyanobacterial blooms in Rodeo Lagoon, Golden Gate National Recreation Area, CA" UC Toxic Substances Research & Teaching Program, 2006-2008, $50,000.

"Initiative on Safe Water and Sanitation", Blum Center for Developing Economies, U.C. Berkeley, 2006-2008, $530,000. Co-PIs: Jack Colford, David Levine, Isha Ray.

"Development of an ITS-1 ribosomal DNA (rDNA) gene specific quantitative real-time PCR method for detecting viable larvated *Ascaris* ova in biosolids," U.S. Environmental Protection Agency, 2007-2008, $90,000.