



# SWES SOUNDS

THE UNIVERSITY OF  
**ARIZONA**  
COLLEGE OF AGRICULTURE  
AND LIFE SCIENCES

The Heartbeat of the Department of Soil, Water & Environmental Science

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## TONES FROM THE TOOTH

As the global, national, state, and local economies struggle through the recent downturns, we see the results in many facets of our daily lives and the impacts are very real at the university level as well. The results of these economic problems are manifest in many forms of change, often quite difficult. We know the realities of this situation through the significant reductions in the state allocations to our university and departmental budgets and what that means in terms of the loss of jobs (positions/people) and operational funds to support our education (instruction and extension) and research objectives. In addition, the prospects in the near future (1-5 years) suggest that these changes will continue.



The times ahead of us offer significant challenges in terms of how we manage our programs in the face of continual reductions of State support. We are being challenged on many fronts through this process and we must identify priority areas where we need to focus our resources to protect and enhance the excellent quality we have for future development. This means it is critical that we understand where we are going and what our long-term objectives are. This is strategic planning at its very essence.

We need to be clear and focused on the future direction of the SWES Department (and all facets of this university) so that we can make the short-term decisions in line with our long-term strategic objectives. We have identified two broad areas of strength and focus in the SWES Department: 1) critical zone science and 2) water quality. Within this context we need to address our strategic objectives more specifically, clearly and vigorously. We need to identify the essential elements necessary to address our educational and research goals.

The circumstances require us to be realistic about the harsh realities ahead of us, step up to the rigors of developing a focused strategic plan, and prepare ourselves to implement it in a step-wise fashion as we are required to do so. In the weeks ahead we will work on this process in the SWES Department.

**Jeffrey C. Silvertooth, Department Head**

## DEPARTMENT NEWS:

**Jeff Silvertooth** has accepted an invitation to be a Consulting Editor for *Farming Outlook*, a quarterly educational magazine on policy and developments of progressive agriculture.

Congratulations to **Ryan Sinclair** (postdoc - Dr. Gerba) who accepted an Assistant Professor position in the Public Health Program at Loma Linda University in Southern California.

**Chris Rensing** has accepted an invitation to be on the Editorial Advisory Board for *Molecular Microbiology*, the highest ranked journal for primary publications in Microbiology.

The book "The Blue Death" traces the history of waterborne disease from John Snow in England in the 1850's to the present. One chapter describes how **Chuck Gerba**, Chuck Sterling and Joan Rose of the University of Arizona help solve the mystery of waterborne *Cryptosporidium*, which caused the largest outbreak of waterborne disease in U. S. history in Milwaukee in 1993.

A section in the book "Slow Death by Rubber Duck" discusses the work of **Chuck Gerba** and why we need to reinvent hygiene for the 21<sup>st</sup> Century.

**Raina Maier** and **Chris Rensing** served on the US Department of Energy Environmental Remediation Science Program (ERSP) Grant Review Panel, Oct. 28-29.

**Raina Maier** served on the Organizing Committee for the 2009 Superfund Research Program Annual Meeting, Nov 2-5.

**Raina Maier** served on the External Advisory Board to review the UC-San Diego Superfund Research Program, Dec. 7.

**Sharon Megdal**, WRRRC posted a special issue of their newsletter on the Arizona-Israeli-Palestinian Water Management and Policy Workshop that they hosted in September. <http://ag.arizona.edu/azwater/awr/awr-pdfs/2009-Fall-awr-newsletter.pdf>

## SWES CLUB NEWS:

Last year SWES Club had 5 new members in the whole year. And now we get about 5 new members every week. There are now 50+ members. We are now one of the largest environmental clubs, second only to ASUA Sustainability. The SWES Club has an intramural Co-rec soccer team. The season started last week. We are currently 1-1. Our team has three SWES grad students, 7 SWES undergrads, and 4 non-SWES undergrads but still SWES Club members. Our team is composed of some pretty tall people so our name is... Midget Kickers. Granted probably not the most politically correct, but fitting.

We just completed our Intramural Co-Rec Inner Tube Water Polo season. SWES Club was undefeated going into the semi-finals. Unfortunately, half the members had to attend conferences out of Tucson, so we were unable to compete and had to forfeit.

Last week SWES Club competed in the Club Olympics. Our crowning achievement was beating the UA Rugby team in Mud Tug O' War! Granted we had 8 guys from the UA men's swim team and some members from Elevation Snow and Ski Club... But a win for SWES Club none the less!

As to other activities ~ SWES Club just received a \$1000 grant from the CALS Alumni to do water harvesting at an elementary school called Lineweaver Elementary. We will also be developing an interactive curriculum to teach special needs kids the hydrological cycle and water harvesting. This is done with the intent of creating an awareness of our Arizona's water issues and having an impact upon a group of kids that are typically under focused.

SWES Club in conjunction with PARASOL is submitting two grants this week for a total of \$13,000. The Pearson Sustainability Awards (\$3,000) grant money would go towards developing a completely self-sustaining and maintaining water harvesting system at the Visitors Center. Right now there is a active water harvesting system at the UA visitors Center (uses a cistern to store water for future use ~ irrigation). However, it requires the UA gardening crew to come out to open and close the valve to irrigate the plants. We will be installing soil sensors to detect whether the soil has adequate moisture. If not then this will be relayed to controller that will open and close the valve attached to the cistern.

The other grant is the USGS 104b grant (\$10,000), which will go towards doing various water harvesting projects on the UA campus, some signage for past completed projects, and further developing the project at Lineweaver Elementary School.

SWES Club is having trips coming very soon. This weekend we will be going to Cholla Bay, Rocky Point, Mexico to do the Annual Cholla Bay Clean-Up. This is an event we do every year where we clean-up all the garbage on Cholla Bay beach and stay in vacation homes. The following weekend we will be having a

camping trip to Peppersauce Cavern, which is a public cave approx. 2 hrs north of UA. We clean up the inside the cave and pick up garbage in the surrounding area. This is a public site with no one to maintain it.

SWES Club has now had two very successful guest speaker events ~ speakers from the NRCS (Natural Resource Conservation Society) and SCA (Student Conservation Association), who shared internship opportunities with our members.

## SWES REPORT CARD:

### GRANTS:

**Brusseau, M. L. and C. Miller.** Multiscale Understanding and Modeling of DNAPL Dissolution In Porous Medium Systems. Sponsor: National Institute of Environmental Health Sciences; \$450,000.

**C. Rensing (P.I.),** Redox-mediated Copper Surface Killing of Bacteria and Yeasts. International Copper Association. 2009. \$65,000.

**M. Tuller and J. Walworth,** Novel Gradient-Based and Surface Chamber Techniques for Monitoring Regulated and Greenhouse Gas Emissions from Animal Feeding Operations. CSREES AFRI Air Quality Program, \$281,275 (this is the SWES portion of a joint \$599,880 grant with S.B. Jones and R. Miller from Utah State University).

**M. Tuller,** "Supplemental Funding for Upgrade of Weighing Lysimeter Facility for Studying Ecosystem and Vadose Zone Dynamics in Arid Environments". NSF EAR, \$32,520.

### PUBLICATIONS:

**Bright, K. R., F. Marciano-Cabral and C. P. Gerba.** 2009. Occurrence of *Naegleria fowleri* in Arizona drinking water supply wells. *J. Amer. Water Works Assoc.* 101(11):43-50.

Cai, L., **C. Rensing,** L. Xiangyang, and G. Wang. 2009. Novel gene cluster involved in arsenite oxidation and resistance in *Achromobacter* sp. SY8 and *Pseudomonas* sp. TS44. *Appl. Microbiol. Biotech.* 83:715-725.

Carreón-Diazconti, C., Santamaria, J., **Berkompas, J.,** Field, J.A., and **Brusseau, M.L.** Assessment of in situ reductive dechlorination using compound-specific stable isotopes, functional gene PCR, and geochemical data. *Environ. Sci. Technol.*, 43(12), 4301-4307, 2009.

**Gerba, C. P.** and C. Y. Choi. 2009. Water quality. In: *The Produce Problem. Causes and Solutions.* G. M. Sapers, E. B. Solomon and K. R. Matthews. (eds.) pp. 105-118. Academic Press. San Diego, CA.

**Gerba, C. P.** 2009. The role of water and water testing in produce safety. In: *Microbial Safety of Fresh Produce*. X. Fan, B. A. Niemira, C. J. Doona, F. E. Feeberry and R. B. Gravanni (eds.). pp.129-142. IFT Press, Ames, IA

Herzog, A. B., D. McLennan, A. K. Pandey, **C. P. Gerba**, C. N. Haas, J. B. Rose and S. A. Hashsham. 2009. Implications of limits of detection of various methods for *Bacillus anthracis* in computing risks to human health. *Appl. Environ. Microbiol.* 75:6331-6339.

**Kempf, A.** and **Brusseau, M.L.** Impact of non-ideal sorption on low-concentration tailing behavior for atrazine transport in two natural porous media. *Chemosphere*, 77, 877-882, 2009.

**Kim, E.H.**, X. Charpentier, **O. Torres-Urquidy**, M.M. McEvoy, and **C. Rensing**. 2009. The metal efflux island of *Legionella pneumophila* is not required for survival in macrophages and amoebas. *FEMS Microbiol. Lett.* 301: 164-170.

**Kurc, S.A.**, Benton, L.M., Digital image-derived greenness links deep soil moisture to carbon uptake in a creosotebush-dominated shrubland, *J. Arid Environ.* doi:10.1016/j.jaridenv.2009.10.003.

Marrero-Ortiz, R., **K.R. Riley**, M.K. Karpiscak and **C.P. Gerba**. 2009. Groundwater quality of individual wells and small systems in Arizona. *JAWWA* 101:89-100.

McLain, J.E.T., **C.M. Rock** Seasonal variation in accurate identification of *E. coli* in treated municipal effluent and irrigated soils, Proceed. 24<sup>th</sup> Annual Water Reuse Symposium, Seattle, WA, Sept 13-16, 2009.

**Rock, C.M.**, J.E.T. McLain Seasonal reclaimed water quality assessment of nutrient, chemical and biological variability, Proceed. 24<sup>th</sup> Annual Water Reuse Symposium, Seattle, WA, Sept 13-16, 2009.

**Russo, A.E.** Mahal, M.K., and **Brusseau, M.L.** Nonideal behavior during complete dissolution of organic immiscible liquid: 1. natural porous media. *J. Haz. Mat.* 172, 208-213, 2009.

**Russo, A.E.** Narter, M., and **Brusseau, M.L.** Characterizing pore-scale dissolution of organic immiscible liquid in a poorly-sorted natural porous medium. *Environ. Sci. Technol.* 43, 5671-5678, 2009.

**Viola, R.**, F. Zama, **M. Tuller**, and E. Mesini. Simulation of incompressible flow through rhombohedral pores. Proceed. 2009 European COMSOL Conf., Milan, Italy, Oct. 14-16.

## PRESENTATIONS:

The following were presented at the Geological Society of America National Meeting. Portland, OR, Oct. 18-21  
**Borden, A.K., J. Berkompas, Z. Miao, K.C. Carroll, E.P.**

**Glenn, J.** Waugh, and **M.L. Brusseau** Pilot Tests of Enhanced Denitrification Using Ethanol.

**Brusseau, M.L.**, V. Rohay, and M.J. Truex. Analysis of Soil Vapor Extraction Data to Evaluate Mass-Transfer Constraints and Estimate Mass Flux: Hanford Case Study.

**Carroll, K.C.**, **A.E. Russo**, and **M.L. Brusseau**. The Impact of Immiscible Displacement and Trapped Air on Pore-Scale Fluid Configuration for Three-Phase Systems.

**Cox, H.A.**, Z. Miao, G.R. Johnson, and **M.L. Brusseau**. Transport of Titanium Dioxide Nanoparticles in Sand.

Johnson, G.R., M.R. Reynolds, Z. Miao, and **M.L. Brusseau**. On the Transport and Fate of Biosolid Colloids in Porous Media.

Johnson, G.R. and **M.L. Brusseau**. The Impact of Contaminant Contact Time and Porous-Media Weathering on Transport of Trichloroethene in Aquifer Material.

**Marble, J.C.**, **K.C. Carroll**, H. Janousek, and **M.L. Brusseau**. *In Situ* Oxidation and Associated Mass-Flux

Reduction/Mass-Removal Behavior for Idealized Source Zones with Poorly-Accessible Organic Immiscible Liquid.

McAndrew, R.M., J.B. Callegary, **M.L. Brusseau**, and F. Gray. Contaminant Transport and Predictive Modeling in the Upper Santa Cruz Basin.

**Russo, A.E.**, **M. Narter**, and **M.L. Brusseau**. Experimental Investigation of Long-Term Removal of Trichloroethene From Various Porous Media.

The following were presented at the ASA-CSSA-SSSA International. Annual Meeting, Pittsburgh, PA, Nov. 1-5.

**Berger, P.A.**, R. Heinse, H. Abdu, **M. Tuller**, and S.B. Jones. Geophysical Characterization of Inactive Mine Tailings – A First Step for Revegetation.

**Chen-Lopez, J.C.**, **M. Tuller**, G.A. Giacomelli, and P. Waller. Optimization of Root Zone Fluid Fluxes in Greenhouse Substrates.

**Levi, M.R.**, **C. Rasmussen**, and **N. Starman**. Predictive Soil Mapping In Southern Arizona.

**Mirjat, M.S.**, and **M. Tuller**. Optimization of Zone Leaching for Salinity Control in Arid and Semiarid Regions.

**Pepper, I.** Soils: A Public Health Threat or Savior?

**Tuller, M.**, and **P. Iassonov**, 2009. Sequential Segmentation for Correction of Intensity Bias in X-Ray CT Grayscale Images.

**Vaz, C.M.P.**, P.R.O. Lasso, I.C. de Maria, **P. Iassonov**, and **M. Tuller**, 2009. Estimation of Soil Water Retention Properties from X-Ray Microtomography Observations.

The following were presented at the 2009 Annual NIEHS Superfund Research Program Mtg., New York NY, Nov. 2-5.

- Hayes, S., R.M. Maier, and J. Chorover. Toxic dust: Studying lead speciation in desert mine tailings to assess health risk.
- Maier, R.M., F.A. Solis-Dominguez, J.A. Rivera Castelo, T. Borrillo-Hutter, S.A. White, and J. Chorover. Phytostabilization of the Iron King Mine Tailings Superfund Site, Dewey-Humboldt, AZ.
- Ramirez, M.D., L. Butler, R.M. Maier, E. Betterton, and A.J. Gandolfi. Creating partnerships with agencies to improve cleanup at the Iron King Mine and Humboldt Smelter Superfund site, Humboldt, Arizona

The following were presented at the 6th International Phytotechnology Conference, St. Louis, Missouri. Dec. 2-4.

- Solis-Dominguez, F.A., A. Valentin-Vargas, A. Legatzki and R.M. Maier. Influence of inoculated arbuscular mycorrhizal fungi on mesquite (*Prosopis juliflora*) rhizosphere microbial community structure in acidic desert mine tailings.
- Solis-Dominguez, F.A., J.A. Rivera Castelo, T. Borrillo-Hutter, S.A. White, J. Chorover, and R.M. Maier. Native desert plants suitable for the phytostabilization of the Iron King Mine Tailings Superfund Site, Dewey-Humboldt, Arizona, USA.
- Solis-Dominguez, F.A. and R.M. Maier. *Prosopis juliflora* and mycorrhizal fungi to revegetate arid acidic, metalliferous desert mine tailings.

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- Gerba, C.P. The role of fomites in disease transmission. Conference held by the Committee on Transportation, National Academy of Sciences on "Disease Transmission in Aircraft". Washington, DC, Sept. 17-18.
- Gerba, C.P. Microbial risk assessment tool for land application of biosolids. Biosolids Basics: Biosolids Management Conference. Semiahmoo, WA, Sept. 20-22.
- Gerba, C.P. Control of MRSA and other environmental pathogens in health care facilities. Amer. Soc. for Health and Environmental Services Annual Meeting. Reno, NV, Sept. 25.
- Gerba, C.P. Infection control in the 21<sup>st</sup> Century. California Dental Association. Sacramento, CA, Sept. 28.
- Gerba, C.P. Hygiene in the 21<sup>st</sup> Century. TEDx Phoenix. Phoenix, AZ, Nov. 6.
- Gerba, C.P. Microbiology – a look at what's bugging you. Annual Meeting of the International Pool and Spa Institute. Las Vegas, NV, Nov. 14.
- Hayes, S. M.; Chorover, J. The applications of synchrotron microprobe to the study of contaminant metal speciation in arid mine tailings and estuary sediments. SSRL/LCLS User Meeting. Oct. 21.
- Hernandez Ruiz S., L. Abrell, S. Wickramasekara, J. Chorover. Evaluation of chemical interactions between dissolved organic matter and model EDC/PPCPs.

- American Chemical Society, 65th Southwest Regional Meeting. El Paso, TX Nov. 5.
- Maier, R.M. Reclamation of mine tailings in the desert Southwest. Lowell Institute for Mineral Resources, University of Arizona, Tucson, AZ, Oct. 16.
- Maier, R.M. Microbial diversity in Kartchner Caverns. 10<sup>th</sup> Anniversary Celebration of Kartchner Caverns State Park, Benson, AZ, Nov. 7.
- Pepper, I. Microbial Risk Assessment of Land Application of Biosolids versus Animal Manures. 14th European Biosolids and Organic Resources Conference. The Royal Armouries, Leeds, UK, Nov. 9-11.
- Renning, C. Love hurts: holding hands with copper. North Carolina A & T State University. Greensboro, NC, Oct. 7.
- Rock, C. Seasonal Reclaimed Water Quality Assessment of Nutrient, Chemical and Biological Variability. Annual Water Reuse Symposium. Seattle, WA, Sept. 13-16.
- Rock, C. Water Quality 101 and Watershed Implementation Plans. Master Watershed Stewards. Safford, Sept. 23.
- Rock, C. Water Quality – Pathogens and Nutrient Loading. – Master Watershed Stewards. Payson, Sept. 24.
- Rock, C. Volunteer Training in Stream Water Quality Monitoring. Master Watershed Stewards. Phoenix, Sept. 29 and Payson, Oct. 1.
- Rock, C. Reclaimed Water Quality: Assessment of Nutrient, Chemical and Biological Variability. ABE Dept. Seminar. Tucson, Oct. 12.
- Rock, C. Volunteer Training in Stream Water Quality Monitoring. Gila Watershed Partnership. Duncan, Oct 13.
- Rock, C. Hands-on activities included Strawberry DNA Extraction and GloGerm. Maricopa Agricultural Center Farm Day. Maricopa, Oct. 24.
- Rock, C. Survey of Public Perceptions Regarding Water Reuse in Arizona: Challenges and Opportunities" Pima Association of Governments (PAG). Tucson, Oct. 26.
- Silvertooth, J.C. Factores de agronomía para el desarrollo de sistemas de producción de cultivos sostenibles en regiones áridas. Simposium Internacional de Agricultura Ecológica. Cd Obregón, Sonora, México, Sept. 29-30.
- Silvertooth, J.C. Recuperación de suelos y/o sustratos afectados por factores inductores de estrés en los cultivos and Efectos de la fertilización sobre el medio ambiente y la calidad de los alimentos and Nuevas técnicas de Laboratorio para determinar el estatus nutricional en plantas. Simposio Internacional Nutrición Vegetal. Guadalajara, Jalisco, México, Oct. 6-9.
- Silvertooth, J.C. Principios para el manejo de nutrientes en esparrago de riego. Conferencias sobre el Cultivo de Esparrago. Mexcali, Mexico, Oct. 16.
- Silvertooth, J.C. Desarrollo de sistemas de producción de cultivos sustentables en regiones aridas y semiáridas. XII Congreso Internacional en Ciencias Agrícolas. Mexicali, Mexico, Oct. 29-30.
- Zapka C. A., S. Maxwell and C. P. Gerba. Open refillable bulk soap dispensers in public restrooms. Annual Meeting American Public Health Association. Philadelphia, PA, Nov. 11.