



SWES SOUNDS

THE UNIVERSITY OF
ARIZONA
COLLEGE OF AGRICULTURE
AND LIFE SCIENCES

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

February/March/April 2010

<http://ag.arizona.edu/SWES>

Tucson, AZ 85721

TONES FROM THE TOOTH

There are several key features that serve to define an academic department's identity. The composition of the faculty, their expertise, and the nature and focal areas of their research programs are certainly important. However, one very clear and definitive element for an academic unit is that of the curriculum and the degree programs that are provided by the department. In the case of the SWES Department we are very proud of our academic programs at both the undergraduate and graduate levels.



The SWES Department provides the Environmental Science (ENVS) B.S. degree program at the University of Arizona. This is an excellent undergraduate degree program with a solid science foundation and focal areas that address several critical subjects in environmental science. The SWES Department had the foresight to develop the ENVS program in the 1990's, and it has experienced significant growth over the past 15 years and several areas of change and modification. The life of any curriculum is an evolutionary process while maintaining a thematic line of focus and development.

As the ENVS program continues to grow and develop it is important to return to the thematic foundation and the context in which a very broad area of study such as environmental science is being addressed and delivered. In review of the ENVS degree in the SWES Department it is clear that a strong science base with appropriate applications is essential. In the context of this degree program emanating from a department of Soil, Water and Environmental Science that now exists in the School of Earth and Environmental Science, it is worthy to consider the value of ensuring all ENVS students a foundation in the fundamentals of the earth and environmental sciences with the exposure of at least one course each in geology, hydrology, soil science, atmospheric science, and ecology. Providing this primary core in the earth and environmental sciences uniformly to all ENVS students would help strengthen the fundamental skills and knowledge base necessary to develop life-long careers in this broad arena while still allowing them to develop strengths and areas of focus.

Jeffrey C. Silvertooth, Department Head

DEPARTMENT NEWS:

James Riley is this year's recipient of the Provost's General Education Teaching Award. Congratulations to Jim for his outstanding contributions to the SWES Department, CALS, and the General Education program on campus. This is very well deserved recognition of his commitment to quality teaching.



Allan Matthias participated in the NSF Graduate Research Fellowship Panel meeting in Arlington, VA March 5-7.

Ian Pepper chaired an external review team that evaluated the UC-Riverside Undergraduate Program in Environmental Science, Feb 28-March 2. Other members of the team were Linda Lee, Purdue University and Paul Sabatier, UC-Davis.

Ian Pepper has been appointed to a 3 year term as liaison between the American Society of America (ASA) and the American Association for the Advancement of Science Society (AAAS) by ASA President Francis Pierce to develop and enhance interactions between the two societies.

Ian Pepper (Chair) and Chuck Gerba will participate on a American Society for Microbiology Public Affairs sub-committee charged with the production of a publication concerning "What we know, what we don't know, and what we need to know about land application of organic residuals including biosolids and animal manures". Other committee members are Gary King, Univ. Maine; Sally Brown, Univ. Wash; and George O'Connor, Univ. Florida.

Martin Yoklic's work on "Evaluation of RO Concentrate Management Using Halophytes" has been featured as a UA Project Sage special report: <http://uanews.org/node/27041>

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Congratulations to:

Kelsey

working with **Ty Ferre** and **Markus**

Tuller on methods for detection of salt/freshwater interfaces for groundwater management in coastal areas was recognized with 7 awards/honors at the recent Southern Arizona Regional Science and Engineering Fair (SARSEF): UA Water Sustainability, 1st Place; Arizona Hydrological Society, 1st Place; SARSEF SciEnTeK-12 Foundation, 2nd Place; US Navy, 3rd Place; Wallace Foundation Scholarship; Invitation to present at the 3rd Internatl. Sustainable World Project Olympiad (Houston, TX, April 14-19); and Invitation to present at the Stockholm World Water Week (Sept. 5-11). Kelsey also presented her project at the 20th Annual El Dia Del Agua Student Symposium at The Arizona Historical Society Museum on March 31.

Jaime Banuelos was awarded the Marriott Golf Scholarship in the amount of \$2000.

Oscar H. Torres Urquidy was awarded the Institute of the Environment Graduate Travel Award and the Jane Bohner Student Scholarship from the Arizona Student Union.

FROM THE SWES BUSINESS OFFICE

Employees who participate in the Arizona State Retirement System (ASRS) will see more money coming out of their paychecks for retirement beginning July 1. The ASRS Board of Trustees has approved a 9.85 contribution rate for the ASRS Defined Benefit Plan, up from the current contribution rate of 9.4 percent. The change, blamed on the struggling economy, will affect about 71% of retirement-eligible employees at UA.

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SWES REPORT CARD:

GRANTS:

Chorover, J., Detection and Quantification of EDC/PPCPs in Source Waters Containing Dissolved and Colloidal Organic Matter. Water Research Foundation. \$356,214.

Crimmins, M., D. Ferguson, W. van Leeuwen, and B. Orr. Assessing and supporting drought monitoring needs on the Hopi and Navajo Nations. NOAA Sectoral Applications Research Program. \$253,121.

Fitzsimmons, K. and **D.B. Walker**, Coordination of Multi-agency Efforts to Control Quagga Mussels and other ANS in the Lower Colorado River Basin. USFWS. \$15,000.

Fitzsimmons K., Farmer to Farmer - Aquaculture Niche Program. US-Agency for International Development. \$100,000.

Rensing, C. Effectiveness of copper surfaces for disinfection of *Clostridium difficile* spores. International Copper Association. \$50,000.

Yoklic, M., E. Glenn and **J. Riley**. Long-term, Evaluation of RO concentrate Management Using Halophytes. US Bureau of Reclamation. \$65,000.

The UA Superfund Research Program "Hazardous Waste Risk and Remediation in the Southwest" was renewed for years 21-26 on April 1. Participants from SWES include **Raina Maier** (Associate Director), **Mark Brusseau**, and **Jon Chorover**. National Institute for Environmental Health Science, NIH, \$13,952,000.

PUBLICATIONS:

Allen, G., S. Fielder, **K. Fitzsimmons**, S. Applebaum, and S. Raizada. 2009. Chapter 36. Inland saline aquaculture. pp. 1119-1147. In: Burnell, G. and Allen, G. (eds). *New Technologies in Aquaculture*. CRC Press and Woodhead Publishing.

Coleman, J.J., S.D. Rounsley, M. Rodriguez-Carres, A. Kuo, C.C. Wasmann, J. Grimwood, J. Schmutz, M. Taga, G.J. White, S. Zhou, D.C. Schwartz, M. Freitag, L.J. Ma, E.G. Danchin, B. Henrissat, P.M. Coutinho, D.R. Nelson, D. Straney, C.A. Napoli, B.M. Barker, M. Gribskov, M. Rep, S. Kroken, I. Molnár, **C. Rensing**, J.C. Kennell, J. Zamora, M.L. Farman, E. U. Selker, A. Salamov, H. Shapir, J. Pangilinan, E. Lindquist, C. Lamers, I.V. Grigoriev, D.M. Geiser, Covert SF, E. Temporini, H.D. Vanetten. 2009. The genome of *Nectria haematococca*: contribution of supernumerary chromosomes to gene expansion. *PLoS Genet*. 2009 Aug;5(8):e1000618.

Iassonov, P., and **M. Tuller**. 2010. Application of Image Segmentation for Correction of Intensity Bias in X-Ray CT Images. *Vadose Zone J*. 9:1 5 doi:10.2136/vzj2009.0042.

Kim, E.H., **C. Rensing**, and M.M. McEvoy. 2010. Chaperone-mediated copper handling in the periplasm. *Nat. Prod. Rep*. DOI: 10.1039/b906681k.

Maier, R.M., M.W. Palmer, G.L. Andersen, M.J. Halonen, **K.C. Josephson**, R.S. Maier, F.D. Martinez, **J.W. Neilson**, D.A. Stern, D. Vercelli, and A.L. Wright. 2010. The bacterial community in household dust: environmental determinants and impact on childhood asthma. *Appl. Environ. Microbiol*. 76: 2663-2667.

San José Martínez, F., M.A. Martín, F.J. Caniego, **M. Tuller**, A. Guber, Y. Pachepsky, and C. García-Gutiérrez. 2010. Multifractal analysis of discretized X-ray CT images for the characterization of soil macropore structures. *Geoderma*, 156(1-2) doi:10.1016/j.geoderma.2010.01.004.

Silvertooth, J.C. 2009. Fertilization. *Farming Outlook*, Sept 17-26.

Stevenson, K. and **K. Fitzsimmons**. 2010. Integration of aquaculture and arid lands agriculture for water reuse and reduced fertilizer dependency. *Exper. Agricul.* 46:1-18.

Zachritz, W., A. Hanson, J. Saucedo, and **K. Fitzsimmons**. 2009. Application of submerged surface flow constructed wetlands in a recirculating tilapia production system. *Aquacultural Engineer*. 39(1):16-23

Zaimes, G. and **M.A. Crimmins**. 2010. Riparian Areas of the Southwest: Learning from Repeat Photographs. *J. Natural Res. Life Sci.s Education*. 39:63-69.

Zerzghi, H., C.P. Gerba, J.P. Brooks and I.L. Pepper. 2010. Long-Term Effects of Land Application of Class B Biosolids on the Soil Microbial Populations, Pathogens, and Activity. *J. Environ. Qual.* 39:402-408.

Zerzghi, H., C.P. Gerba and I.L. Pepper. 2010. Long-term Effects of Land Application of Class B Biosolids on Soil Chemical Properties. *J. Res. Sci. Technol.* 7: 51-61.

PRESENTATIONS:

Jon Chorover received an award from the Society of Environmental Toxicology and Chemistry (SETAC) which allowed three research team members to present their research at the North America 30th Annual SETAC Meeting in New Orleans, Nov. 19-23, 2009:

Effects of dissolved and colloidal organic matter on quantification of EDCs in water samples by tandem mass spectrometry.

Development of methodologies to extract and detect trace levels of EDCs and PPCPs in watersheds in the presence of Dissolved Organic Matter (DOM).

Interaction of Model EDC/PPCPs with Dissolved Organic Matter.

EARTH WEEK 2010:

The following were presented at the 20th Annual El Dia Del Agua Student Symposium:

Poster Session

M.L. Brusseau et. al. Experimental investigation of long-term removal of trichloroethene from various porous media.

E. Glenn, and M.L. Brusseau. et al. Pilot tests of enhanced denitrification using ethanol.

M.L. Brusseau et. al. Transport of titanium oxide nanoparticles in sand.

E. Glenn et. al. Scaling sap flow over wide areas using high-resolution aerial multi-scale digital imaging, leaf area index (LAI) and MODIS satellite imagery in saltcedar stands in the lower colorado river.

Oral Presentation

M.L. Brusseau et. al. Measurement and estimation of organic-liquid/water interfacial areas for several natural porous media.

The following were presented at GeoDaze: 38th Annual Geosciences Symposium:

Posters

R.M. Maier et. al. Influence of inoculated arbuscular mycorrhizal fungi on *Prosopis juliflora* (mesquite) rhizosphere microbial community structure in acidic desert mine tailings.

J. Chorover et. al. Use of instrumented plant-soil columns to analyze the efficacy of mine tailings phytostabilization.

R.M. Maier et. al. Culturable fungal diversity from speleothem surfaces in Kartchner Caverns, Benson, Arizona.

R.M. Maier et. al. Intra- and inter-speleothem variability of bacterial communities in Kartchner Caverns

M. Schaap et. al. Measuring and modeling in hydrodynamics in crushed basalt in support of constructed hillslopes in Biosphere 2.

Oral Presentation

C. Rasmussen et. al. and N. Starman. Predictive soil mapping in Arizona's Basin and Range.

R.M. Maier et. al. Characterization of bacteria present on a calcite speleothem in Kartchner Caverns. UA UBRP Conf., Jan. 23.

Fitzsimmons, K., Malaysian Farmers Day - Tilapia - Kuala Lumpur, Malaysia, Nov. 5, 2009

Fitzsimmons, K. Tilapia advances and set-backs: 2008 in review, 2010 in preview - Nanning, China Nov. 8, 2009

Fitzsimmons, K. Overview of University of Arizona - College of Agriculture and Life Sciences, Chinese Academy of Agricultural Sciences, Beijing, China, Nov. 13, 2009.

Fitzsimmons, K. Comparison of tilapia industry between Eastern Asia and Latin America, Guatemala City, Guatemala, Dec. 3, 2009.

Fitzsimmons, K., Tilapia for the South Pacific - Keynote address, Noumea, New Caledonia, Dec. 10, 2009.

A. Huete et. al. Evaluation of uncertainties of MODIS VI products using the AERONET-based Surface Reflectance Validation Network dataset. Progress In Electromagnetics Research Symposium, Xi'an, China, March 22-26.

A. Huete et. al. Linearization of NDVI based on its relationship with vegetation fraction. Progress In Electromagnetics Research Symposium, Xi'an, China, March 22-26.

M. Tuller et. al. 2009. Exploring Soil Properties through Electromagnetic Sensor-Based Complex Dielectric Permittivity. Eos Trans. AGU, 90(52), Fall Meet. Suppl., Abstract H33A-0847.

Neilson, J.W. and **R.M. Maier.** The search for life in the driest desert on earth - the Atacama Desert, Chile. B2 Institute Lecture Series "Let's Talk Science!", Biosphere 2, AZ, Feb. 13.

Pepper I. L., Global Research Needs on Potable Water Distribution Systems: Studies at The University of Arizona Water Village. University of Adelaide, March 15.

M. Tuller et. al. Numerical evaluation of heat pulse technology for estimation of evaporation rates from a subsurface drying front. Eos Trans. AGU, 90(52), Fall Meet. 2009, Suppl., Abstract H33A-0848.

E. Glenn, M. Yoklic et. al. The Use of RO Concentrate for Agricultural Production of the Halophyte, *Atriplex lentiformis*. Multi-State Salinity Conference. Las Vegas, NV, Feb. 17-19.

Silvertooth, J.C. Evaluation of Mepiquat Chloride Management in Irrigated Cotton. Beltwide Cotton Conferences. New Orleans, LA, Jan 6.

Silvertooth, J.C. Crop Management under Scenarios of Reduced Water Availability. Farmer's Days. Safford, AZ, Feb. 17.

Silvertooth, J.C. Crop and Weed Management for Maximum Crop Yields and Water Efficiency. Early Season Crop and Weed Management Workshop. La Paz County, Feb. 24.

Silvertooth, J.C. Water Stress and Plant Nutrition. Western Plant Health Association. El Centro, CA, Feb. 24.

Silvertooth, J.C. Improving Crop Nutrient Management Efficiency. Southwest Ag Summit. Yuma, AZ, March 11.

Tuller, M., and Th. Gebrenegus. 2009. Polypropylene Fiber Amendments to Alleviate Initiation and Evolution of Desiccation Cracks in Bentonite Liners. Eos Trans. AGU, 90(52), Fall Meet. Suppl., Abstract H23F-1029.

Vaz, C.M.P., P.R.O. Lasso, I.C. de Maria, **P. Iassonov**, and **M. Tuller**, 2009. Application of a Benchtop MicroCT Scanner to Determine Soil Pore Size and Aggregate Distributions at Different Scales and Resolutions. Eos Trans. AGU, 90(52), Fall Meet. Suppl., Abstract H23F-1031.

R.M. Maier et. al. The search for a flavolipid-negative *Flavobacterium* sp. MTN11 mutant. UA UBPR Conference, Jan. 23.

Walworth, J.L. keynote speaker at the International Conference on Management of Soil and Groundwater Salinization in Arid Regions, held at the Sultan Qaboos University, Muscat, Oman, January 11-14.

J. Chorover et. al. Detection and quantification of EDC/PPCPs in source waters containing dissolved and colloidal organic matter. 2nd International Conference on Occurrence, Fate, Effects, and Analysis of Emerging Contaminants in the Environment, Colorado State University, Fort Collins, CO, Aug. 4-7, 2009.

R.M. Maier et. al. Home microbial communities as risk and protective factors for childhood asthma. UA Arizona Respiratory Center, Feb. 25.

PLANE TALK

Ian Pepper, Director

The Real-Time Sensor Lab within the Water Village continues to grow in size and complexity. We are acquiring (courtesy of Tucson Water) a \$50K in-line water toxicity sensor. This sensor detects toxicity due to contaminants by measuring the light emitted from *Vibrio fischeri*. In essence the light output decreases as toxicity increases. This sensor will ultimately have potential for use in the CAP canal. We have also purchased a data logger to interpret multiple sensor signals simultaneously using event monitoring algorithms like CANARY (developed by EPA and Sandia National laboratories). In essence this provides us with a SCADA system (Supervisory Control and Data Acquisition) that can detect contamination events while decreasing the incidence of false alarms. Finally, we are remodeling and enhancing the interior appearance of the whole lab. We have been told by visitors that the lab is the equal of any such facility anywhere worldwide. Hence we not only want it to be good—we want it to look good.