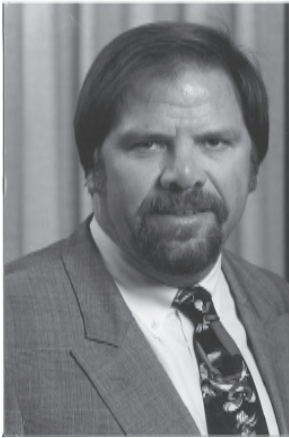




DIRECTOR'S CHAIR

Robert C. Knox



Dear Friends:

It is my pleasure to provide this annual report for the School of Civil Engineering and Environmental Science. Once again, the talented CEES faculty led the College of Engineering in almost every category of productivity. Our external research expenditures exceeded \$4.3 million last year, which equates

to more than \$211,000 per faculty member. In Calendar Year 2009, CEES faculty published 44 refereed journal articles or book chapters. This equates to an average of 2.31 refereed journal publications per faculty. Also in CY2009, CEES faculty publications were cited 871 times in the refereed literature, which equates to an average of 44 citations per faculty member. Almost all of these productivity metrics equal or exceed those of our peer institutions in the Big 12.

As with every issue of *Communiqué*, I take great pride in listing this year's award recipients, and this year CEES garnered a much-coveted national award. Assistant professor Amy Cerato became the first person from the University of Oklahoma ever to be named a recipient of the Presidential Early Career Award for Science and Engineering. Read more about Amy's prestigious PECASE award starting on page 4.

I am pleased to announce Chris Cope as yet another National Science Foundation Graduate Fellowship recipient. Chris is part of the WaTER

Center research team. As you will see, CEES has been very busy this past year with the OU International Water Conference (p. 5), Professor David Sabatini's Presidential Dream Course (p. 6), and international work in Cambodia and Ethiopia (p. 13). Also, the OU student chapter of Engineers Without Borders hosted a regional workshop (p. 6). CEES and the WaTER Center are rapidly becoming international leaders in the efforts to provide safe drinking water to emerging regions around the world.

CEES has one of the larger geotechnical engineering faculty groups in the nation. These talented faculty members have been making names for themselves with state-of-the-art-research on earthquake engineering. Obviously, world events lately have been filled with tragic news of the devastation that can be wrought by earthquakes. CEES researchers are studying ways to build earthquake-resistant structures. I encourage you to read the article on page 8 describing how centrifuges can be used to study soil-structure interactions during an earthquake.

Once again, I invite you to stay in touch with CEES. We would love to hear from our devoted alumni and friends.

Robert C. Knox, Ph.D., P.E.
Ted A. Kritikos Chair, Presidential Professor, Director
School of Civil Engineering and Environmental Science

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SCHOOL NEWS

CEES to Host 2010 Mid-Continent Region American Society of Civil Engineers Conference

CEES will host the 2010 ASCE Mid-Continent Region Conference on Thursday, April 23, and Friday, April 24. Approximately 300 students from 14 universities in Oklahoma, Kansas, Arkansas, Nebraska, Missouri and Illinois will descend on Norman to compete in the following events:

- ASCE Concrete Canoe competition
- American Institute of Steel Construction Steel Bridge competition
- GeoChallenge competition, with a \$1,000 scholarship for best paper
- Technical Paper and Presentation competition, with \$3,000 in scholarships for best undergraduate paper in structural, geotechnical and environmental design



Front to Back: Captain Michaela Campbell, Amy Hufnagel and Shannon Jenkins paddle in the Women's Endurance Race.

All events will be held on Friday, April 23 with the exception of the Concrete Canoe competition, which runs both Friday and Saturday. On Friday, the Steel Bridge Competition will be held in Howard T. McCasland Field House, while the Concrete Canoe, GeoChallenge and Technical Paper

competitions will be held in the new Devon Energy Center and the Rawl Engineering Practice Facility. On Saturday, the concrete canoe races will be held on the Oklahoma River in Regatta Park in Oklahoma City, adjacent to the Olympic Training Facility. The conference will end with a banquet and awards ceremony Saturday evening at the Sam Noble Oklahoma Museum of Natural History on the Norman campus.

As host, CEES is responsible for organizing the conference, which includes renting venues, funding scholarship awards, supplying competition T-shirts and feeding the thundering hoard. To help minimize the financial impact, the competition is being held over a period of two days instead of three. This reduces the cost by approximately 1000 meals and two venues. Needless to say, any help our alumni and friends can provide would be greatly appreciated. Volunteers for judging and staff also are needed and appreciated. A volunteers and donors form is provided on the back of this page. If you have questions, feel free to contact assistant professor Chris Ramseyer at ramseyer@ou.edu or Audre Carter at audre@ou.edu or (405) 325-4216. The schedule of events can be found at www.cees.ou.edu. We look forward to seeing you in April!

ASCE Needs Sponsors and Volunteers 2010 Mid-Continent Student Conference

April 23-24, 2010

Norman, Okla.

As you can imagine, hosting a regional competition will require a lot of time, effort and money. Our student chapter is a not for profit organization and we need your help! We are responsible for 100 percent of the costs for this event. Your contribution will help cover costs for facilities, volunteer judges, meals, the award banquet and competitions.

Please check one or more.

- ☐ Platinum Level Sponsor (\$2000 and over) ☐ Gold Level Sponsor (\$1000 - \$1999)
- ☐ Silver Level Sponsor (\$500 - \$999) ☐ Bronze Level Sponsor (\$10 - \$499)
- ☐ Team Supporter (Donations will be designated for OU teams) - \$_____

Name or Company Name: (as you would like it to appear on promotional materials):

Contact: (name, address, phone number, fax number and e-mail address)

Web site Address: _____

Please make check payable to The University of Oklahoma Foundation. Please send sponsorship registration and tax deductible gift to:

University of Oklahoma
CEES
Attn: Audre Carter
202 W. Boyd St., Room 334
Norman, Okla. 73019-1024

Please forward copy of logo to: audre@ou.edu or mfsmith@ou.edu

If you would like to volunteer during the conference on Friday, April 23 and/or Saturday, April 24, please e-mail Audre Carter at audre@ou.edu or Molly Smith at mfsmith@ou.edu with your availability.

Amy Cerato Receives PECASE Award

Assistant professor Amy B. Cerato received the Presidential Early Career Award for Scientists and Engineers, the nation's highest honor for scientists and engineers in the early stages of their careers. One of the 100 beginning researchers to receive the award in 2009, Cerato was the only civil engineer selected and the second geotechnical engineer to receive the award since 1996. She is the first PECASE recipient for the University of Oklahoma.

President Barack Obama stated in a press release, "These extraordinarily gifted young scientists and engineers represent the best in our country. With their talent, creativity and dedication, I am confident that they will lead their fields in new breakthroughs and discoveries and help us use science and technology to lift up our nation and our world."

When she moved to Oklahoma in 2005 to begin her academic career at OU and was cautioned to avoid expansive soils when choosing a house, Cerato's curiosity took over. She began studying soils, trying to determine how to predict the effects of changes in weather on expansive soils. In 2007, she sent a proposal to the National Science Foundation and was awarded \$400,000 to continue her research.

"I wanted to be able to tell homeowners, contractors, department of transportation workers and anyone that builds any structure how to build foundations when you have expansive soils," said Cerato. "This is the most costly hazard in the U.S. It's not on people's radars because it doesn't happen suddenly, but it's a big draw on the tax base." Repairing infrastructure built on expansive soils costs the U.S. government more than it spends on damage caused by tornadoes, hurricanes, earthquakes and floods.



Assistant professor Amy Cerato

"Amy Cerato is highly regarded by her students and faculty peers," said Thomas L. Landers, dean of the OU College of Engineering, in a press release. "National recognition was sure to follow suit. We are very proud of her accomplishments and grateful for the recognition she brings to our engineering college."

"I knew we had someone special when we were recruiting her to come here," said Robert C. Knox, director of CEES. "However, raw talent is just part of the equation. Amy has worked extremely hard and is most deserving of this recognition."

Inaugural OU International WaTER Conference and Water Prize Award Ceremony

The OU Water Technologies for Emerging Regions Center, led by CEES faculty members David Sabatini, Randall Kolar, Robert Nairn and Robert Knox, and ably assisted by staff member Molly Smith, hosted the inaugural OU International WaTER Conference on Oct. 26 through 28, 2009. The conference theme “bringing water and sanitation to remote villages in developing countries” attracted 170 participants from 21 states and 21 countries on six continents, who reported on work conducted in 35 different countries. The conference included two days of oral and poster presentations, plus one half-day workshop demonstrating drilling techniques and pump technologies for remote villages.

Coincident with the conference, Oklahoma Gov. Brad Henry declared October “OU International Water Awareness Month.” The governor’s proclamation acknowledged OU’s



L-R: Luby and Sabatini

During the conference, the first University of Oklahoma International Water Prize was awarded to Dr. Stephen Luby, program head of Infectious Diseases and Vaccine Services at the International Centre for Diarrheal Disease Research in Bangladesh. The award honors Luby’s 20-plus-year career researching public health, water, sanitation and communicable disease epidemiology in low-income countries.

This is the first prize specifically dedicated to the field of water supply and sanitation in remote areas of emerging nations.

“I am both humbled and honored to be the first recipient of the OU International Water Prize,” Luby said. “I accept this honor on behalf of all the researchers and scientists and doctors and journalists worldwide who are working to solve global

water problems. It’s my hope that over time, a prize of this stature will help bring increased attention and interest to the issues, needs and concerns related to water and sanitation in low-income countries.”



L – R: Kolar, Nairn, Luby, Landers, Sabatini and Knox with OU Water Prize

multidisciplinary approach to providing permanent solutions to water problems through global educational leadership, organizational expertise, innovative research and on-location projects.

Sabatini Teaches Presidential Dream Course on WaTER

Professor David Sabatini received a Presidential Dream Course award for the fall 2009 semester. Begun in 2004-2005 by OU President David L. Boren, the dream course program provides funds to enhance undergraduate courses by hosting four to five international experts to interact with students and give a public lecture.

Courses receiving particular consideration for participation in the program are those covering important topics of concern to citizens in the 21st century. Sabatini's course, taught through the Honors College, was titled "Water for Health, Education, Development and Peace," and focused on the Bottom Billion – those in emerging regions who live on less than \$1 per day. The honors course, limited to an enrollment of 19, brought together students from all across campus, including engineering, geology, history, meteorology, international security and international business.

Beginning in October and running through November 2009, Sabatini's 19 undergraduate students met with a series of experts in the fields of water and sanitation in developing countries. Following is a list of fall 2009 speakers and their presentation titles.

Christine Moe, School of Public Health, Emory University. "Glittering Bathrooms That Fit Your Pocket: Water, Sanitation and Health for Remote Areas in the 21st Century"

Dr. Stephen Luby, International Centre for Diarrheal Disease Research. "Frontline of the Global Water Crisis: Efforts to Secure Safe Water in High Need Rural Communities"

Derek Chitwood, Partners in Hope. "Drinking Water Issues and Proposed Solutions for Indigenous Peoples in Mountainous Southwest China"

Henock Gezahegn, PSI/Ethiopia. "Mixes That Heal the Water"

Thomas Clasen, London School of Hygiene and Tropical Medicine. "Household Water Treatment in Low-Income Settings: Effectiveness, Experience and Issues in Scaling Up"

Due to scheduling conflicts, the final speaker, Greg Mortenson, will appear April 22 on the Norman campus, serving as a Dream Course expert and a keynote speaker for the College of Engineering Centennial celebration. Mortenson, director of the Central Asia Institute is the co-author of the *New York Times* bestseller, *Three Cups of Tea*, and more recently, *Stones Into Schools*.

The students also presented posters at the first OU International WaTER Conference (see separate article in this issue), which allowed them to interact with experts from around the world. The timely subject, the interdisciplinary student body and the opportunity to interact with a wide range of international experts made this a truly exciting opportunity for the students.

OU Engineers Without Borders Chapter Co-Hosts Fall EWB Workshop

The OU student chapter of Engineers Without Borders and the EWB Central Oklahoma Professional Chapter co-hosted the fall 2009 EWB South Central Chapter Workshop in Norman in early October 2009. Fifty participants, representing 13 chapters and the EWB national office, attended the one-and-a-half-day workshop that was designed to provide a venue for networking, as well as classroom-style lectures and hands-on practical experience.

Updates on project process and health and safety were provided by representatives of the EWB national office. Other topics included public relations and media, principles of sanitation, principles of water treatment, and seismic structural design.



OU Engineers Without Borders chapter members and workshop coordinators

Back row L-R: Jesse Berdis, Jennifer Ma, Nicole Rowlette, Diana Lucero, Joseph Keeling.

Front row L-R: Daniel Simmons, Jason Kilpatrick, Kyle Olson

Hands-on demonstrations in field mixing and pouring concrete, and working with PVC and hand-operated drilling rigs, were held at the Fears Structural Engineering Laboratory and were a big success with all participants. Billy Crynes, Dean Emeritus of the College of Engineering, entertained the participants at the banquet with a presentation titled "Far and Wide: Outhouses Around the World."

Sponsorship of the workshop was generously provided by CDM, PBS&J Inc., the EWB Central Oklahoma Professional Chapter, CH2M Hill, Ideal Homes, BP and CEES.

Christopher Cope Receives NSF Fellowship

In May 2009, Christopher O. Cope was awarded a National Science Foundation Graduate Research Fellowship. Cope currently is pursuing a master's degree in civil engineering as a part of OU's Water Technologies for Emerging Regions Center. The NSF fellowship provides three years of funding and a stipend for graduate-level research and academic study.

"It is a great honor to receive this fellowship. I think it speaks highly of the quality of faculty, staff and research at the University of Oklahoma, in the WaTER Center, in the

College of Engineering and in the School of Civil Engineering and Environmental Science," Cope said.

Cope's research focuses on two regions of the world, Cambodia and Brazil. His work in Cambodia focuses on using locally available and inexpensive materials to remove naturally occurring arsenic from subsurface drinking water. In Brazil, Cope is helping start a non-governmental organization to bring clean water and sanitation to the remotest villages of the Amazon and develop an implementation model for future work in other regions of the world.

Cope grew up in Texas, Florida and Kansas before coming to the University of Oklahoma in 1998 to pursue a bachelor of science degree in petroleum engineering. During his senior year, Cope participated in an independent study with CEES professor and WaTER Center director David Sabatini, focusing on low-tech water well drilling and water purification systems for developing countries. When he heard about the newly formed WaTER Center in 2007, he applied for graduate school and returned for continued studies in 2008. After his time at OU, Cope desires to work internationally using his "talents and skills to help bring safe water and sanitation to those who need it most."



Cope with children at a village school in Cambodia, where he collaborated with others to build a rainwater harvester and conduct water, sanitation, health and hygiene courses.

Whole Lot of Shaking Is Going On in Oklahoma



Earthquakes have been in the news lately. All of us witnessed the horrific and tragic scenes following the Jan. 12, 2010, earthquake in Haiti. A few days later on Jan. 15, two minor earthquakes near Jones rattled some nerves here in central Oklahoma. The energy released by the Haitian earthquake was about 30,000 times larger than the Jones earthquake, and Oklahomans didn't have to worry too much about falling bridges and buildings. What you may be surprised to learn is that CEES faculty members are conducting cutting-edge earthquake engineering research in Oklahoma to improve the performance of civil infrastructure such as bridges during earthquakes.



Liu and Price lowering a CDSM block into the centrifuge model

Professors K.K. "Muralee" Muraleetharan, Gerald A. Miller, and assistant professor Amy Cerato are part of a team of researchers who are investigating and finding ways to improve the performance of pile foundations in soft clayey soils. Pile foundations are deep foundations used to support major structures such as bridges and tall buildings that cannot be directly supported on soft soils. The piles carry the heavy superstructure loads to a firm bearing layer such as the bedrock beneath

the soft soil. Piles are typically steel tubes or reinforced concrete cylinders driven or cast-in-place into the ground before a structure is constructed. Soft clays are present in many parts of the world prone to earthquakes, including the San Francisco area and Missouri and Arkansas within the New Madrid fault zone. Because of the low strength of soft clays, large diameter piles have to be used to resist earthquake loads on structures.



Muraleetharan and Thompson driving a centrifuge model pile

Seismic design codes are being continuously updated to reflect new understanding of earthquakes and the behavior of structures during these events. When an existing bridge foundation is inadequate to resist a designed earthquake specified in the revised guidelines, expensive retrofitting often is needed to bring these structures up to code. The CEES researchers are working on using a ground improvement technique called "cement deep soil mixing," whereby the surrounding soft clayey soil is strengthened to improve performance of the pile foundations. With the CDSM technique, cement is mixed with the soil using specialized equipment; the advantage of this technique is that it is faster and cheaper to improve the soil around an existing pile foundation than to add additional piles to that foundation.

Muraleetharan is the principal investigator for this OU-led National Science Foundation-funded project, titled "NEESR-SG: Understanding and Improving the Seismic Behavior of Pile Foundations in Soft Clays." Miller is a Co-PI and the overall geotechnical lead for the project. Cerato also is a Co-PI and taking the



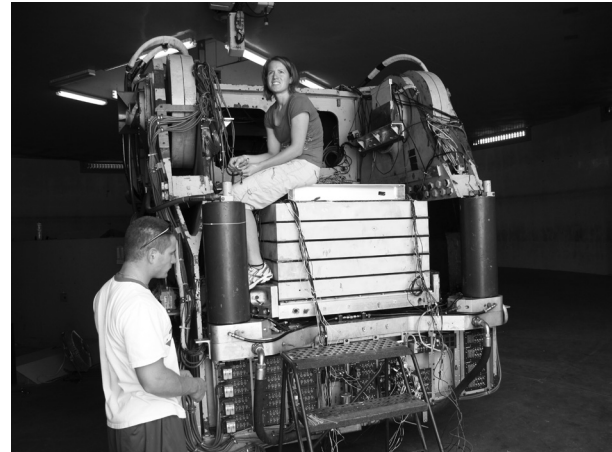
Centrifuge model is being instrumented

lead for laboratory testing and education and outreach activities. Two other universities, Iowa State University and San Jose State University, and two consulting firms in California, Earth Mechanics, Inc. and Advanced GeoSolutions, Inc., also are part of this project. This \$1.15 million, four-year project, started in October 2008, is funded through the NSF's highly competitive George E. Brown Jr. Network for Earthquake Engineering Simulation research program (<https://www.nees.org/>). NEES is a shared collection of national experimental facilities connected through a high-speed network capable of tele-observation and tele-operation (i.e., remote-controlled testing). Through research conducted using NEES facilities, NSF is aiming to revolutionize earthquake engineering research and reduce human and economic losses during major earthquakes. OU CEES researchers have named their project NEES-pilEs (piles in low E soils). The letter "E" in this play on words is the notation used to denote the Young's modulus with which all civil engineers are familiar. Soft clays have a low Young's modulus.

Muraleetharan points out that one doesn't have to live in an earthquake-prone area to do earthquake engineering research. He says, "First, it is hard to predict where the next earthquake is going to strike. Second, it is better to put the research facilities in a place that will not be knocked down in an earthquake." He thinks Oklahoma is an ideal place to do earthquake engineering research. Since real earthquakes are hard to predict, the NEES-pilEs team will conduct tests using a

geotechnical centrifuge and a portable shaker in the field. They will test a variety of different pile configurations and ground improvement extents around the piles.

The research team already has conducted its first successful centrifuge test at the University of California, Davis' NEES centrifuge testing facility. The 9-meter radius UC Davis centrifuge is the largest in the world and can spin a model weighing 5 tons at 75 g, i.e., 75 times the gravitational acceleration of the earth (1 g). The idea behind centrifuge testing is that a small physical model of a structure subjected to increased gravitational acceleration (e.g., $75\text{ g} = 736\text{ m/s}^2$ simulated via the centrifuge) will behave like a much larger structure subjected to the earth's gravitational acceleration (i.e., $1\text{ g} = 9.81\text{ m/s}^2$). For example, a structure that is 75 feet high under 1 g and a 1-foot-high small model under 75 g will behave the same. Thus, it is possible to study how real structures will behave in an earthquake by constructing and shaking (in-flight) a small model in the centrifuge



Cerato and Thompson setting up the centrifuge model on the centrifuge arm

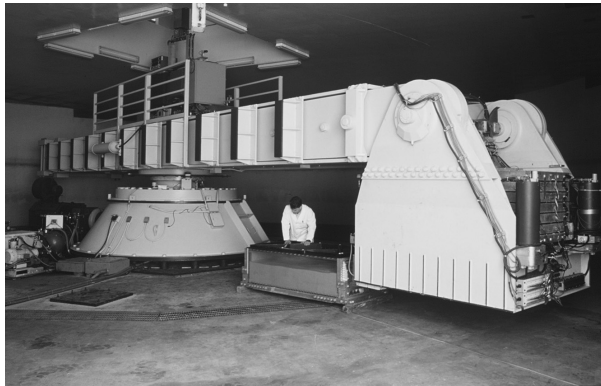
under increased simulated gravitational acceleration. This is possible for structures in soils, such as foundations, or made of soils, such as earthen dams, because the behavior of soils is controlled mostly by the stresses and stress distributions caused by the self weight of the soils.

To verify the findings from the centrifuge tests, the research team also will conduct full-scale tests of pile foundations using the University



UCLA's MK-15 Portable NEES Shaker (Courtesy NEES@UCLA)

of California, Los Angeles' NEES portable shaker that can apply up to 100 kips of load over a wide range of frequencies (0-25 Hz). The work is tentatively planned for June 2010 at a test site near Miami, Okla. Centrifuge and field test results are being used to validate a sophisticated finite element computer code,



Nine meter radius UC Davis Geotechnical Centrifuge (Courtesy UC Davis Center for Geotechnical Modeling)

TeraDysac, developed by Muraleetharan and his coworkers. Once validated, TeraDysac can be used to analyze other pile and soil configurations that were not tested.

Chunyang Liu (OU Civil Engineering 2009) is the research associate coordinating many aspects of this project. OU undergraduate students Zac Thompson and Sean Price and graduate students Juan Pinilla and Karrthik Kirupakaran all have contributed to this project. Thompson is continuing his research as a masters student at OU.

CEES Receives \$500,000 Award From Department of Education for Graduate Fellowships

In 2009, CEES received news from the U.S. Department of Education that it was selected to receive a Graduate Assistantship in Areas of National Need Award to support graduate student fellowships; this represents CEES's third award from the program since 1996. The GAANN program was created "to sustain and enhance the capacity for graduate education in areas of national need," of which engineering and environmental science have been designated "absolute priority areas." More specifically, as reported by the Department of Education, "This program provides fellowships, through academic departments and programs of Institutions of Higher Education, to assist graduate students with excellent records who demonstrate financial need and plan to pursue the highest degree available in their course study at the institution in a field designated as an area of national need." The award will provide financial support for five to six doctoral students per year for the next three to four years in CEES. The project team consists of principal investigator professor Randall Kolar, associate professor Elizabeth Butler, professors David Sabatini, Kim Mish and Robert Knox, and assistant professor Amy Cerato.

The title of the most recent award is "Doctoral Fellowships in Technologies for Sustainable Infrastructure and Environmental Systems." This general focus area refers to the processes, products and management strategies that lead to more robust, resilient, risk-free systems, emphasizing the nation's civil and environmental infrastructure. The overall goal of the program is to fully educate specialists in civil and environmental systems for the 21st century, so that they may assume leadership roles. Research projects undertaken by students will fall into one of five thematic areas in which CEES specializes: 1) infrastructure design and management; 2) sensors and intelligent systems; 3) hazard modeling and mitigation; 4) ecosystem renewal; and 5) renewable energy sources.

A distinguishing feature of the GAANN program is that it prepares the student equally well for research and teaching careers by immersing them in a structured education component in addition to the traditional research path. GAANN Fellows will participate in a subset of the following comprehensive list of educational activities:

- Attend university programs courses that focus on pedagogy
- Serve as teaching assistants for at least two semesters
- Prepare a teaching portfolio
- Participate in one of CEES's educational programs (e.g., K-12 outreach)
- Co-teach with a faculty mentor at least two semesters
- Attend discussion groups offered by OU's Program for Instructional Innovation
- Take two graduate education courses
- Attend (and hopefully present at) an educational conference, such as those offered by the American Society for Engineering Education

Thus, in contrast to other graduate programs that concentrate instruction on pedagogy into a few targeted activities, CEES's program threads educational activities throughout the graduate student's tenure, beginning in the first year.

The Department of Education is particularly interested in increasing opportunities for those from under-represented groups at the doctoral degree level. Demographic data from our two previous GAANN Awards documents that CEES is doing an excellent job in this area; 52 percent of previous CEES GAANN Fellows were female and 26 percent minorities, as compared to CEES's base doctoral degree enrollment of 29 percent female and 11 percent minorities. In fact, this success played a big role in securing funding for this third GAANN Award. For this third award, special attention will be given to recruiting Native Americans. Based on the 2000 U.S. Census, Oklahoma's Native American population was 273,230 (nearly 8 percent of the state), which ranks Oklahoma second in the U.S. in total number of Native Americans.



Russell Dutnell, current GAANN Fellow

A number of tribal infrastructure projects require considerable scientific and technological skill, e.g., degradation of natural resources on tribal lands because of historical oil, gas and mining activities. The rural character of the communities also presents unique infrastructure challenges, such as those associated with the widespread use of septic tanks. The leadership of Oklahoma's Native American communities is interested in increasing the number of students who choose technology-related careers so that they may benefit from the expert advice of those who share their system of values. However, few are pursuing advanced degrees. In fact, the most recent data shows that of the 3,900 doctorates earned in civil engineering, less than 1 percent were Native Americans.

Given this dearth of Native American doctoral students in civil engineering, CEES is particularly pleased to announce that the first student to receive a GAANN Fellowship under this new award is Russ Dutnell, a member of the Chickasaw tribe. A statement about Dutnell's research area and the value of the GAANN program to his education follows.

"I was introduced to the field of fluvial geomorphology in 1994 and have been assessing, studying and restoring streams and rivers across the country ever since. Although I have learned a lot over the years, I have found that the more I learn, the more there is to learn. To my surprise, I also have discovered that outside of the relatively small community that studies and practices FGM, there is relatively little understanding about the field among the general public or within the engineering community. Consequently, management of our natural resources and regional and city planning are happening without an understanding of the importance of natural channel form and function.

Within the FGM community, difficulty in accurately measuring sediment movement has hindered development of a deeper understanding of the sediment transport processes that form creek, stream and river channels. Recent developments in Acoustic Doppler Current Profiler technology provide a potential means for measuring sediment movement and stream discharge in a fairly simple, non-invasive manner. The GAANN Fellowship that I have been awarded is allowing me to investigate ADCP use for this purpose, as applied to the sediment transport characteristics and FGM within the Little River watershed above Lake Thunderbird. The GAANN Program is paying my tuition, providing a generous stipend, helping pay for research equipment, and providing travel funds when it comes time to present my findings. Without the GAANN Fellowship, it is unlikely that I would be undertaking this important research that I have been wishing to pursue for at least a decade.

Upon obtaining my Ph.D., I am not entirely certain what I will do, but I do know that the lack of knowledge about FGM within the general public and the engineering community needs to be addressed. Ultimately, I think I would relish the opportunity to teach FGM and research sediment movement at OU or some other university. What the future holds, of course, remains to be seen, but I believe teaching will be a part of that future, so the diverse educational activities provided by GAANN will allow me to be effective in the classroom."

CEES Faculty Develop Agreement With Grand River Dam Authority

Under a recently signed Memorandum of Understanding between OU, the Grand River Dam Authority and Oklahoma State University, OU CEES faculty members Robert Nairn, Randall Kolar and Robert Knox and their students have begun working at the new GRDA/OU/OSU Ecosystems and Education Center on the shores of Grand Lake O' the Cherokees. The new \$6 million center includes a state-of-the-art water laboratory, partially equipped by OU and OSU, which will facilitate research on ecosystem



GRDA laboratory at Grand Lake, Okla.

issues relevant to the Grand Lake watershed. The GRDA Carbon Sequestration and Ecosystems Research and Restoration Area on the Neosho River also is available for research.

The 10-year agreement provides for GRDA-funded graduate student fellowships. The GRDA Fellows will conduct stream and river ecological and biogeochemical studies, limnological studies, on-site laboratory flow through studies, watershed and lake modeling, geographic information systems, mapping and land use planning, and environmental remediation and restoration in the Tri-State Mining District. The program is open to all OU graduate students performing research in the Grand Lake watershed.

In spring 2010, the environmental science and engineering capstone class is taking advantage of this new partnership by conducting a sediment metals contamination survey in Grand Lake. Using GRDA Lake Patrol equipment, students will obtain sediment cores and analyze them in the GRDA Ecosystems and Education Center and at CEES laboratories in Norman. They will present their findings at the first GRDA Watershed Conference in April.

Drinking Water Issues in Remote Villages of Ethiopia and Cambodia

In the summer of 2009, CEES professor David Sabatini made trips to Ethiopia and Cambodia to better understand water and sanitation issues in remote villages and to lay the groundwork for collaborative research to address these issues.



Sabatini's Chulalongkorn colleague Sutha Khaodhiar, inspecting a rope pump in Cambodia.

In late May, he and doctoral student Laura Brunson attended the Water Engineering and Development Center conference in Addis Ababa, Ethiopia. After the conference, Henock Gezahegn of Population

Services International took them to rural villages struggling with not only a lack of water – Gezahegn stated that people in rural areas often travel several kilometers to fetch water many times a day – but also with fluoride levels well above the standard of 1.5 mg/L. They saw many instances of dental and skeletal fluorosis caused by fluoride concentrations as high as 10 mg/L in the drinking water. They also visited with professor Feleke Zewge at the University of Addis Ababa and discussed common research interests on simple and sustainable adsorbents for removing fluoride from water in villages where people are living on less than \$1 per day. As part of this research, they also are interested in behavior change and microenterprise efforts (the focus of PSI – www.psi.org) for dissemination of the products. They look forward to building on this very fruitful first trip to Ethiopia.

In mid-June, Sabatini traveled to Cambodia to visit Marc Hall and Andrew Shantz with Resource Development International Cambodia (www.rdic.org), a non-governmental organization located 30 kilometers outside of the capital city, Phnom Penh. In contrast to Ethiopia, Cambodia has an abundance of water, but the river water is often unsafe to drink and the ground water along the Mekong River

Valley suffers from elevated arsenic. Sabatini and his student, Chris Cope, first visited RDIC last summer. Cope has been working on incorporating iron oxide-coated media into the widely used ceramic water filters for arsenic removal. While in Cambodia, Sabatini taught in RDIC's bridge program to help top Cambodian students "bridge the gap" between their current level of academic training and English skill and what is needed for them to pursue advanced degrees abroad. He taught a three-and-half-day short course (morning and afternoon) on physicochemical processes in water treatment (carbon adsorption, ion exchange) and subsurface contaminant transport.

Sabatini brought his colleague, professor Sutha Khaodhiar, from Chulalongkorn University in Bangkok, with him to Cambodia to explore collaborative undergraduate student projects and graduate research and to inform the "bridge students" of the environmental

graduate program at Chulalongkorn. OU has been part of an international graduate program in environmental engineering and science at Chulalongkorn

since 2002. After the week in Cambodia, Sabatini spent two weeks in Bangkok teaching in the mornings and co-advising graduate research students in the afternoon.

Sabatini's trips to Ethiopia and Cambodia remind him how fortunate we are to live in the United States and how much environmental engineers and scientists have to offer the "bottom billion" (those that live on less than \$1US per day). The OU WaTER Center (<http://WaTER.ou.edu>) engages both undergraduate and graduate students in addressing these challenges as we do our part to meet the United Nations' Millennium Development Goals (www.un.org).



Children from village in Ethiopia. Mottled teeth as a result of elevated fluoride levels are visible on close inspection as well as skeletal fluorosis.

Extreme Construction – OU CEES Students and a Sea of Mud

On Feb. 1, construction began on an “Extreme Makeover: Home Edition” home at 13650 E. 120th St., about 12 miles south of Norman. Ideal Homes, the builder, was tasked with completing the project in 106 hours, including grading the site, building a 2,800-square-foot home and installing landscaping.

CEES students Christopher Davis, a master’s student from Jones; Mark Emde, a master’s student from Stillwater; Patrick Crowder, a senior from Vinita; and David Frank, senior from Norman, helped assistant professor Chris Ramseyer refine the concrete mix used for this unusual project. Due to the construction schedule, the concrete needed to



Extreme Makeover crew

be able to make strength rapidly in 20 degrees Fahrenheit weather. Typical Portland cement concrete will not hydrate (i.e., become hard) at temperatures below 40 degrees F. The concrete mix also was required to reach a minimum strength of 2,500 psi within six hours to allow post-tensioning to occur. Ramseyer’s research team was able to develop a mix that would meet these requirements from an initial temperature of 50 to 60 degrees F.

Building a house in 106 hours would be a daunting task in the best of times. But with record amounts of precipitation and snow, followed by a thaw at the end of January,

this task became vastly more difficult. For instance, the road into the construction site was originally estimated to require 600 tons of rock, but it took almost 3,000 tons to make it moderately passable to the point a concrete truck only sank in up to the rims of the flotation tires. This semi-organized sea of mud and muck was the site our CEES students volunteered to work in.

On Tuesday, Feb. 2, a team of OU CEES students left Fears Lab at 1 p.m. and joined the research team on the construction site. The first Dolese Concrete truck arrived around 4 p.m. with a batch temperature of more than 80 degrees F. The concrete was literally steaming as it was placed and finished. At this temperature, the concrete had less than 15 minutes of workability. Throughout the casting, the Dolese team, led by Gaylan Towle and Ramseyer, continued to adjust the mix to accommodate the temperature and workability requirements. The OU CEES students cast concrete cylinders to test at Fears Structural Engineering Lab and placed all the thermal blankets on the foundation to help with the curing process. The thermal blankets helped retain the heat of hydration and improved the rate of concrete hydration. During the slow moments, professor Ramseyer held impromptu question and answer sessions with the students, helping to explain what they were witnessing. The OU CEES students returned to Fears Lab in good spirits at roughly 1 a.m. on Wednesday.

At 5:30 a.m. on Wednesday, Ramseyer and a group of volunteers returned to the construction site and removed the thermal blankets and test cylinders, which were taken to Fears Lab. By 6:30 a.m. on Wednesday, tests on the cylinders indicated the foundation was at 1,400 pounds per square inch and framing could begin. At the time of post tensioning, the concrete had achieved a strength of 4,000 psi, well in excess of the 2,500 psi minimum required, and by Sunday, Feb. 7, the concrete had achieved a strength of approximately 7,000 psi.

Later on Wednesday, several CEES students returned to the site and assisted with the framing of the house. This included working with the roof trusses and assisting employees of Simpson Strong-Tie attach the frame to the foundation using rock anchors.

All in all, the OU CEES students and Ramseyer were able to help the project in a small but very important way. Considering the number of questions asked during the trip, it also was a beneficial educational experience for the students. Both Fears Lab and Ramseyer are listed as sponsors on the Ideal Homes Extreme Build Web site.

Sooner Engineering Education Center

The pervasiveness of technology in our lives and its significance for the development of our future society underscores the importance of effective and efficient techniques in teaching engineering. In response, the College of Engineering initiated the Sooner Engineering Education Center to formally facilitate, conduct and promote engineering education research, outreach and teaching that will lead to recruitment, nurturing and retention of diverse students within engineering pathways at all stages of the educational enterprise. Mark A. Nanny, Boggs Professor of Engineering Education and CEES associate professor, is the director of SEED, which officially began in 2009, and originated out of the long-term collaborative educational research and outreach efforts of the associate director, professor Susan E. Walden, and the other founding principals: professors Randa L. Shehab, Deborah A. Trytten and P. Simin Pulat.

SEED's value to the College of Engineering's educational infrastructure is through providing expertise and collaboration on faculty-led engineering and education grants, by creating opportunities for engineering faculty to contribute to and extend current engineering

education and outreach programs, and by calibrating the engineering education interests of federal funding agencies. Specific SEED Center resources available for engineering faculty are the Engineering Education Seminar Series; the course ENGR 4113/5113: Science, Engineering and Mathematics Educational Outreach for Science, Technology, Engineering and Mathematics majors, which provides students with the pedagogical background to effectively assist faculty with engineering education projects; and a deep expertise, grounded in more than eight years of National Science Foundation-funded research, on increasing diversity in engineering.



SEED also supports undergraduate and graduate students through SEED Student Scholarships. These scholarships are awarded to engineering students who provide leadership in community or K-12 engineering outreach activities. Additionally, starting in the fall of 2010 and in collaboration with the OU College of Education, a two-year graduate Masters of Education in Science, Technology Engineering and Mathematics Teaching will be available. This innovative program provides anyone with a STEM degree the opportunity to obtain a graduate degree in STEM education leading to state teaching certification.

Forming and nurturing community between the College of Engineering and K-12 schools, teachers and principals also is a top goal for SEED. A diverse array of K-12 outreach programs range from the Sooner Elementary Engineering and Science program, an after-

school program, to the NSF-supported Engineering in Practice program, which develops engineering-based, guided-inquiry activities for high-school science and math courses. Because the professional development of teachers is critical for nurturing future engineers, SEED has facilitated, in partnership with Norman Public Schools and Putnam City Public Schools, a two-week engineering research program for middle school science and math teachers. Another teacher preparation program, the Summer Engineering Academy, brings high school teachers from across Oklahoma to OU for two weeks to learn how to teach authentic, guided-inquiry engineering activities and practice their new skills by teaching high school students. Engineering concepts presented in these authentic activities are demonstrated in practice through field trips to local businesses and organizations such as Bergey Wind Power, the Oklahoma City Zoo, the Norman Drinking Water Treatment Facility and the Norman Fire Department.

As these programs grow, the ExxonMobil Lawrence G. Rawl Engineering Practice Facility will accommodate more K-12 students and teachers. SEED is actively developing outreach programs for K-12 classes who visit the EPF. Supported by funding from the NSF, SEED is conducting workshops with rural

and urban Oklahoma school superintendents to identify ways to optimize K-12 outreach through the EPF. Additionally, a select group of K-12 STEM teachers and principals is being assembled to act as an advisory board and think tank for developing and implementing innovative outreach activities and opportunities for forming partnerships with the K-12 community.

A new focus for SEED is facilitating experiential learning in the undergraduate curriculum through the EPF. In experiential learning, students engage in hands-on and teamwork experiences to model, design and test solutions to complex, multifaceted problems. Later in their education, these experiences can expand into internships with companies to solve real-world problems. The key component is providing learning experiences that allow the students to create knowledge through their own discovery.

Building off SEED's expertise and dedication, it is anticipated that OU faculty and students, along with Oklahoma's K-12 teachers and students, will find themselves actively engaged as a community of learners and scholars, thereby making the OU College of Engineering an exciting and vibrant place for learning, teaching and conducting engineering education research.

We'd love to hear from you! If you have news to share in the next issue of *Communiqué*, please contact us:

**334 Carson Engineering Center
202 W. Boyd St.
Norman, OK 73019-1024
or cees@ou.edu**

ALUMNI NEWS

Stephanie Lansing grew up in Tulsa and started her undergraduate education in 1996 at the University of Oklahoma. She wanted to



Stephanie Lansing

become a doctor but did not want to get a traditional biology or chemistry degree. After searching through degree programs her freshman year, she realized she could get a degree in an exciting field that she was passionate about,

environmental science, and still have all the prerequisites needed for medical school. She is forever thankful for that decision, as her life has taken a completely different path through the wetlands of Belize, farmlands of Costa Rica, villages in Haiti and to Ohio State University where she earned a master's and a doctoral degree (of philosophy, not medicine). She is now an assistant professor of ecological engineering in the Department of Environmental Science and Technology at the University of Maryland.

While at OU, Lansing was given the opportunity to conduct her undergraduate honors research with associate professor Robert Nairn. She received undergraduate funding to research the retention of metals in a passive treatment wetland that received acid mine discharges from historic underground coal mining activities in southeastern Oklahoma. For her research efforts, she was awarded first place in the Undergraduate Research Opportunities' Environmental Category and presented her research at the Governor's Undergraduate Research Day. In addition to this individual research, as team leader in her senior design capstone

class, she presented a wetland design plan to the Tar Creek Governor's Task Force for the treatment of mine drainage that has destroyed aquatic life and is linked to lead poisoning in the local, predominantly Native American, population. The class was awarded an Oklahoma Public Health Excellence award for their dedication and innovation. During this time, at the advice of Nairn, Lansing applied for a Rhodes Scholarship, and she became Oklahoma's representative in the regional competition.

After graduating from OU in 2000, Lansing turned down her spot in medical school to join the Peace Corps. She served as an environmental educator in Belize, teaching wetland education to students and teachers throughout this small Central American country. This two-year experience exposed her to the need for low-cost waste treatment options for human and ecological health and solidified her desire to pursue research in low-cost wastewater treatment techniques.

Lansing completed her master's and doctoral degrees at Ohio State University in the Department of Food, Agricultural and Biological Engineering. She conducted her doctoral research in Costa Rica and investigated the use of low-cost anaerobic digesters to treat animal wastewater and produce a renewable energy source for electricity generation. Her graduate research focused on wastewater treatment using a "living machine," which consisted of a series of anaerobic and aerobic tanks, hydroponics and wetlands that worked in conjunction to remove pollutants from wastewater.

At the University of Maryland, she teaches classes in renewable energy and ecological design. Her current research is focused on the production of renewable energy using low-cost anaerobic digestion technology. Lansing currently has research projects in Maryland, Costa Rica, Haiti and Sierra Leone. She enjoys working with students both inside the classroom, in the field and through community projects. She believes that even

the most “local” environmental issue is part of a global process, and ongoing international research and educational opportunities are important steps in improving the environment for everyone.

She has been married to her husband, David, for five years. David was a fellow Peace Corps volunteer in Belize and shares her love for travel, research, community development and education. He is a professor of geography and environmental systems at the University of Maryland, Baltimore County. They live in Hyattsville, Md., with their two young children, Quinn, 2, and Gavin, 10 months, and dog, Peppy.

In Memoriam - Former CEES Director Leale Streebin

Leale E. Streebin, former director of CEES and professor of Civil Engineering, died at his home in Norman Oct. 23, 2009.

Professor Streebin graduated from Bedford High School in Iowa in 1952 after having attended grammar school in a one-room schoolhouse. He married Leah Joan McCalla in 1956, and they moved to San Francisco, where he was a surveyor in the U.S. Army and their first child, Perry, was born. When Streebin completed his service in the Army, the young family returned to Iowa and he returned to school, receiving his bachelor's in civil engineering and environmental science. While in Iowa, a daughter, Jenny, was born, and Streebin worked for a civil engineering firm for two years in Iowa City. The family then moved to Corvallis, Ore., and it was there that Streebin earned his master's and doctoral degrees in civil engineering and another son, Dan, was born. The family moved to Norman in the fall of 1966, where Streebin joined the CEES department, and he and Joan had their fourth child, Beth.

In his 24 years with OU, Streebin was director of CEES for nine years and was the founder of the CEES Visiting Council. He is fondly remembered for his acts of service and his availability to students and peers. Upon his retirement from academia, he was director of Search Incorporated, a systems engineering and research organization dedicated to the solution of broad environmental problems and mitigation techniques. His wife and children reside in Norman.

2009 GRADUATES

Spring

B.S. Architectural Engineering

Charles Lee Blackburn
Eric S. Holderby
Jacqueline A. Martin

B.S. Civil Engineering

Michaela M. Campbell
Kelley K. Davis
Mark Emde
Sauban A. Hanif
Hollis J. Henson
Jonalyn N. Janey
Kah Mun Lam
Jonathan M. Locke
Matthew S. Long
Wassim E. Tabet
Zachary M. Thompson

B.S. Environmental Engineering

Brandt L. Fleharty
Eiji Nakamura

B.S. Environmental Science

Jacob S. Messina
Preston D. Wilson

M.S. Civil Engineering

James Marty Farris
Ali Farzaneh
Ashish Gupta
Bryan E. Haskins
Randy D. Martin
Shelby Pankop
Derick Thompson
Ian Patrick Toohey

M.S. Environmental Science

Laura R. Brunson
D. Deane Carlberg, Jr.
Jonathan Clifton

Ph.D. Civil Engineering

Lisa Holliday
Danny Krier
ChunYang Liu

Ph.D. Environmental Engineering

Orphius I. Mohammad

Ph.D. Environmental Science

Xiaoming Liang

Summer

B.S. Civil Engineering

Roy T. Khalife

M.S. Civil Engineering

Juan Diego Pinilla Gomez
Maria Moreno Gutierrez
J. Mike Imgarten
Zi Wang

M.S. Environmental Science

Darcy Lynn Lutes

Ph.D. Environmental Science

Yiran Dong

Fall

B.S. Civil Engineering

Seth M. Boydston
Marc H. Breidy
David A. Frank
Joe C. Howell
Rick L. Howland
Parker J. Pilkington
Danny L. Powell
Karim R. Saadeddine

M.S. Civil Engineering

Russell L. Buhler
Victor G. Njiru
Andrew Scherman

M.S. Environmental Science

Kyle Kauk

Ph.D. Environmental Engineering

Tri Thanh Phan

2008-2009 FACULTY AWARDS AND HONORS

- Associate professor Elizabeth C. Butler received the 2009 Dr. Larry W. Canter Influencing Environmental Interest Award.
- Assistant professor Amy B. Cerato received the Presidential Early Career Award for Scientists and Engineers; the Rapp Foundation Presidential Professorship, which is an appointment for life; and the spring 2009 College of Engineering and Michael F. Price College of Business Alumni Teaching Award.
- Assistant professor Kianoosh Hatami received the 2009 College of Engineering Cross-Disciplinary Seed Funding Award and the 2009 College of Engineering and Michael F. Price College of Business Alumni Teaching Award for the third time. He was invited to join the editorial board of the *Geotextiles and Geomembranes Journal* and is also serving as guest editor for the *ASCE International Journal of Geomechanics*.
- Associate professor Tohren C. G. Kibbey received the 2009 Good Teaching Award.
- Professor Gerald A. Miller received the 2009 George W. Tauxe Outstanding Professor Award.
- Professor Kanthasamy K. "Muralee" Muraleetharan received the 2009 David Ross Boyd Professorship, which is an appointment for life, and the 2009 College of Engineering Alumni Teaching Award.

2008-2009 STUDENT AWARDS AND HONORS

- Michaela Campbell was named the Outstanding Senior in Civil Engineering.
- Christopher Cope received a National Science Foundation Graduate Research Fellowship.
- Chris Davis, Yu Huang, Randy Martin, Victor Njiru and Shelby Pankop received fourth place in the Zone 2 PCI Engineering Student Design Competition for 2009.

- Linh Do was a member of a graduate business development team awarded third-place honors in the graduate division of the 2009 Donald W. Reynold's Governor's Cup Collegiate Business Plan Competition.
- Brandt Fleharty was named the Outstanding Senior in Environmental Engineering.
- Alan Garrido received the Best Student Oral Presentation Award at the 2009 American Society of Mining and Reclamation meeting.
- Jacob Grasmick was selected to participate in the 2009 Undergraduate Research Opportunities Program and awarded funds for his research.
- Eric Holderby was named the Outstanding Senior in Architectural Engineering.
- Amy Hufnagel was selected to participate in the 2009 Undergraduate Research Opportunities Program and awarded funds for her research.
- Jacob Messina was named the Outstanding Senior in Environmental Science.
- Thu Nguyen received the 2009 Ralph H. Potts Memorial Fellowship Award.
- Jessica Prince received the Oklahoma Traffic Engineering Scholarship for 2009.
- Yonathan Reches received third place in the 2009 American Concrete Institute Concrete Projects Competition.
- Katherine Ryan was selected to participate in the 2009 Undergraduate Research Opportunities Program and awarded funds for her research.
- Beatriz Santamaria received the 2009 OU Graduate College Robberson Travel Grant and the 2009 Colombian OU Alumni Association Scholarship.
- William Strosnider received the 2009 American Society of Mining and Reclamation Memorial Scholarship at the doctoral level and the 2009 Universität Hamburg Wetland Science and Management Study Scholarship.
- Zac Thompson received the International Association of Foundation Drilling 2009 Graduate Fellowship.

2008-2009

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The goal of the School of Civil Engineering and Environmental Science is to provide a high-quality educational experience for undergraduate and graduate students in the areas of environmental, geotechnical, transportation, architectural and structural engineering and environmental science. The educational experience is accomplished through innovative classroom instruction aided by computer and multimedia-based instruction, laboratory experiences and student mentoring. The products of this experience are engineers and scientists capable of critical thinking, devoted to a lifetime of learning, and highly sought after by employers.

Contributing writer and editor: Robert Knox, Ted A. Kritikos Chair, Presidential Professor, Director, School of Civil Engineering and Environmental Science

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