

ERE MESSENGER

Environmental Resources Engineering

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VOLUME 23, NUMBER 2

SPRING 2014

Ecological Restoration Engineering in Idaho

by Susan Firor, PE (BS ERE 1993), Principal Restoration Engineer
TerraGraphics Environmental Engineering, Inc., Moscow, Idaho

Before I began at HSU, I was working, taking Calculus at night, and saving money to attend school full-time. I was torn between studying aeronautical engineering (I love airplanes) and hydrology (I love rivers). While shopping around for schools, I got a call one evening from Brad Finney, who argued convincingly that the best

hydrology degree was to be obtained through an engineering program such as ERE. It seemed like a perfect fit—combining my passion for rivers and my desire to study engineering. Before long, I was in Arcata taking chemistry, physics, and ecology.

I can hardly believe that I graduated from the ERE program more than

20 years ago! For seven years after graduation I stayed at HSU and taught part-time in the ERE program. The adjunct faculty position was rewarding, fun, and educational for me. During that time I also took odd engineering jobs when they came my way. As I learned more and more, I realized that I didn't know enough to be a good teacher, so I turned my attention to full-time engineering.

I had the great fortune to join a group working with the Forest Service on the problem of fish passage. I worked with a couple of my former students from Humboldt and some other extremely smart biologists and geomorphologists to develop a computer program called FishXing. This wonderful collaborative work and another water-quality project that I did for EPA sent me down a path of stream and wetland restoration.

But I was still a one-person firm, and I longed for more collaboration. So,

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Figure 1: Degraded channel of Corral Creek in the Potlatch River basin, one of the highest priority watersheds for Steelhead habitat in Idaho.

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FROM THE EDITORS

Hello from the Messenger staff! We hope you enjoy this Spring 2014 edition.

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“Yesterday is gone.

*Tomorrow has
not yet come.*

We have only today.

Let us begin.”



Mother Teresa

Alumni Profiles



Bruce Moore, PE

BS ERE 1983

Water Resources Engineer
Wisconsin Dept of Natural Resources
Madison, Wisconsin

In 1977, I transferred to HSU from Cal Poly-San Luis Obispo. My interest was in learning about water environments, in terms of both natural and engineered systems, so I pursued undergraduate degrees in ERE and Oceanography. Coupled to this was a year of study in freshwater ecology (Limnology) at the University of Uppsala in Sweden in 1979-80.

The experience of living and studying abroad was pivotal for me, leaving me with a much broader sense of the possibilities for career and living situations. I strongly encourage anyone who has an interest in experiencing a different culture to do so not simply as a tourist, but as a student and member of the local work force. And, if you do so, learn the local language. It will enrich your experience and broaden your perspective in ways that few other experiences in life can.

In my own case, I learned Swedish, and ultimately worked in 1981 for VBB-Sweco, a Swedish engineering consulting firm in Stockholm. I have returned to Sweden numerous times through the years to renew

friendships there. My other work experience abroad includes a short stint with Barrett-Harris & Associates on Guam, where I was employed as an environmental/civil engineer, and in the mid-1980s I took a year to try teaching on for size, and I taught English to Japanese businessmen in Odawara, south of Tokyo.

For the past 20 years, I have worked in the stormwater program of the Wisconsin Dept of Natural Resources. The work is a mix of office time reviewing erosion control plans, and field work making site inspections. For someone who enjoys working close to the resource, it's a good fit.

With a primary professional interest in environmental protection and management, I gravitated early on to public sector work. During the early 1980s, I worked at the U.S. Environmental Protection Agency in San Francisco, where I reviewed ocean monitoring programs associated with major municipal wastewater treatment plants in California, including San Francisco, Los Angeles, and San Diego. I also worked on environmental enforcement aspects of commercial hazardous waste facilities.

Graduate school took me to the Midwest, where I have lived since 1988. Following completion of a master's degree in Civil & Environmental Engineering at University of Wisconsin-Madison, I joined the WDNR as a wastewater engineer in 1990, working in the municipal wastewater treatment area.

A strong interest in remote sensing image interpretation and geographic information systems provided the motivation to return to school to complete a second master's degree in Environmental Studies and to pursue doctoral studies. Skills learned enabled me to design and implement an early generation GIS

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application that has been used widely within WDNR for natural resource evaluation.

My work in the stormwater program began in 1994. The challenges of implementing a fledgling regulatory program have provided a rich work experience.



Suzanne Theiss, PE

BS ERE 1984

District Local Assistance Engineer
Caltrans
Eureka, California

The year was 1984. Ronald Reagan was president, the summer Olympics were being held in Los Angeles, and “When Doves Cry” by Prince was number one on the billboard charts. But there was a regional historic event taking place in Humboldt County that most people knew nothing about. I was apparently the first female ERE student with an emphasis in energy to graduate from HSU. The day after my last class, I started work as a Jr. Civil Engineer at Caltrans. I have now been with Caltrans for 30 years, and am currently the District 1 (North Coast area) Local Assistance Engineer.

I come from a family of six kids and grew up in Saratoga, California, just outside of San Jose. All of us kids

teased our folks that they just needed a larger work force for all the projects Dad had around the house. Now, I have a full house of my own. I live with my husband Eric, our 3 children (two are adopted Humboldt natives) and my mother-in-law, in a log house just outside Eureka in Freshwater. Looking back at my entire career, this last year has been the busiest.

I fell in love with Humboldt when visiting colleges as a senior in high school, and have considered this area my home since moving here when I was 18 years old.

After realizing I wanted to be a part of developing solutions to a variety of issues, I chose the field of environmental engineering with an emphasis in energy. I was the only female student in most of my upper division engineering classes. I have always been comfortable working with guys, so I didn’t feel too different; however, I know some of the guys were not always comfortable working with me as a female. I didn’t have the same experience at Caltrans, where most folks treated me the same as a guy in my same position.

I began my Caltrans career performing construction inspection projects around the Boonville area. I did have to tell some of the contractor staff that, “yes, I thought that watching a bunch of guys work and keeping a diary fit just fine as women’s work,” but I was always able to get the job done without being held back by my gender. Running after paving trucks in the summer heat was a nice excursion from the coastal fog.

In 1986, an opportunity at Trans Lab in Sacramento became available and I jumped at the opportunity. My job was to oversee energy studies for transportation projects and research alternative energy opportunities for Caltrans. My first supervisory position

was for the environmental engineering group responsible for noise, energy, air quality, and water resources. I even published a small research paper on geothermal use in transportation facilities with the Transportation Research Board. My work at Trans Lab varied quite a bit over the years until I ended up working on bioacoustic issues for transportation construction on both terrestrial and aquatic critters.

I got married in 2004 and wanted to start a family. My husband and I wanted to raise our children on the North Coast, so in 2008 I transferred back to District 1 into the Local Assistance Unit, providing oversight of city and county transportation projects throughout the District. I am glad to be home again!



John Rupp, PE

BS ERE 1999

Project Director, Senior
Hydrogeologist
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As a young adult, I believed that my life would end up entirely based on my own self-determination. As an older adult I now realize that life isn’t that simple. Some decisions seem to take

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hold in ways one might not imagine. For me, deciding on HSU exemplifies that concept.

My high school sophomore biology teacher was a Humboldt alumnus. His office was decorated with an HSU pennant and pictures of campus and Arcata, and through these mementos I fell in love with the idea of attending Humboldt State. Although I struggled in math in high school, my grades were good enough and I was accepted to the HSU Fisheries program. Disappointingly, I couldn't afford HSU, so I enrolled in the local community college the next fall.

The following few years were fun, but I wasn't going anywhere. I dropped out of community college and before I knew it had spent 6 years in retail. The job was a dead-end, but it had an upside. The company was Patagonia, and its founder, Yvon Chouinard, influenced my understanding of my place in life. In retrospect, my interpretation of Yvon's philosophy changed me significantly. Re-focused on becoming an environmental consultant, I was admitted to the ERE program in Fall 1994.

Succeeding in the ERE program required me to overcome my math deficiencies, and I didn't get off to a great start. The first homework assignment in Math 115 nearly killed me. But I didn't give up. I spent large chunks of that first semester in Dr. Bile's office learning and improving. It was at this point that two life-changing events occurred. First, I discovered math modeling. My new obsession with math modeling led to a career in hydrogeology (I had never even heard the word hydrogeology before HSU). Secondly, I realized the personal attention and accessibility of the HSU professors would affect my career unimaginably. I owe a debt of gratitude that can never be repaid to a long list of Humboldt professors, including Charles Biles, Robert Willis,

Beth Eschenbach, Margaret Lang, Brad Finney, Peter Lehman, Charles Chamberlin, Wes Bliven, and Mike Anderson. Their influence helped me remake myself into a good consultant.

I ended up doing pretty well at HSU. I graduated in 1999, and followed in 2001 with a Hydrogeology master's degree from the University of Nevada, Reno. Throughout my professional career, I have had interesting and rewarding jobs. I have had assignments in North America and internationally for Schlumberger, including two years in Santiago, Chile, as well as my two most recent assignments in British Columbia, with 2 years as operations manager in Vancouver. In my latest position as Project Director, I provide technical oversight and leadership to a diverse team of hydrogeologists and modelers. I now work from my home office on Vancouver Island on projects mostly in Nevada and British Columbia, but also at other locations worldwide.

The past 20 years have provided some important lessons. When a person is slogging through the challenges of the ERE program, it can be hard to see what it might lead to. It is clear now that my participation in the ERE program, along with a few key events in my time at HSU, have translated into opportunities that have enriched my life and career immensely. I hope that every student reading this article will find what they are looking for from the ERE program, just as I have, and that 20 years from now they will look back, smile, and understand that it was all worth it. 

*“Nothing will work
unless you do.”*

—◆—
Maya Angelou

ERE DEPT NEWS

To meet CSU guidelines effective Fall 2014, ERE degree requirements will be reduced by a total of 10 units, from 130 to 120 units, as follows:

1. (3 units) The Oral Communications requirement in Lower Division GE Area A will be satisfied by coursework within the ERE major. Course COMM 100 “Fundamentals of Speech Communications” will no longer be required.
2. (3 units) Lower Division GE Area D will be met by the two required Institutions courses [HIST 110 or HIST 111 (US History) and PSCI 110 or PSCI 210 (US & California government)] along with coursework within the ERE major. No other “designated” Area D courses will be required.
3. (3 units) Course PHYX 315 “Intro to Electronics and Electronic Instrumentation” will no longer be required. However, it can now be used to satisfy your upper division Science and Natural Resources elective requirement. Note that PHYX 315 will remain as a prerequisite course for ERE design elective course ENGR 475 “Renewable Energy Power Systems.”
4. (1 unit) Course ENGR 313 “Systems Analysis” will be reduced from 4 to 3 units. The new 3-unit version of ENGR 313 will be taught with two lectures and one lab session per week.

Although these changes become effective officially for students who enter HSU in Fall 2014 or later, the two changes related to ERE major requirements (items 3 and 4 above) have been approved for all ERE students, even if you entered HSU prior to Fall 2014. However, your GE requirements are determined by your individual Catalog Year, generally the year you entered HSU. You should plan to complete the GE requirements in effect during your entry year, or discuss options for changing your Catalog Year with your ERE advisor. 

ERE and Materials Engineering

by Lianna Winkler-Prins, ERE Senior

“Physical properties of materials. Analyze stresses and deformations involving elastic behavior of materials.

Tension, compression, torsion, and flexure. Combined stresses, static indeterminacy. Beams of two materials. Engineering design applications.” This is the description in the HSU Catalog for ENGR 330 – Mechanics and Science of Materials.

Do you wonder how these topics will be important to you in your future life as an environmental engineer? Isn't the concern with how materials behave the job of other branches of engineering (civil, mechanical, etc.)?

ERE Lecturer Pat DuRant, the Materials instructor since she joined the Humboldt State ERE team in Fall 2010, will tell you otherwise. When

asked why, she replied emphatically, “You HAVE to understand how materials work to improve their use.”

Pat earned her BS in Physics at Georgia Tech (the only woman graduating in physics that year) and took a job at Motorola in its research department. There, she worked on glass insulators for integrated circuits and had the exciting opportunity to work on a joint effort between Motorola, NCR, and Intel to design and build the first commercially available 4K RAM.

After that successful venture, Pat decided to enter a Master's program at Arizona State. She started in physics, but soon switched to Materials Engineering, a new major at the time. During grad school, she worked for Bowmar, where she designed the

process for layering glass to be used in the “Bowmar Brain” calculator. (Note: Pat still has a “Bowmar Brain” stowed away. Ask her to show it to you... it is a museum piece!) Her studies focused on machining optimization, and when she graduated she took her knowledge to Garrett Corporation. Pat enjoyed this job, where she “worked on the shop floor, talking to machinists and fixing problems.”

Today, Pat teaches Statics, Dynamics, and Materials here at HSU, and she also does consulting for companies on their materials manufacturing processes. Previously, Pat taught engineering courses at the College of San Mateo for 14 years and at College of the Redwoods for one semester.

Here are two of Pat's many examples of how an environmental engineer might use prior knowledge of materials. In one case, the designer of a wastewater treatment plant neglected to consider the properties of the concrete mix selected for the plant's holding basins. Wastewater treatment plants require cement that is sulfur resistant, due to the sulfuric acid present in wastewater. As a result, the non-sulfur-resistant concrete experienced major corrosion, and the basins had to be replaced. A second example is concerned with how the energy transfer efficiency of materials increases with higher operating temperatures. She explained, “High-temperature materials are essential to renewable energy sourcing: solar thermal collectors, ceramics and exotic alloys for turbines, even catalysts for high-temperature fuel separation.”

One of Pat's concerns is that, in the current poor economy, graduating ERE students may find a job and become afraid of losing it, possibly working in an environment where they do not thrive. Her advice is to “Look around! Don't be afraid to figure out what you really love. Environmental engineers should REALLY appreciate their branch of engineering. They will make a huge difference in where the planet goes.”



ERE Lecturer Pat DuRant holding her “Bowmar Brain” calculator and pieces of pure silicon. Silicon is an important material in manufacturing integrated circuits such as those used in the Bowmar Brain.

Graduate Program Options in the HSU ERE Department

by Karen Stufkosky, ERE Senior

In 1983 the ERE, Geology and Math Departments at HSU all wanted to offer masters degree programs, but they were individually too small to support their own programs. Consequently, they combined to form a single MS program called “Environmental Systems,” with several options. The number and names of the options have changed slightly over the years, with four current options: Environmental Resources Engineering (ERE); Energy Technology and Policy (ETaP); Mathematical Modeling; and Geology. Previously, the degree also included an option called International Development Technology (IDT). The options that have been managed by the ERE Department are ERE, ETaP, and IDT. These Master’s program options are not ABET-accredited and do not require having earned an engineering degree, allowing them to be more diverse and interdisciplinary. The undergraduate degrees of students accepted into the program range all over the map, from engineering to nursing to education to English.

The ERE option was developed in 1983 as part of the original Environmental Systems program. In the past ten years, 15 to 20 degrees have been granted annually with this option. The ERE option is under the guidance of ERE Professor Brad Finney and has specialty areas in water resources/ water quality and renewable energy. Thesis projects range from ground-water-saltwater intrusion modeling to reservoir optimization models to fuel cell research and optimization.

The IDT option was founded in 1988. Dr. Robert Gearheart served as the director of the program in conjunction with other professors. Topics included economics, appropriate technology, and empowering women in develop-

ing countries through technology. The IDT option focused on sustainable development, including how development is affected by culture and natural resources. Many students were recruited after having finished stints in the Peace Corps and having fallen in love with international development. At the conclusion of the IDT program in 2008/2009, 72 students had successfully completed it. Thesis projects were associated with countries such as Madagascar, the Philippines, Indonesia, and Belize. Some projects worked with Native American tribes. Examples include improvements in slow sand filtration technology, design of solar cookers and training people in their use, and development of national energy conservation programs for the Fiji Islands.

The Energy Technology and Policy (ETaP) option began in 2007 under the direction of Dr. Arne Jacobson, as a transition after the end of the IDT program. Originally, ETaP was named Energy, Environment, and Society (EES), but the name was changed to mitigate confusion with another program on campus that already had a name similar to EES. ETaP is similar to the past IDT program in that it focuses on sustainable development, but it differs by including domestic development issues along with international development. Projects range from energy consumption and environmental impacts of cannabis cultivation, to sustainable management of rural micro hydropower systems, to off-grid lighting systems in Kenya.

To give context to these options, here are brief bios of three MS Environmental Systems grads, one from each of the two current options (ERE and ETaP) and one from the former IDT.



ERE Option

Colin Sheppard
MS Environmental Systems 2009
Research Engineer
HSU Schatz Energy Research Center
Arcata, California

As a new college graduate, I had plenty of optimism and enthusiasm. Some might even call my early years delusional. I attended Stanford during the peak years of the dot-com bubble, and I found the salivating, gold-rush mentality of so many of my peers totally repugnant. I wanted to set the world straight, to right the injustices, to save us from ourselves. All good things – or at least well-intentioned – but there was this tricky question of... how?

After a stint as a grassroots organizer powerlessly trying to prevent the Iraq War from occurring, I realized I needed to engage in work that is actually effective and that uses my affinity for technical problem solving. Fortunately, I had some inspiring engineer friends and soon made up my mind to go back to school.

My partner (now wife) Jillian and I came to Humboldt totally seduced by the redwood landscape and the small-town feel. I entered the ERE program and started taking the core undergraduate curriculum. After my first year, I applied to the graduate program and was accepted.

My undergraduate training in computer science proved extremely useful in

the context of engineering and opened up many exciting opportunities. I soon got a job at the Eureka Office of the National Weather Service working on the near-shore wave forecasting system, a project developed by several talented students who preceded me. I took to the computational methods series, and at the end of my second year at HSU, I was given the honor of teaching ENGR 325 "Computational Methods II," which I continued to do for several semesters thereafter.

As a student, I was also involved with the Renewable Energy Student Union (RESU), serving as the president and the manager of the EPA P3 Program, funded by the EPA to develop a low-cost methodology for wind resource assessment. We used the grant to purchase and install a meteorological tower on Kneeland Hill, and I turned the statistical modeling component of the project into the topic of my Master's thesis. This experience contributed to my being hired by the Schatz Energy Research Center to assist with a wind and micro-hydro feasibility study on the Yurok Reservation.

I'm lucky to say that I'm still at Schatz and I've had the privilege of working on a variety of interesting projects, often wielding my skills as a modeler and quantitative analyst. I helped develop a model of the Humboldt County energy sector that we used to assess the technical feasibility of achieving a high penetration of renewable energy resources on the local grid. I also worked under contract with PG&E to develop real-time monitoring and short-term forecasting capabilities for the pilot-scale wave power plant they were pursuing.

More recently, I led the development of a model of electric vehicle driving and charging behavior used to site charging infrastructure on the North Coast, in the Northern Central Valley, and in Delhi, India. The approach we took in this modeling effort is called agent-based (aka individual-based) modeling. My experience with this approach is another story in itself.

When I graduated from the ERE program, I was fortunate to be hired as a programmer by Steve Railsback, HSU Adjunct Professor of Mathematics (and spouse of Margaret Lang) who literally co-wrote the book on individual-based modeling and ecology. Working with Steve has been extremely fun, rewarding, and enlightening. I continue to work part-time with Steve and part-time at Schatz.

Jillian and I live in Sunny Brae with our two daughters. We both fortuitously found a way to live in Humboldt and do work that we enjoy and find meaningful. (Jillian teaches first grade.) As a good friend of ours once put it, we're blisssed and we're blessed.



ETaP Option (formerly EES)
Stephen Kullmann
MS Environmental Systems 2009
Natural Resources Director
Wiyot Tribe, Loleta, California

I earned a BA in English from Rutgers University in 1989, and after drifting for several years through many states and jobs (fish cleaner, bike messenger, line cook, etc.), I decided to come to HSU and pursue the ERE degree. I found the program very welcoming to a returning student like me, and after a few semesters in the undergraduate program I switched into the IDT Masters Program. I graduated with an M.S. in Environmental Systems in May 2009. At that time, the name of

the program had changed to Energy, Environment, and Society. My main focus was renewable energy, and my thesis project was a long-term comparison of small solar panels developed for the sub-Saharan African market. I collected data on the performance of 12 modules in varying light conditions over the course of a year with the primary focus to measure if there was any discernible difference between amorphous and crystalline silicon modules, particularly in low and diffuse light conditions. I also had the opportunity to work in the nascent LED light lab at the Schatz Energy Research Center (SERC), helping develop testing equipment and protocols. As a member of the Renewable Energy Student Union I participated in the 2004 National Hydrogen Association Design Contest, and our team won the Grand Prize.

My first experience working with Native American Tribes was through an internship with the Yurok Tribe, where I conducted household energy audits, renewable energy assessments, and troubleshooting and repair of existing PV systems on the Yurok Reservation. This project was funded through a U.S. Department of Energy First Steps grant and was sponsored by SERC.

After completing my classwork (but before completing my thesis) I began working for Winzler & Kelly (now GHD) as an Engineering Technical Analyst, and again my primary focus was energy work on Indian Reservations, including projects for the Karuk Tribe, Blue Lake Rancheria, and the Fort Bidwell Reservation. Making the best of a bad situation after I was laid off from Winzler & Kelly due to the state budget crisis, I completed writing my thesis project. In September 2009, I accepted the position of Environmental Director with the Wiyot Tribe.

Over the past four-plus years, I have worked on an amazing diversity of projects and taken on many responsibilities. The ongoing cleanup of the Brownfield site at Tuluwat Village on

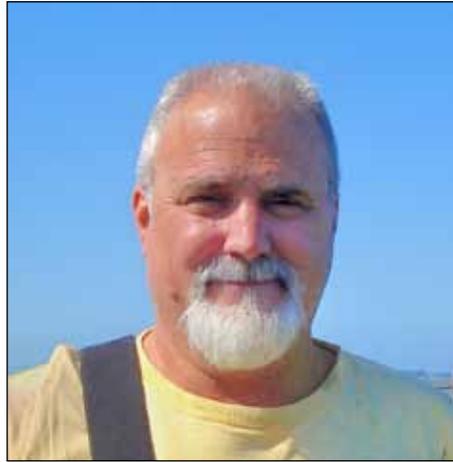
Continued on page 8

Grad Program Options

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Indian Island has been a major project that I am honored to have completed to the point where the Wiyot Tribe can hold its World Renewal Ceremony for the first time since the tragic massacre in 1860. This work has been a crash course in project management, contractor and consultant oversight, grant writing and management, public outreach, permitting and compliance, and on-the-ground work. In addition to the work on Indian Island, I have been building the Tribe's capacity for fisheries restoration on the Wiya't (Eel River), Wigi (Humboldt Bay), and Baduwa't (Mad River). We have also begun two major projects, focusing on the gou'daw (Pacific lamprey) and b'am (green sturgeon). We also coordinate with state and federal agencies as well as local non-profits on river restoration projects and other local environmental issues. To reflect our diverse duties, and in preparation to expand our department, last year we officially changed the name from the Environmental to the Natural Resources Department. Although my work currently has little to do with renewable energy, the problem solving, critical thinking and presentation strategies I learned at HSU have proven invaluable.

Finally, because I was apparently not busy enough, in 2012 I was elected to the Blue Lake City Council.



IDT Option

Jeff Woodke
MS Environmental Systems 2003
Jeunesse En Mission Entraide et Développement (JEMED)

I received my BS from HSU in 1985 and went immediately overseas. In 1988, I started a faith-based NGO in Niger, working with nomadic pastoralists. The program sought to do community based, integrated development, and much of our early work centered on regenerating land degraded by the changing climate.

In 2002, I returned to HSU, and with the encouragement of Dr. Bob Gearheart, I entered the Environmental Systems Master's Program with an IDT option. I finished the program in 2003, doing my thesis on the impact of some of our regeneration tech-

niques on degraded lands in the Sahel. I had been looking for a Master's in Development and had researched many programs. However, the IDT program and its connection with the HSU Engineering Department offered a technical approach that was lacking in all of the other programs.

What I learned in my studies has enabled me to reinforce my work here with pastoralists, helping them adapt to the rapidly changing climate. The lives of the nomads are quickly changing, and new approaches to development are necessary. The IDT program helped me to think outside the box and work with the communities to develop appropriate and sustainable solutions. I also became a lobbyist for the pastoralists, attending many UN climate change conferences and presenting our program and research. Our work on disaster risk reduction and climate change adaptation received an international award from the UN in 2009.

After running many crisis relief programs, we are now pioneering the idea of resilient development, and our approach is being adopted by institutional donors in many parts of the world. I could not have achieved this without what I learned from the faculty of the engineering department through the IDT program. Currently, I live part time in Arcata and I work with Dr. Gearheart and Dr. Finney at the Arcata Marsh Research Institute. 

Ecological Restoration

Continued from page 1

10 years ago, I took a job as a Project Manager for a small environmental engineering firm based in Moscow, Idaho: TerraGraphics Environmental Engineering, Inc. The firm has a 30-year history of human health remediation projects, most commonly at mine-waste contaminated sites. When I joined the firm, it was just starting to expand into ecological restoration. I'm now a partner in the firm and I manage a team of engineers and ecologists who design and build restoration

projects. Our projects range from very small meadow and wetland sites to miles of remediation and restoration, some within superfund sites. Before I present two examples, let me say a bit more about our company.

TerraGraphics Environmental Engineering

TerraGraphics was founded 30 years ago to address a human health crisis where children suffered from lead poisoning as a result of exposure to hard rock mining waste in northern

Idaho's Silver Valley. The site became the Bunker Hill Superfund Site. TerraGraphics remains the State of Idaho's consultant for this ongoing human health and ecological cleanup, and has expanded its business to include contaminated and degraded sites around the world.

We are a team of engineers, environmental scientists, ecologists, hydrologists, geologists, and risk assessors in six offices around the Western US, and we specialize in mine waste remediation and river and wetland restoration.

While our primary business is in the Northwest, we have also performed site characterization, emergency health response, and cleanup activities at contaminated sites in Africa, China, Russia, and the Dominican Republic.

Corral Creek Restoration

I currently oversee construction of the third phase of a wet meadow restoration project that is driven by a need to restore habitat for endangered Steelhead. This project is in one of the highest priority watersheds for Steelhead habitat in Idaho: the Potlatch River basin. On this small, ephemeral tributary to the Potlatch, logging practices in the early 20th century created a network of railroad berms and associated borrow ditches. In many places, the creek has found a straighter path in the borrow ditches and abandoned its historical channel. These straight channels have become incised and eroded, leaving the water table low and the meadow under-hydrated for much of the summer (Figure 1, front cover).

The solution to the problem in this case is relatively straightforward

conceptually, and pretty elegant, because in many of these meadows the historical channel still exists. We are plugging (damming, really) the degraded borrow ditch channel in several opportune places so the flow is diverted back into the historical channels. Remaining portions of the degraded borrow ditch now form a series of wetland cells that store water throughout the summer (Figure 2), raising the water table and prolonging the receding limb of the flow hydrograph. Meanwhile, spring flows are back in small, shallow, well-vegetated historical channels.

The water storage element of this project is particularly important in the face of the changing climate. We are already seeing clear evidence that modeling predictions in our region are correct: less storage in the form of snow; earlier, flashier spring runoff; and more winter runoff. These environmental changes mean that our restoration projects must be designed for stream, wetland, and floodplain functions that provide more summer water storage and greater overall resilience in the face of high-magnitude, short-duration flows.

Clark Fork River Operable Unit (Superfund)

On another project of a completely different scope and scale, we are designing a remedy for problems on parts of the Clark Fork River in western Montana. This river flows down from the Continental Divide near Butte, where extensive mining left tons of mine waste in the bottom of nearly every creek drainage. Large flood events have washed the waste downstream, and much of it has been deposited in the floodplain of the Clark Fork River. Contamination by heavy metals poses a risk to the health of humans and aquatic organisms, and vegetation doesn't grow well in soils with high metals concentrations. Contaminated sediments are also visually identifiable in some of the streambanks.

We characterized floodplain sediments by digging test pits with an excavator and using X-ray fluorescence (XRF) and laboratory analysis to determine the extent and concentration of metals. Site characterization also included topographic survey of the river and a geomorphic, hydrologic, and hydraulic survey and investigation. Finally, we produced a design and construction bid package.

As the "Engineer" for the Montana Department of Environmental Quality starting in spring 2014, my team at TerraGraphics will oversee construction associated with remediation of a 4.5-mile reach in which 450,000 cubic yards of contaminated soil and sediments will be removed from the floodplain. Following removal, the streambanks and floodplain will be reconstructed, including reconnecting some tributaries that have been cut off by irrigation ditches.

Perhaps in a few years I can revisit this project with you, and present a further description of our activities along with photos of the restoration of this beautiful river system. You can find more information on this cool project at: <http://www.deq.mt.gov/fedsuperfund/cfr.mcpx> 



Figure 2: New wetland formed from portions of the degraded channel of Corral Creek (see Figure 1, front cover).

Staying Upright

by Steven Pearl, ERE Senior

Since the Spring semester of 2011, I have balanced ERE and cycling. When I'm not plugging away at schoolwork, chances are I'm out riding, working at a local bike shop, or with the HSU cycling club. Eating and sleeping also happen. When I decided to do ERE, I was equally excited to learn that HSU had a solid mountain bike team. I knew I had to join if I wanted to be a successful student. Now in my final year, I realize I probably wouldn't be riding as much if I were not an ERE student. I have accepted the reality of sleepless nights, broken computers, and serious allergic reactions as an ERE student, but I still prioritize activities that improve my attitude on campus. So far, that activity has primarily been mountain biking. I have travelled thousands of miles with the cycling club to race all over California, Nevada, New Mexico, and North Carolina. We are lucky to have such a supportive sports club organization at HSU.

The fall semester ended up being a manageable school load and a successful season for me with the cycling club. About halfway through the semester, HSU was leading the conference and I held the points lead for the Western Conference. Nationals were about 2 weeks away and on the other side of the country, and no travel arrangements had been made. Checking out from classes for a week in the middle of the semester to race your bike is a big decision. Each year I have gone to nationals I have treated it as if it were my last, should the ERE work load prevent future opportunities. We decided to go, and with a lot of outside support, plans fell into place.

I competed in the omnium, which means I raced in all four events: cross country, short track, downhill, and dual slalom. Your points are summed from each event and podiums go 5 deep. I felt I had a pretty good chance to land on the podium.

It snowed the second night, literally freezing the courses for practice on Thursday. In these challenging conditions I rode tight and was all over the place, going down several times. During practice I caught up with my friend and fellow ERE student Derek Roelle, and was a bit behind him going into a fast section, frosted and hard from the snow. Suddenly, Derek was on the ground in extreme pain, with our two friends by his side. He was loaded onto a backboard, and we carried him off the course. He was taken to the hospital with a broken femur, and he had a titanium rod placed in his leg that night. The mood changed and not much was said in the condo that evening. The next day my downhill efforts were good enough for 28th place.

The next day was short track, and it was still freezing with snow on the ground. I had a good starting position and was dicing with the top 5 guys before 2 of them took off about half way. I held on as long as I could, finishing 6th in a field of 46. I could barely stand after the race, but I was pleased with my effort, knowing I had left it all on the course. The next day was cross country, my best discipline. This course was also frozen, and I struggled in the wooded sections dense with slippery roots. I was doing everything I could to just stay upright. I didn't do as well as I had hoped, placing 17th in a field of 48.

The dual slalom was the final event. Slalom is a one on one, side by side race of elimination rounds down a twisting course. You qualify based on your cumulative time for both the right and left lane, and I qualified in 12th position. I eliminated my first opponent easily, and then got to the second round where I had my toughest competitor, my teammate and friend Justin Graves, the fifth place qualifier. In our first round,

he beat me by 0.04 seconds, and when we switched lanes I beat him by 0.06 seconds, giving me a narrow margin to advance to the next round. The course suited me and I felt strong. I had high hopes of a podium until I crashed, putting me in 8th place in a field of 35. My two top ten finishes and my not-so-good finishes were enough for 4th place overall in the nation, and I got to stand on the podium. I was swept away in a world of mountains and trails. During all this, the Green and Ampt method, zener diodes, and municipal waste strategies barely crossed my mind.

The cycling club has been a really positive outlet for me as an ERE student. In my case, the two complement each other perfectly. Whether getting through a rough semester of school or charging on a mountain bike, you're going to go down. You just have to recognize your limitations and get back up for the right reasons. 



Steven at his first race with the HSU team in 2011 at the UNR Peavine Challenge

ERE Clubs Information Board

Compiled by Lianna Winkler-Prins, ERE Senior

Organization	Spring 2014 Activities	Fall 2014 Planned Activities
<p>ERE Student Assn (ERESA)</p> <p>Email: <i>eresahsu@gmail.com</i></p> <p>Webpages: <i>http://www.humboldt.edu/clubs/club_sites/eresahsu.1</i> & <i>http://www.facebook.com/hsu.eresahsu</i></p>	<ul style="list-style-type: none"> • Monthly meetings • Coffee table • Local water treatment competition • ASCE MID-PAC water treat comp • Mock interviews • ERE Rafting Trip • Fundraising at Entrepreneurship Day • Ice cream social and ERE awards • Volunteer at Arcata Comm Garden • Order of the Ring Ceremony • Graduation reception 	<ul style="list-style-type: none"> • Monthly meetings • Coffee table • All-clubs meeting • New officer elections • Fall Follies • Prof resume review • Tour of engineering firms • Welcome Back BBQ • Pizza with Professionals
<p>Engineers Without Borders (EWB)</p> <p>Email: <i>humboldtewb@gmail.com</i></p> <p>Webpage: <i>http://www.humboldt.edu/ewb/</i></p>	<ul style="list-style-type: none"> • Continue proj in Camoapa, Nicaragua (w/ North Coast Professional EWB) • Re-design and re-build the demonstration Rope/Ram pump • Wiyot Tribe Project • Poker Party Fundraiser • Volunteer at Humboldt Humberg (w/ North Coast Professional EWB) 	<ul style="list-style-type: none"> • Sister City Project's I-Block Party • Continue proj in Camoapa, Nicaragua (w/ North Coast Professional EWB) • New ram pump design party • Redesign and rebuild demonstration rope/ram pump • Wiyot Tribe Project
<p>Renewable Energy Student Union (RESU)</p> <p>Email: <i>resu@humboldt.edu</i></p> <p>Webpage: <i>http://www.humboldt.edu/resu/</i></p>	<ul style="list-style-type: none"> • RESU reunion • Hydrogen Fueling Station Design Competition • SORMS data collection • Solar PV array installation • ElectricSun Frost tour • Solar Thermal design for Jefferson School 	<ul style="list-style-type: none"> • Redesign microhydro system • SORMS data collection • Solar PV array installation at Jefferson School • Write proposal for Humboldt Energy Independence Fund
<p>Society of Women Engineers (SWE)</p> <p>Email: <i>swe@humboldt.edu</i></p> <p>Webpage: <i>http://humboldt.edu/clubs/club_sites/society_of_women_engineers1/</i></p> <p>Facebook: <i>http://www.facebook.com/groups/swehumboldt/</i></p>	<ul style="list-style-type: none"> • Attend 2014 Region A SWE Conference in Sacramento • PRO project • "Inspire to be an Engineer" outreach program • Francis Creek Surveying Project • Girl Scout Day • 4th annual SWE Social • Brown Bag Lunches • ERE end-of-year BBQ 	<ul style="list-style-type: none"> • PRO project • "Inspire to be an Engineer" outreach program • Francis Creek Surveying Project • Annual SWEShi • Brown Bag Lunches • STEM (Science Technology Engineering and Math) advocacy in local elementary schools
<p>Society of Hispanic Professional Engineers (SHPE)</p> <p>Email: <i>jl2357@humboldt.edu</i></p> <p>Webpage: <i>coming soon</i></p>	<ul style="list-style-type: none"> • Weekly meeting for club logistics • Bi-weekly study sessions 	<ul style="list-style-type: none"> • Weekly meeting for club logistics • Bi-weekly study sessions

The Society of Hispanic Professional Engineers is Coming to HSU

by Jairo Luque Villanueva, ERE Senior

My name is Jairo Luque Villanueva and I am working to bring a Society of Hispanic Professional Engineers (SHPE) chapter to HSU. I am a 25-year-old ERE student (Spring '15) and aspiring engineer and researcher. I lived in impoverished areas of Mexico for six years of my life, which shaped my path toward pursuing a career in engineering. In the last few years, I have been fortunate to receive internships and opportunities for research. Perseverance, coupled with a good academic record and faculty support, have allowed me to access these opportunities. With the SHPE Chapter, I hope to bring a learning environment and community to HSU, to further motivate and inspire others to be successful. The club will focus on academic success while also working on projects, attending national and regional conferences, and giving back to the community.

SHPE is a national organization at the forefront of advancing Hispanic individuals in Science, Technology, Engineering, and Math (STEM) careers. It has been supporting hispanic engineers for forty years and currently has a presence in hundreds of college campuses around

the United States. SHPE Chapters exist within seven regions. Region 1 includes California, Nevada, Washington, and Oregon. Thirty-three student chapters and seven professional chapters exist at universities, community colleges, and districts in Region 1 alone. Also, five of the seven professional chapters are in California. My goal is to have HSU's ERE department be recognized as a main contributor to the SHPE mission and vision:

Mission: SHPE changes lives by empowering the Hispanic community to realize their fullest potential and to impact the world through STEM awareness, access, support, and development.

Vision: SHPE's vision is a world where Hispanics are highly valued and influential as leading innovators, scientists, mathematicians and engineers.

The club will be in its beginning phases for the next several semesters, and I strongly encourage all who are interested to become involved and support these efforts. We are having meetings this semester to address the logistics of becoming a recognized chapter, and we are sponsoring study group sessions, or learning communities, for ERE students at all levels in the program. The 2014 spring semester location and times are:

Thursdays:
10:30 AM-12:30 PM in SciD_17

Sundays:
3:00 PM-5:00 PM in SciD_17

The study group hours for the Fall 2014 semester are subject to change. All ERE students are welcome to participate and attend SHPE meetings and study sessions! 



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