HUMBOLDT STATE UNIVERSITY

ASCE Student Chapter American Society of Civil Engineers

ERE MESSENGER

Environmental Resources Engineering

VOLUME 18, NUMBER 1 SPRING 2009

Drew Gronewold Joins ERE Faculty

Greetings! My name is Drew Gronewold, and I'm excited to be joining the faculty here in the Department of Environmental Resources Engineering (ERE) at Humboldt State University (HSU). My family's move to HSU represents fulfillment of a vision I've had for quite some time of working in an environment with beautiful natural surroundings that foster a rich blend of creative teaching, experiential learning, and innovative applied research.

My interests in engineering education and research took shape during my undergraduate education at Cornell University's School of Civil and Environmental Engineering, and continued developing over eight years as a project manager and professionally-licensed engineer in the environmental engineering consulting industry. Throughout my career, however, I've questioned conventional approaches to addressing uncertainty in water quality observations, infrastructure construction cost estimates, and other critical decision criteria. One of the reasons I'm excited to be working at HSU, of course, is that these questions are similar to those being asked not only by students and faculty within ERE, but by colleagues throughout the College of Natural Resources, across the University, and in the neighboring communities and environmental management agencies as well.

I am passionate about teaching, and my dream of pursuing a career in academia was really confirmed when I worked as an assistant scientist with the Sea Education Association (SEA) based in Woods Hole, Massachusetts. The similarities between HSU and SEA run deep, and are yet another reason why am excited about moving my family to Arcata, and joining ERE.

Sara, John, Michael and Drew Gronewold

When I'm not thinking about environmental engineering problems, I spend time with my wife Sara and our two young sons Michael and John. I try to sneak in trail runs and bike rides as often as I can. Sara is an accomplished rower, and has already made some new friends and reconnected with old acquaintances in the local rowing community. Our boys, meanwhile, despite being only three years old, are avid hikers and enjoy the outdoors. I can't wait to see the looks on their faces during our first hike together in Redwood Park.

I'm looking forward to meeting and working with you this Fall. If you'd like to chat before then, or have questions you think I could help answer about engineering, research, or careers, please shoot me an e-mail at **adg12@duke.edu**. Best of luck with the end of the semester, enjoy the summer, and we'll see you in August.

Cheers, Drew

IN THIS ISSUE

FROM THE EDITORS

Greetings, readers!

After a 5-year hiatus, the ERE Messenger is making a comeback! This newsletter provides a way for the ERE Department to broadcast exciting news about it's programs, students, faculty, and alumni.

This being our first issue as editors, we would like to hear any feedback that you (the readers) have regarding the content and layout of our newsletter. Love it? Hate it? Please send us your questions, comments, quotes, quips, or queries. We, the editors, are simply an email away!

Thank you for picking up the newest issue of the ERE Messenger. Also, a huge THANK YOU to Mike Anderson and Leslie Anderson for their guidance and support, and also to ERESA.

From the ERE Messenger Faculty Advisor: After five years of trying to find editors to bring the Messenger back to life, I am very pleased that Claudine and Nolan happily took on the task this year. Please thank them when you see them next.

Co-editors
Claudine Custodio
Nolan Kloer

Faculty advisor
Mike Anderson

Design and layout
Leslie Scopes Anderson

Printing
University Graphic Services

ERESA@humboldt.edu

For the ERE Messenger online:
www.humboldt.edu/~ere_dept/undergrad/cat/alumninotes.php

Alumni Profiles

Sherry Constancio, P.E.
B.S. ERE 1997
Flood Management Coordinator
CA Department of Water Resources
Division of Flood Management
Eureka Flood Center
sconstan@water.ca.gov

Looking back over the path of my career I marvel at the passage of time and how, in a sense, I've managed to come full-circle. As evidenced by my chosen career path, my heart has always been in the area of water and the ERE degree has served me quite well in my endeavors. In the months leading up to my graduation at HSU, I applied for a few jobs while also entertaining thoughts of continuing onto graduate school in pursuit of an M.B.A. When I actually landed a position with the CA Department of Health Services (DHS) Drinking Water Program, I packed my bags and headed out of beloved Arcata for the Bay Area. I spent the next year being mentored in the fine art of regulatory oversight of public water systems, including everything from single-well purveyors to behemoth districts like East Bay MUD. Such work involved developing permits, conducting inspections, dealing with compliance issues, monitoring water quality data and occasional enforcement. My role covered aspects of drinking water from its source (watersheds, groundwater, etc.), treatment, monitoring, distribution, use and recycling. After a brief stint in underground storage tank cleanup work, I ventured to the Central Valley Regional Water Quality Control Board in Sacramento to take on another regulatory role, only this time I was dealing with the other end of things – wastewater. I spent the next four years working in that field until I decided it was time for a new perspective and transferred to the Department of Water Resources (DWR), Division of Flood Management. Going from a regulatory framework to more operational work was a refreshing change at the time. The dynamics of statewide water resources is fascinating, and working in the public safety aspect of flood operations has been quite rewarding. It has even been rewarding at times when I've found myself in a flood event at our State-Federal Flood Operations Center, toasting in the New Year with co-workers (apple cider, of course) instead of with my family and friends. But, it's an amazing experience to be a part of something that has such a direct, immediate impact on people's lives – working with such dedicated professionals and issuing hydrologic forecasts, notifications and products that can and do save lives. Two years ago, and five years into my time at DWR, I was offered the opportunity of my dreams to return to the North Coast and take over the position of Flood Management Coordinator at DWR's Eureka Flood Center. Armed with my experience at the State-Federal Flood Operations Center and pregnant with my second child, I made my way back to Humboldt County where I plan to stay this time around…I can't think of a better place to raise my family, or to enjoy the beauty and serenity that is the North Coast.

In closing, I offer these observations and words of advice to current and future ERE students. First and foremost, you should know that the ERE degree from HSU is highly regarded in the outside world. It's a great program and I can't say how many alumni I have run into throughout my career that are doing very well in their respective fields. Stick with it and I believe you'll be very pleased you did. No matter what you choose to do, communication and collaboration are both key to accomplishing any project. Make sure you know how to work well with others, and hone your writing and speaking skills. I also encourage students to acquire experience and some level of proficiency in GIS, as it has become an essential element in this field. Such specialized skills can give you an advantage in getting certain positions and will significantly enhance your performance. Lastly, best wishes to you all and much success!

Alumni Profiles

Denise McKay
B.S. ERE 2002
Assistant Professor
Smith College
Northampton, MA
dmckay@smith.edu

While it has been seven years since I graduated from HSU and the ERE program, I find myself often reflecting on my time there. In a rush to experience the world, I left the comfort of HSU and the unique and nurturing community at the Schatz Lab, to pursue graduate studies at the University of Michigan. While in grad school I shifted from fuel cell system design and testing toward modeling, optimization and control. I acquired an M.S. degree in Mechanical Engineering (2005) and a Ph.D. in Environmental Engineering (2008). This time served to hone my senses, discipline my mind, and focus my goals and ambitions.

Having popped out of the system as a cross-disciplinary engineer who has now studied environmental, mechanical, electrical, and chemical engineering through both research and education, I am focused on the development of renewably derived fuel and electricity generation technologies through the design, modeling and control of dynamic and complex systems. That is certainly a mouth full. In brief, I am interested in both fuel cell electricity and electrolytic hydrogen production.

I recently joined the engineering faculty at Smith College, a women's liberal arts college in Massachusetts. Being the only women's college that offers a B.S. in engineering, we are helping to shape what it means to be educated as an engineer. It is my hope that we challenge the next generation of engineers to not just solve technological problems, but to evaluate the social and environmental impacts of competing alternatives and explore the appropriate use of technology. Oddly, my office is in the attic of an old house which strangely resembles House 18, creaky stairs and all! The parallels are quite shocking.

I recently bought an old Victorian home, and in my "free" time have begun documenting the process to decrease its environmental footprint and bring it up to code in a cost effective way. Stay tuned to see if it is actually as possible as my models indicate! I do, however, still manage to make wine and go backpacking.

My advise to prospective, current, and graduated ERE students is to follow your heart and string together the reality that makes sense to you. It is when we strike our own path that giant boulders seem like mere pebbles!

Tracie Billington, P.E.
B.S. ERE 1985
Supervising Engr, Water Resources
Chief, Sacramento Valley Section
Div of Planning and Local Assistance
CA Departmentt of Water Resources
Sacramento, CA
tracieb@water.ca.gov

I graduated from Humboldt ages ago, back in 1985, with an emphasis in Water Quality and Water Resources. Now, when I am on engineering interview panels and I see the quality of candidates that graduate from Humboldt, I am glad that I am not competing against these candidates for a job. Keep up the good work!

After graduation I moved to the Mojave Desert (a drastic change from the environs of Humboldt County), where I accepted an engineering position at the California Regional Water Quality Control Board, Lahontan. I began working in the hazardous waste field and subsequently worked for the California Department of Toxic Substances Control, U.S. Air Force Center for Environmental Excellence, and the U. S. Army Corps of Engineers. After 14 years of hazardous waste, I switched career paths and I now work in the water resources field for the California Department of Water Resources. I manage General Obligation Bond funded grant programs, including the Integrated Regional Water Management Grant program, which provides grant funding for a wide-variety of water management construction and planning projects and programs. Throughout my engineering career I have worked almost exclusively as a Project Manager. I believe that the ERE program helped build my project management capabilities by exposing me to a variety of engineering fields, projects, and assignments. Managing projects is quite similar to managing your course work – competing priorities, conflicting deadlines, and identifying the critical path to meet project objectives.

Finally, here's some advice I have to offer, which I gathered as a struggling ERE student who was just trying to keep up with my engineering classes. I strongly recommend that you students take Business English or Technical Writing classes, even if you have no desire to take them. I do much more writing as a professional than I ever envisioned or desired. In working almost 25 years as an engineer for different agencies, on different projects, and in different disciplines, I have never had a project fail due to technical or engineering obstacles. What has put projects at risk of failure is a team's ability to cooperate, communicate, and make decisions that address the project participants' differing views and needs. Also, take the EIT as soon as you can.

Σ

ERE MOVES TO A NEW HOME

Margaret Lang, ERE Department Chair

If you're an alumni visiting campus and want to stop and visit with ERE faculty, or if you are a current ERE student in need of help, don't head for the familiar confines of House 18 or the trailers …we've moved to new (to us) space! The trailers are no more, and the department office and all ERE faculty offices are now under a common roof on the ground floor of Harry Griffith Hall (HGH), located at the corner of B Street and Harpst Street. The Department Office is in HGH 119.

This is the first time since the department moved out of Van Matre Hall in 1982 that all of our offices have been located in a single building. Our laboratory and primary classroom space remain on the first floor of Science D and in Jenkins Hall (JH 214).

In a mad rush a few weeks before the Fall 2008 semester, all ERE faculty members moved into their new offices. It was an exciting summer with lots of denial, frantic packing and recycling.

Stop in and say Hello if you're on campus or passing through town.

Our new home – Harry Griffith Hall.

Charles Chamberlin enjoys the final hours packing up House 18.

Arne Jacobsen checks out the new graduate student office.

The old and the new. Foreground – our trailer park. Background – the newly painted Harry Griffith Hall.

Bob Gearheart AWOL and in denial with 48 hours to go!

HSU's Compost Program

Luke Armbruster, ERE Undergraduate

Do you want to keep Humboldt clean? If so, consider becoming a part of the compost branch of the Campus Recycling Program (CRP). This branch is committed to reducing waste here at HSU, and needs your help to continue its service to the campus community.

One of the many services the compost program offers is on-campus food waste collection. Waste is collected in small capacity buckets at different locations around campus. Current outdoor bucket sites are: the quad, the front entrance to Founder's Hall, as well as the entrances to the Music Building, Gist Hall, and the Library. Indoor bucket locations can be found at coffee tables in the following buildings: Science D, Science B, Natural Resources, and Wildlife. All other locations are barrel collection sites, which collect large amounts of food waste. Barrel collection is done at the campus-community and dining services drop-off sites located at the Depot, Redwood Bowl, and Creekview apartments, respectively.

The compost branch also collects food waste through on-campus zero-waste events and festivals. A 'zero-waste' event is any function that aims to reduce waste through composting food waste (i.e. fruit, vegetables, bread, coffee, tea grounds, and compostable dishware). Specifically, SLAM and the May Day Compost Festival are two festivals that the compost branch help organize.

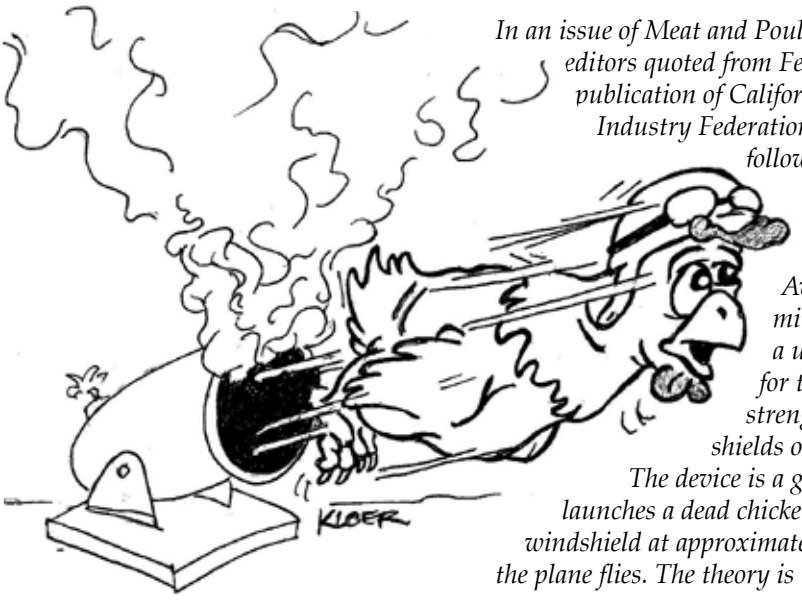
Another service of the compost branch is providing opportunities for the campus community to learn more about composting. Throughout the school year our branch offers workshops and presentations. Last semester the branch offered a workshop on vermicomposting (composting with worms), and informed residents of Sunset and Redwood dorms about on-campus compost collection. The branch also gave a presentation about waste minimization to first generation incoming college students at the Northern California Student Conference.

The monthly Compost Day is another educational event that our branch puts on for the campus community. Compost Day is usually at the Compost Demonstration site, located at the northwest corner of the Redwood Bowl. At this event, students learn how to compost the food waste collected on campus, and engage in construction projects around the Demonstration site. Advertisement for Compost Day is posted on public bulletin boards throughout campus, and on the University Announcements. Participating in Compost Day or any other compost-event isn't the only way HSU students can be a part of the compost branch. Students who want to fulfill a leadership position, and who are passionate about diverting waste are encouraged to apply for a position! For fall 2009, the positions for Zero-Waste coordinator and CDS operator will open. Also, there is a part time position as a Compost Site Operator available during Summer 2009. To apply, submit a cover letter and resume to Kelly Karaba at the Campus Recycling Program, Warren House 53, 1 Harpst St., Humboldt State University, Arcata, CA 95521.

The friendly staff at the Campus Recycling Program looks forward to working with reliable students with a passion for making a difference in waste diversion!

Σ

FAA CHICKEN TEST!



In an issue of Meat and Poultry magazine, editors quoted from Feathers, the publication of California Poultry Industry Federation, telling the following story.

It seems the U.S. Federal Aviation Administration has a unique device for testing the strength of windshields on airplanes. The device is a gun that launches a dead chicken at a plane's windshield at approximately the speed the plane flies. The theory is that if the windshield doesn't crack from the carcass impact, it will survive a real collision with a bird during flight.

It seems the British were very interested in this and wanted to test a windshield on a brand new, speedy locomotive they were developing. They borrowed the FAA's chicken gun, loaded the chicken and fired. The ballistic chicken shattered the windshield, went through the engineer's chair, broke an instrument panel and embedded itself in the back wall of the engine cab. Stunned, the British asked the FAA to check the test to see if everything had been done correctly, and to make recommendations for future testing.

The FAA reviewed the test thoroughly and made a one-sentence recommendation: "Next time, use a thawed chicken."

Humboldt County's Renewable Energy Future

Jim Zoellick, Senior Research Engineer, Schatz Energy Research Center

Humboldt County shows great promise for a clean, sustainable, renewable energy future, and the Schatz Energy Research Center (SERC) at HSU, along with other local collaborators, is working toward this vision.

In 2005, SERC worked with a local consulting team to develop an Energy Element for Humboldt County's General Plan update, which will shape local energy policy for the next twenty years. To guide creation of the Energy Element, SERC prepared a background technical document that examined energy use, energy infrastructure, and energy resource potential in Humboldt County.

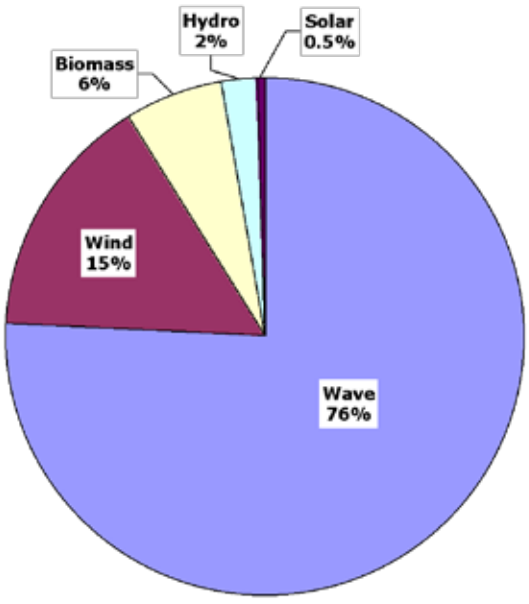
The background technical report found the following characteristics associated with Humboldt County's current energy picture:

- Humboldt County is like an energy island, with minimal connections to the larger electricity and natural gas grids.
- More than a third of our primary energy use is for transportation.
- A fifth of our primary energy use is for natural gas heating and process needs.
- More than 40% of our primary energy use goes toward electricity generation.
- About three quarters of our electricity is generated locally, largely using biomass resources (wood waste from the forest products industry).
- Large wind, wave, and biomass energy resources are available locally that could supply all of our energy needs, including electricity, heating and transportation.

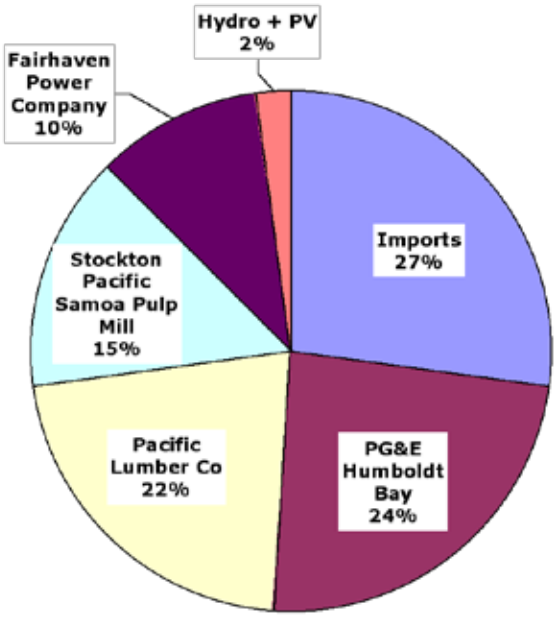
Some of the recommendations that came out of the energy report are to increase our energy efficiency and conservation efforts, employ "smart growth" development strategies to reduce transportation energy needs, and further develop our wealth of renewable energy resources. So where do we go from here?

There is great potential to develop our wind, wave and biomass energy resources. There is a tremendous wind energy resource in the Cape Mendocino area south of Ferndale, and Shell Wind-Energy has been working to develop a 60-70 MW wind farm in the area. It is estimated that there is greater than 400 MW of on-shore capacity in this area, and much more offshore resource potential. In terms of wave energy, Humboldt County has some of the richest resource potential on the west coast, with an estimated capacity of 1000 MW or more. Pacific Gas and Electric Company, our local electric and gas utility, is currently exploring development of a pilot wave energy project outside Humboldt Bay. A large but sustainable increase in the biomass energy resource could be obtained through better utilization of logging slash and other waste material generated during timber management and wildfire fuel reduction efforts.

However, developing these resources to generate clean, renewable electricity will not be without challenges. Wind and wave resources are intermittent, and their availability will not perfectly match local electricity demand. When there is excess generation it needs



Humboldt County Renewable Electricity Generation potential. Total = 6950 Gigawatt-hours/year.



Humboldt County Electricity Supply by Source (2003.) Total = 940 Gigawatt-hours.

Humboldt County's Renewable Energy Future *Continued*

to be either stored or sent out of the county to meet electrical demand in other geographic areas. The problem here is that our connection to the larger electricity grid is small, with a transmission capacity of only about 70 MW. For comparison, our baseload demand is about 85 MW and our peak demand is about 160 MW.

One possible solution to this problem is to increase the capacity of the transmission system, but this is expensive because we are a long way from major load centers where the power is needed. A second approach is to continue to treat Humboldt County as an island and develop ways to match supply to demand by storing, using and managing power on the local electrical grid. Strategies could include using surplus electric capacity to charge electric vehicles and generate hydrogen, as well as "smart grid" technologies that control electrical loads to best manage power flows on the grid. We could also switch some of our heating demand from natural gas to electric heat pumps with thermal storage. Finally, we could utilize some of the forest biomass resource to generate cellulosic biofuels, like ethanol or bio-diesel. And of course, increased emphasis on energy efficiency and conservation in all sectors would complement the above strategies. In this way we could strive to meet the majority of our electricity, heating, and transportation energy needs using local renewable energy resources. This is a tall order to fill!

To begin the process in earnest, SERC and the Redwood Coast Energy Authority recently submitted a proposal to the California Energy Commission to fund research and planning on this topic. SERC also recently completed the installation of a hydrogen fueling station powered by grid electricity on the HSU campus and obtained a hydrogen powered Toyota Prius. We are pursuing other opportunities to build more fueling stations and bring more hydrogen-powered vehicles to our area. In addition, SERC is researching biomass energy systems, including a newly installed gasification system. Through these efforts and others, SERC is working to bring a renewable energy future to Humboldt County!

Σ

Katy Gurin, ERE Undergraduate

Migrating salmon face many barriers as they travel upstream to spawn, not the least of which are road culverts. During high flows, water shoots through culverts at velocities too large for fish. To improve fish passage, many culverts have been retrofitted with baffles which reduce the flow rate and create sheltering eddies where fish can rest. However, adding baffles to culverts has some drawbacks. They can increase a culvert's surface roughness and reduce its hydraulic capacity. When stream flow exceeds the culvert's hydraulic capacity, roads may be flooded or even washed out. Under some conditions, baffles may also fill with sediment and do little to aid fish passage.

These issues motivated ERE Professors Margaret Lang and Eileen Cashman to develop design guidelines for culvert retrofits. The research was funded by Caltrans, and during the research period they employed many undergraduate student assistants to help with various aspects of the project.

I was involved in testing models of culverts in the hydraulic flume in Science D. My research team simulated flow behavior in a culvert using small plexiglass models, and outlined water surface profiles with careful depth measurements along the length of the models. We also learned how to survey using a total station, and spent time in the field measuring sediment deposition on retrofitted culverts.

When I applied to work over the summer on this project, I was relatively new to the ERE program, and I had not taken fluid mechanics. I felt my inexperience would put me at a disadvantage in relation to some of my senior classmates. However, Dr. Cashman told me that she was hoping to hire students who had just started in the engineering program because they could work on more projects in the future. This brings up an important difference between applying for internships and applying for other jobs. Most professors managing research projects are looking to hire people who will benefit the most from their experience. So, be sure to match the project you apply for to your interests, abilities, and expectations.

I've been interested in watershed restoration for a long time, so it was great to work on a fish passage project with a group of people who shared similar interests. To make some contribution to the field, even if it was a small one, felt good. Participating in research can be a very motivating experience, giving you a better idea of what specifically you may want to do for a job or what you may want to pursue in graduate school. And, on a very practical note, professors can write much stronger and more detailed letters of recommendation if you have worked for them and they know you better.

Although I learned of the Caltrans project from a flyer, I recommend that you talk to professors about their projects even before you hear of a job opening. Getting a job that will actually help further your career makes finding and applying for a research position worth the extra effort.

Σ

An Annual Carbon Budget of Arcata Marsh

Mary C. Burke,
International Development Technology Option,
Environmental Systems Master's Degree Program

Arcata's constructed wetlands provide a groundbreaking demonstration of an engineered natural system for treating wastewater. In addition to successfully treating municipal wastewater, providing habitat for wildlife and serving as a passive recreation area, this wetland may provide additional benefits, such as carbon sequestration and peat soil accretion. My thesis project is to develop a carbon budget for Arcata's wastewater treatment wetlands.

While Arcata's constructed wetlands have drawn international attention, it is not well known that they deviate from their original engineered design: they float! The roots of cattail and bulrush pulled out of the bottom of the wetland and now form a mat of biomass so thick and buoyant you can walk on it. This root mat formed from peat-like material is derived from 22 years of continuous growth. The resulting sediments composed of settled algae and plant detritus are the assumed carbon storage components. In addition to peat-like root mat and sediments, above-waterline plant material, algae and soluble carbonaceous compounds in the water column, sediment, and gaseous emissions will be sampled.

With the growth of carbon markets and concern for greenhouse gas emissions, there is interest in locating carbon sources and sinks. The wetland's capacity for carbon storage is balanced by losses due to carbon emissions of methane and carbon dioxide. Effects of greenhouse gas emissions may offset carbon sequestration benefits, but production of biomass and accretion of peat soils are of particular interest in areas of wetland subsidence. The development of a carbon balance in Arcata's constructed wetlands will help to describe net productivity and carbon storage in high nutrient-available wetlands.

Wetland ecosystems are extremely productive biomass producers, and peat-producing wetlands are carbon storage sites. Arcata's constructed wetlands combine fertilized productivity with a peat-like root formation in an anaerobic, highly eutrophic environment. The slow rate of decomposition due to consistent anaerobic conditions and biomass production fueled by high nutrient wastewater are factors that contribute to long-term carbon storage. Preliminary estimates from the 1.2 acre treatment marsh 2 indicate removal of 12 tons dry weight algae solids per year. And a trial run sampling biomass in treatment marsh 2 shows dry weight of 3 tons of above ground biomass, and 23.5 tons of root mass.

The plant and peat-like root components, or primary productivity, will be sampled in the late summer during the peak of biomass production. Net primary productivity takes into account losses to the environment, mainly decomposition processes such as respiration. To account for decomposition, dried and weighed samples of plants and root material will be placed in the water column and allowed to decompose throughout the growing season. The samples will be removed, dried and weighed at the end of the study period to assess decomposition losses. Carbon assessment for biomass and sediment will be dry weight and loss-on-ignition followed by sample verification through a certified lab carbon analysis. Water column sampling and testing continues weekly through the study period. The tests used to quantify carbonaceous material in the water are familiar water quality tests: Total Suspended Solids (TSS) and Carbonaceous Biochemical Oxygen Demand (CBOD). Testing gaseous emissions is the most technically and instrumentally challenging aspect of the sampling program, yet most crucial component for a discussion of carbon sequestration. A closed, thermally stable environment will be built to capture gas emissions. The captured emissions must be analyzed, and I am still working to acquire access to a gas chromatograph. As you have read above, the sampling regime will be demanding and physically challenging. If you are interested in volunteering for the sampling program, please contact me at **mburke5@gmail.com**

HOW FACULTY SPEND THEIR "FREE" TIME

Brad Finney, ERE Professor

Municipalities in the United States began collecting wastewater for treatment 50 to 100 years ago. The collection systems have been successful in eliminating open running sewers and large standing ponds of raw sewage in urban areas. Unfortunately, the collection system pipes are subject to age-related deterioration, and many are now leaking, overloaded, or partially plugged, resulting in sewer backups into homes, overflows into public spaces, and spilling into rivers, streams, lakes, and beaches. Newer communities are not immune from collection system problems. Relatively new collection systems experience many breaks and sewage overflows because of damaged or plugged pipes, indicating poor construction techniques and inadequate maintenance of the sewer pipes. The U.S. Environmental Protection Agency (U.S. EPA) recently estimated that nationwide there are more than 40,000 municipal sewer spills or overflows each year. The spills and overflows result in several billion gallons of raw wastewater reaching public lands or waterways each year.

The impact from sewer spills and overflows is enormous. Raw sewage may contain numerous disease-causing pathogens. Illnesses resulting from human contact with raw sewage include cholera, dysentery, Hepatitis B, stomach flu, respiratory infections, and serious bacterial skin infections. Because of public health threats from these organisms, impacts on water sport activities, closures of municipal water supplies, and warnings on the consumption of shellfish are common. There are between 1000 and 2000 beach closures each year in the U.S. directly linked to sewage spills. Raw sewage spills in waterways can result in aesthetic problems and environmental quality degradation, seriously impacting the productivity and health of numerous aquatic organisms. While there are enormous impacts from wastewater collection system spills and overflows, the cost of addressing the problems are also significant. An estimated $80 to $200 billion dollars are required over the next 20 years to remedy existing problems, and another $100 billion to accommodate growth. These estimated costs are approximately $1,000 per person in the U.S. spent over the next 20 years.

During my 2008 fall term sabbatical leave, I developed the Sewer Collection system Asset Rehabilitation Prioritization (SCARP) model to assist in two basic areas of collection system asset management: 1) determining appropriate scheduled maintenance intervals for O/M pipe defects, and 2) selecting appropriate measures to address structural pipe defects. In the case of structural defects, SCARP determines whether a defect should receive regular maintenance, be repaired, or be eliminated by pipe relining or replacement. Alternative maintenance intervals and defect repair or elimination strategies are compared based on maximizing the net benefit to the operating utility, subject to operational, budget, and level of service constraints.

SCARP was applied to a pilot application problem consisting of 108 collection system pipe segments containing 506 structural defects in the City of Seattle collection system managed by Seattle Public Utilities. For a wide range of budget constraints, SCARP easily identified the optimal mix of rehabilitation measures for the defects that provided benefits (reduced risk of failure) exceeding the cost of providing those benefits. While the tool was developed using data from the City of Seattle, it will provide a general approach to the asset management problem that should have a significant impact on reducing the cost of upgrading the performance of wastewater collection systems in the U.S. Σ

In the Next Issue . . .

ERESA Rafting Trip Report

Every spring for 17 years, ERESA has experienced a 2-day whitewater rafting and camping trip in the nearby mountains. The trips are always eventful and fun, with great opportunities to connect with other like-minded students.

This year's event took place on April 25 - 26, after press time. Look for a full report in the next issue of ERE Messenger!

HSU'S POWER MIX AND GREEN CAMPUS PROGRAM: Every Plume Has a Silver Lining

Jon Mitscha and the Green Campus Team

California has relatively strict guidelines for producing electricity from coal within our state, but Humboldt State University purchases its electricity from Constellation Energy Group, which is based outside of California and has quite a different power mix from that of our local provider, Pacific Gas and Electric Company.

The "Power Mix Comparison" table (see below) compares Constellation Energy Group's California power mix to that of PG&E's.

As you can see from the table, Constellation uses 16 times as much coal per kWh as PG&E. That equates to approximately 1,318 more tons of coal burned last year to satisfy HSU's electricity demand compared to the same amount of energy from PG&E. Pacific Gas and Electric offsets coal primarily by using more natural gas and nuclear power.

Fortunately, the Green Campus Program at Humboldt State has found many opportunities to reduce the electricity and heating demands of our campus, thus reducing our indirect use of coal. The three current projects listed below are expected to save HSU $59,454 annually, which translates to 491,449 kWh of electricity and 13,890 therms of natural gas (1 therm = ~ 100,000 BTUs or ~ 29.3 kWhs). A fourth project, the bundle project, is expected to cut an additional 253 metric tons of campus greenhouse gas emissions annually. Together, these projects have an expected payback period of less than 36 months, and will continue to provide savings for many years to come.

1. Installation of Network-Based Power Management Software
Based on our office auditing campaign, we found that virtually none of the computers we assessed had energy saving settings enabled. Green Campus decided the best way to address this problem would be to install network-based power management (NBPM) software, which powers down the systems after a period of inactivity, to 1,719 campus computers. This software has already been installed on 450 computers, and installation on the remaining 1,269 computers is expected to be completed before the end of this semester.

2. Controlling Dining Hall Ventilation
A project to install a demand-controlled ventilation system (DCV) on the hoods in HSU's Jolly Giant Commons dining hall was on the backburner for some time prior to Green Campus' involvement. Working together, Green Campus and the Food Service Technology Center (FSTC) determined that HSU should install a DCV package to manage ventilation energy consumption. The installation was completed in December 2008.

3. Re-commissioning of the Wildlife Building
The Green Campus team conducted an initial walk through of the Wildlife Building in early 2008. Preliminary energy assessments were conducted to identify savings opportunities which included measuring the load of electric heat tape used on hot water lines and analyzing energy consumption of lab fume hoods. It was obvious that there was potential for significant energy savings. The project will fine-tune the Wildlife Building's heating, ventilation and air conditioning (HVAC) equipment to reduce the energy wasted by these aging systems.

Saving energy is important for so many reasons, and Green Campus is passionate about seeking out more opportunities to cut costs at the university and reduce our ecological footprint. If any students would like to get involved with our award-winning program or would like more information, email us at greenhsu@humboldt.edu and check out our website at www.humboldt.edu/~greenhsu.

The Alliance to Save Energy's Green Campus Program is funded by the ratepayers of California under the auspices of SCE, PG&E, and Sempra Energy.

POWER MIX COMPARISON (Estimated 2008)

SOURCE	CONSTELLATION ENERGY %	PG&E %
Eligible Renewable	10	14
Coal	32	2
Natural Gas	31	44
Nuclear	3	22
Large Hydro	24	17
Other	0	1
TOTAL	100	100

Σ

Life After Your ERE Degree . . .

Celeste Robinson, Natural Resources & Science Career Counselor

Graduation is getting closer and closer every day and with its inevitable arrival comes the tough part--- making career decisions that will impact your life. Even in a robust economy with tons of jobs available, the job search process can be hectic and anxiety ridden. But, since the country's economic meltdown last fall, we have seen more and more jobs disappear and the nation's unemployment rate skyrocket. So, as a graduating senior, what are you supposed to do? And even more critically, just what CAN you do?

First, sit back and take a moment to decide how you want to handle the situation. Do you want to find a job, move on to grad school, or simply take a breather? If the employment option appeals to you, consider the following three questions: "What three to five occupational choices am I willing to explore?", "What three to five geographical areas interest me?", and probably the most difficult question of the three, "What am I willing to give up to get what I want?" In other words, if you had to choose between salary expectations, location, and types of duties, which two are the most important? Which one are you willing to compromise on?

Second, seek professional advice and guidance. While advice from family and friends abound, the best way to handle these tough decisions and begin charting your post-degree life is to visit the Career Center to talk to trained professionals whose sole purpose is to help you help yourself. Didn't have the time to do an internship before graduation? Curious about which employers/sectors to explore for jobs and post-graduation internships? Not sure how to identify and research graduate programs? The Career Center, located in room 130 Nelson Hall West, can help. You can either stop by and set up an appointment, or touch base by phone at 826-3341. When you come in, we invite you to tour the premises and browse through the extensive career library of books and publications on successful job search techniques, resume writing, interviewing, possible employers you might wish to investigate, and graduate school research. In addition, we encourage you to take home some of the materials and resources that the staff has created in-house to help you in your decision making.

Third, take a hard look at your schedule and make a firm commitment to tackling those tough decisions. True, you have those pesky little pre-graduation details to attend to: writing those last-minute papers, prepping for those dreaded final exams, putting the finishing touches on the end-of-semester projects. But ask yourself the most challenging question of all: where do you want to be the day AFTER graduation – at home with mom and dad or starting that exciting new job in environmental resource engineering that was the impetus for getting this degree in the first place? While the job market is daunting right now, things WILL get better. But, you need to make sure that you will be all set for the takeoff when it comes. This means you should start NOW to build time into your schedule that you designate only for finding answers to those difficult questions raised earlier in this article. Even if it is only one hour a day a couple of times during the week, you will find yourself much more organized and prepared for the most important question faced by most new college graduates: "Where am I going to be working, and what will I be doing?" Let the Career Center help you find the answer.

A group of happy, hopeful 2008 ERE graduates

Σ

Thanks to our sponsors:

A.M. Baird Engineering
1257 Main Street
Fortuna CA 95540
707-725-5182

SHN Consulting Engineers & Geologists
812 W. Wabash Avenue
Eureka, CA 95501
707-441-8855
www.shn-engr.com/

Caltrans District 1
1656 Union Street
P. O. Box 3700
Eureka, CA 95502
707-445-6600
www.dot.ca.gov/dist1/

Spencer Engineering & Construction Management
1585 Heartwood Drive, Suite F
McKinleyville, CA 95519
707-839-4336

LACO Associates
21 West 4th Street
P.O. Box 1023
Eureka, CA 95502
707-443-5054
www.lacoassociates.us/

Winzler & Kelly
633 Third Street
Eureka, CA 95501
707-443-8326
www.w-and-k.com/

ERE Student Association, ASCE Student Chapter
Department of Environmental Resources Engineering
Humboldt State University
Arcata, CA 95521-8299
www.humboldt.edu/~ere_dept

NON-PROFIT ORG.
U.S. POSTAGE
PAID
Permit No. 78
Arcata, CA 95521

$$\nabla^2 \rho_A + \frac{\dot{n}_A}{D_{AB}} = \frac{1}{D_{AB}} \frac{\partial \rho_A}{\partial t}$$

$$\nabla^2 T + \frac{\dot{q}}{k} = \frac{1}{\alpha} \frac{\partial T}{\partial t}$$

Printed on 100% recycled paper
HSU is an AA/EQ institution