

## Sustainability Fair Posters 2011

### **MSU Campus Garden:**

Jes Hagan and Jake Berger, Missouri State Campus Garden

The Missouri State Campus Garden broke ground this last April thanks to a grant from the universities Sustainability Fund. Students, alumni, faculty, and community members have contributed their time to keep the garden fruitful. We usually have at least one work day a week and volunteer's are rewarded with fresh free organic veggies! So far we have successfully produced an abundant variety of vegetables, herbs, and flowers. If you would like to join us check out our MOState Campus Garden Facebook page for gardening dates and times. There is also a blog you can follow to find out more information about what the garden is up to: <http://blogs.missouristate.edu/campusgarden/>

### **Sustainable Design: FMD 470 Advanced Design Class**

Instructor Sandy Bailey (sbailey@missouristate.edu)

Reduce; recycle and reclaim are 3 methods of sustainable design by our students. The basis of the reduce concept is zero waste in the development of a garment. The goal is to use every inch of fabric to create a look it will be compared to a similar look using traditional fashion design methods. The projects that represent the recycle concept take used, outdated or vintage fabrics and turn them into contemporary fashion designs. The final concept displayed is reclaiming of nontraditional fashion fabrications and make them into wearable art.

### **A Model for a "Sustainability Minor" at Missouri State University**

D. Alexander Wait – Department of Biology; Lora Vess, Department of Sociology

There is a strong need for skills and learning in the area of sustainability – defined as “the triple bottom line” or “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. Sustainability addresses ways of protecting the Earth’s ecosystems while taking into consideration economic and social justice concerns. Student future success will benefit from a minor emphasis in sustainability – whether it is in, e.g., chemistry, health or theater. A group of 12-15 faculty from 11-14 disciplines are developing the minor. The SGA Director of Sustainability also participated to provide student input. The model proposes that the minor be housed in the Provosts Office or University College. All students would be required to take “Principals of Sustainability” (currently GRY 108; 3 credits) and meet a “Sustainability in Action” requirement (between 1 and 4 credits) – which could include Study Away, Internships, Service Learning, or Independent Study. Students would be required to enroll in 12 credits from classes from at least two of the following tracks: Technology and the Built Environment; Social Equity and Ethics; Economics and Policy; Global Environmental Systems. A system to find and evaluate courses for each track is underway. The group also discussed a portfolio requirement.

## **Ozarks New Energy: Providing Education and Connections for a Sustainable Ozarks Energy Future**

D. Alexander Wait – Department of Biology

Ozarks New Energy, Inc. (ONE) promotes responsible and sustainable energy choices for the Ozarks. Specifically, ONE supports the use of solar, wind, biofuels, energy efficiency, geothermal and hydro power. According to the Department of Natural Resources, \$1.5 billion leaves the Springfield area each year through the purchase of coal, gasoline, diesel, heating oil, propane and natural gas to power vehicles and generate electricity. By making energy sustainability more mainstream for businesses and individuals, ONE is working to reverse some of that outflow back to the local economy. A new initiative of ONE (besides our Conferences and Energy Café's) is to showcase energy successes among businesses and individuals. We are developing an exciting new initiative called "ONE Spotlight". We have identified 11 categories for commercial and residential individual entities: Solar, Wind; Product design; Architectural engineering and landscaping design; Waste heat recovery; Biomass; Energy efficiency; Geothermal; Hydro; Transportation; Education. No other organization is offering these local energy success stories, which could stimulate business for contractors and vendors and raise awareness of renewable energy applications in the Ozarks.

## **Drury University Sets Goals of Carbon Neutrality and Zero Waste by 2030 in Sustainability Action Plan**

Wendy B. Anderson, Ph.D., Director of Campus Sustainability

Drury University's sustainability initiatives are now guided by a comprehensive Sustainability Action Plan. Initially developed to fulfill the implementation of the American College and University President's Climate Commitment, Drury's Sustainability Action Plan has evolved into a living document that will inform operations, curriculum, research and design activities, and community outreach efforts of the institution. It builds on existing strengths and programs and sets long-term goals and short-term benchmarks to measure success. The Plan was developed over the course of two years by the President's Council on Sustainability and the Director of Campus Sustainability. They relied on input and feedback from all Vice Presidents and major campus stakeholder groups. The Board of Trustees approved the Sustainability Action Plan along with its associated funding mechanism, a Green Revolving Fund in May 2011.

## **Missouri State Sustainability Fund's impact on sustainability of the Springfield campus and surrounding communities.**

Paige Jenkins, Chief Sustainability Commissioner, SGA

The Student Sustainability Fund was created in March 2009 after the passing of the Student Sustainability Fee by the student body. The fee allocated two dollars from every student enrolled at the Springfield Campus every semester. The purpose of the Sustainability Fund is to provide financial support to implement student initiated projects at Missouri State Springfield Campus. These projects focus on initiatives that will lessen the negative environmental impact that the University may have over the community. Any student can submit a proposal, they will need to fill out a proposal (available online through the SGA website), and have a faculty sponsor. Current sustainability projects that are being implemented on campus are: Electric Vehicle, Campus Garden, Hydration Stations, Campus Recycling, and the Green Bike Project.

### **A rapid and inexpensive bioassay to model decontamination of organophosphates**

Dr. David Claborn and Sanjay Gupta Sagar, Master of Public Health program

The purpose of this study was to develop an inexpensive and rapid bioassay for decontamination procedures of organophosphates and related chemicals. Current methods utilize expensive chemistry techniques to identify degradation products, but do not assess actual biological toxicity. For this study, the insecticide malathion was diluted with xylene to 25%, then applied to unpainted steel plates. The plates were sprayed 1-3 times with a 5% bleach decontaminating solution. Toxicity was determined by confining ten red flour beetles (*Tribolium castaneum*) on the plates in inverted Petri dishes for one hour. Mortality and knockdown rates were determined at 1 and 24 hours post-exposure. A single decontamination resulted in a reduction in mortality of about 50%; three decontaminations resulted in over 70% reduction in mortality. These preliminary results suggest that this bioassay could be an inexpensive and rapid method for screening decontamination agents and for investigating the effect of environmental factors such as temperature and insolation on the degradation of common household toxins. A rapid bioassay would help in evaluating decontamination for accidental spills, for researching response to terrorist attacks with chemical warfare agents, and for cleaning houses that have been improperly treated with insecticides.

### **Exploring & assessing hard and soft energy paths within the Ozarks**

Dr. Jacob Sowers--Department of Geography, Geology, & Planning, MSU

There are many substantial obstacles to the global community's effort of achieving a more sustainable future. It has been argued that the most daunting challenge to progress is the continued reliance on non-renewable energy production coupled with exponentially increasing energy consumption. In the past few decades Amory Lovins and the Rocky Mountain Institute have quantitatively demonstrated that this centralized, ambiguous, and autocratic dynamic, termed the "hard energy path", would extol a negative impact on natural, social, and economic systems. Lovins, however, did not simply indicate the fallacy of a centralized fossil fuel economy; he also detailed a "soft energy path" alternative. This "soft" path is both economically and environmentally sustainable; concentrating upon diversified renewable energy production and increased efficiency. The path recognizes that although resource availability is important energy development also needs to be culturally sensitive, locally understood, and ethical. My current research connects the theoretical framework of hard and soft energy paths with a regional study of the Ozarks detailing the environmental potential, residential perceptions, and politics of shifting paths during the 21<sup>st</sup> century's "energy turn." This display focuses on preliminary findings that describe the environmental realities of the Ozark region's hard energy path and potential soft energy options.

## **Modeling the Potential Distribution of the Joshua Tree (*Yucca brevifolia*) using Logistic Regression**

Joseph M. Sturgis, Department of Geography, Geology and Planning

Predictive vegetation modeling is important for conservation and resource management. Advances in remote sensing provide increased opportunity to model the potential distribution of plant species. The Joshua tree (*Yucca brevifolia*) is one such species that is an important indicator species for the Mojave Desert. The purpose of this study is to create a potential distribution map of the Joshua tree across Clark County, Nevada. Logistic regression, a particular form of generalized linear models (GLM), is used to build a potential distribution model based on a set of predictor variables derived from remote sensing, climate and topography. The model input data consists of present/absent points with associated predictor values. Predictor histograms are visually examined for both present and absent data points in order to select significant predictors to include in the model. Model fit and assessment are completed using five-fold cross-validation, with predictive success measured by Cohen's Kappa coefficient and predictive power measured by the area under the receiver operating characteristic (ROC) curve. Once fitting is complete, a probability threshold is established in order to map locations of Joshua trees based on the potential distribution model. Finally, model refinement for subsequent studies and other ideas for further research are discussed.

## **Earth Science for Teachers: Leading the Way to Sustain Resources for Future Generations**

Jill Black, Missouri State University, Department of Geography, Geology, & Planning.

Elementary and middle school teachers will exert great influence on their students, not only by what they say, but probably more importantly, by the example they set and the attitudes they convey. Students in two sections of GRY240 Earth Science for Teachers will have the opportunity to design posters or elementary/middle school hands-on science activities about various topics related to Earth resources and sustainability, and will present their projects to their fellow preservice teachers. Examples of possible topics are recycling, air pollution, soil conservation, water pollution, controlling water quantity, energy resources, ocean pollution, sustainability of mineral resources, and groundwater pollution, especially in karst areas like the Ozarks. Students will be photographed with their posters or activities and their projects will be described on the Sustainability Fair poster. Hopefully, this personal connection with a sustainability issue will further students' involvement with these issues and students will also influence other preservice teachers in their classes. Ultimately, it is hoped that their many future elementary and middle school students will also carry on the ideas and ethic of sustainability.

### **Sustainability of Coastal Watershed Communities in Jamaica.**

Jackie Ebert and Dr. Robert Pavlowsky, Ozarks Environmental and Water Resources Institute, Dr. William Wedenoja, Department of Sociology, Anthropology, and Criminology, Dr. Daniel Beckman, Department of Biology, Linnea Iantria, Department of Geography, Geology, and Planning, Missouri State University.

At Missouri State University, the Ozarks Environmental and Water Resources Institute has been working in collaboration with the Department's of Biology, Geography, Geology, and Planning, and Sociology, Anthropology, and Criminology in Jamaica to assist local communities in developing a sustainable economy. The projects are in southwestern Jamaica along Bluefields Bay primarily in the towns of Bluefields, Belmont, and Cave. These international efforts support the university's mission in public affairs in the areas of environmental research, undergraduate and graduate education, and community outreach. To date, completed and ongoing projects have focused on water quality, stream health, cultural resource preservation, conservation ecology, coastal management, and geotourism.

### **Understanding Water Quality in Southwest Missouri.**

Heather Hoggard, Marc Owen, and Dr. Robert Pavlowsky. Ozarks Environmental and Water Resources Institute and Department of Geography, Geology, and Planning, Missouri State University.

The Ozarks Environmental and Water Resources Institute at Missouri State University provides technical assistance and student education in the area of water quality monitoring and management in the Ozarks. We work with environmental groups, consultants, government agencies, and MSU faculty and students to study and understand water quality conditions in streams and how they influence aquatic life and human activities. The three studies described on this poster focus on evaluating water quality trends in urban streams of various sizes in the James River Basin.

### **Sustainable Solutions for Stream Management.**

Marc Owen and Dr. Robert Pavlowsky, Ozarks Environmental and Water Resources Institute and Department of Geography, Geology, and Planning, Missouri State University.

The Ozarks Environmental and Water Resources Institute at Missouri State University provides technical assistance and student education in the areas of stream channel monitoring and management in the Ozarks. Information on river stability and sedimentation is collected using field and remote sensing methods. The main goal of this research is to support stream restoration efforts to revitalize impaired and disturbed streams. Two studies described in this poster include examples of restoring stream stability for flood control and water quality improvements in the Springfield area. In addition, a third study showcases a regional monitoring program aimed at understanding the channel conditions present in the Ozarks for broader management purposes.

**New “Sustainable Watersheds” Course.**

Dr. Robert Pavlowsky, Environmental and Water Resources Institute and Department of Geography, Geology, and Planning, Missouri State University.

A new sustainability course is being offered at the graduate-level in the Department of Geography, Geology, and Planning in Spring 2011. It will be offered on Tuesday nights from 6 to 9 pm under the title of GRY 751-SUSTAINABLE WATERSHEDS (Topics in Advanced Physical Geography) in Temple 335. The course will involve presentations and discussions of readings on the relationships among water resources and human activities within watersheds. The sustainability themes and case studies covered in class will relate to the specific interests of students in the class as well as broader subjects.

**Urban Water Quality in the Metropolitan Springfield, Missouri Area: MS4 Monitoring Results.**

Anna Larkin, Heather Hoggard, and Dr. Robert Pavlowsky. Ozarks Environmental and Water Resources Institute and Department of Geography, Geology, and Planning.

Municipalities within Greene and Christian Counties in Missouri have implemented storm water discharge monitoring programs to address water quality problems specific to urban watersheds as required by U.S.E.P.A. and Missouri DNR. Urban municipalities must participate in the NPDES storm water program to reduce adverse impacts from storm water discharges on water quality and aquatic habitat. This poster presents the results of the first two years of water quality monitoring for total phosphorus, total nitrogen, total suspended solids, chloride, specific conductivity, and pH. Thirty-one sampling sites within two counties were chosen for monitoring based on accessibility for sampling, suitability for the project, basin location, and urban land distribution. One base flow and four seasonal first flush samples were collected from each site annually. Water quality data were grouped by local watershed location to determine which areas were exceeding established limits and what affects they have on downstream lakes and rivers. This information will be used to plan management strategies to reduce water pollution and create sustainable watersheds in the Ozarks.

**Sustainable Watershed Assessments Using Geospatial Technology.**

Marc Owen, Bob Pavlowsky, Ben Young, and Andrew DeWitt. Ozarks Environmental and Water Resources Institute and Department of Geography, Geology, and Planning, Missouri State University.

Geospatial technology provides information on the variability of the Earth’s surface over time and space. Application of this technology is essential for addressing water quality and erosion issues at the watershed scale. The Ozarks Environmental and Water Resources Institute at Missouri State University utilize geospatial technology to address community sustainability issues that relate to development, agriculture and environmental restoration for watershed management in Missouri. Field based technology includes using land surveys, Global Positioning Systems (GPS) and Ground Penetrating Radar (GPR). Remotely sensed technology includes historical aerial photography, digital maps, and satellite imagery.