

## Results of the Sustainability Research Survey

Their research interests fell into 11 research themes. Each of these is briefly summarized below, in descending order of the number of faculty members involved. One or two projects in each theme are also identified as examples of the work being conducted.

- **Sustainable Agriculture.** This theme addresses agricultural practices aimed at water and soil conservation, low inputs, integrated pest control, waste reduction, and other activities that can produce sustainable agricultural product yields. Twenty-one faculty members are currently researching this area. Michael Anderson's "Plant Growth Promoting Bacteria" project aims to increase agricultural yields and reduce fertilizer inputs. Hailin Zhang's "Sustaining Oklahoma's Wheat Production by Soil Testing" uses improved testing technology to help farmers to make better sustainable economic decisions.

- **Conservation of Natural Resources.** Enlightened stewardship of natural resources is crucial to sustaining their production and use. Twenty-one faculty members are also involved in research this area. Bill Fisher's "Application of Gap Analysis to Biodiversity Conservation in Oklahoma" provides an initial step to a more detailed and comprehensive effort at long-term planning for biodiversity conservation in Oklahoma. Keith Owens's "Patch Disturbance for Ecosystems Restoration: Vegetation, Grazing, and Wildlife Interactions in Heterogeneous Landscapes" investigates the impacts of heterogeneity and distribution on ecosystems and possible restorative practices.

- **Energy.** Energy research, especially into renewable energy sources, can yield results that reduce cost, reduces pollution, conserves resources, increases energy security, reduces reliance on foreign energy sources, and creates jobs. Seventeen faculty members are currently researching this area. Yanqi Wu's "Improving Biomass Yield and Seed quality in Switchgrass" seeks to improve the genetic makeup of switchgrass to increase its potency as an energy crop. Carol Jones's "Harvesting and Handling Equipment to Meet the Demands of Oklahoma Lignocellulosic Biomass under Indigenous Growing Conditions" is looking for sustainable ways to produce biofuels here in Oklahoma. OSU is also a part of the Oklahoma Bioenergy Center (OBC) along with the University of Oklahoma and the Noble Research Foundation. OBC-funded projects related to biofuels are currently underway. Additionally, OSU and OU have partnered on licensed technology to produce biofuels from any carbon-based material.

- **Zero Waste/Waste Management/Pollution Prevention.** Cutting down on waste production can free up landfill space and promote product reuse. Sixteen faculty members are currently involved in this area. Jeff Hattey's "Animal Waste Management in Semiarid Ecosystems" seeks to develop plans for the sustainable use of livestock waste. Tim Bowser's "Food Byproduct Utilization" project optimizes waste streams at a large food processor in Oklahoma.

- **Social/Community Sustainability.** Strengthening communities is an important aspect of sustainability, which can be accomplished through the promotion of social justice and equity. Thirteen faculty members are currently pursuing research this area. Riley Dunlap's "International Attitudes toward Environmental Issues" measures public

acceptance of sustainable development. Mike Woods' "Entrepreneurial Communities" project identifies the traits and characteristics that lead communities to nurture successful entrepreneurs.

- **Sustainable Development.** Sustainable rural, urban, and suburban development that minimizes their ecological footprints are also essential components of sustainability. Thirteen faculty members are engaged in this research. John Veenstra's "Sustainable Development in Northwest Costa Rica" measures the impacts of cattle ranching and reforestation on pollution loads to rivers and economic development in this region of Costa Rica.

- **Green Architecture/Landscape Architecture.** Green building design reduces energy and water use, uses recycled and recyclable materials, minimizes ecological disruption, and promotes the aesthetic value of green spaces. Ten faculty members are conducting this type of research. Huatian Cao's "Design of Sustainable Relief Housing in Africa: An Implementation of 'Cradle to Cradle' Model in Earthbag Construction" project creates new construction techniques for African relief housing

- **Green Product Design.** Producing everyday items in a sustainable way, whether by using less non-renewable materials, making products that are reusable, reducing energy consumption, reducing waste generation, or using less toxic materials, is the goal of "design for the environment" initiatives that promote green manufacturing and green product design. Seven faculty members are currently researching this area. Huantian Cao's "C2CAD: A Sustainable Apparel Design and Production Conceptual Framework" integrates the 'cradle to cradle' model into apparel design and production models to provide sustainable production guidelines for apparel designers and manufacturers.

- **Industrial Ecology.** Industrial ecology applies the lessons of biomimicry and other natural systems designs to industrial/manufacturing operations. Five faculty are currently researching this area. Bill Kolarik's "Industrial Assessment Center" aids manufacturing businesses in energy conservation and efficiency.

- **Ecotourism.** Sustainable ecotourism educates people on the environment. Four faculty members are involved in this research. Lowell Caneday's "Resource Management Plan: Natural Falls and Eucha" developed a resource management plan for two of Oklahoma's state parks.

- **Business Sustainability.** This theme seeks to maintain a healthy economy while also addressing environmental and social sustainability. Three faculty members are interested in this area. We were not able to identify any current research projects, though we suspect that this area is ripe for development at OSU given the new entrepreneurship program.