



Policy Initiative invests in land tenure program

By MARY ADAMS Outreach and Policy Coordinator

How does land ownership affect decisions about land use and, ultimately, its sustainability? What can be done to encourage land owners and their tenants to seek out and choose more sustainable options? A new two-year jointly funded program – the Iowa Landowner and Sustainable Agricultural Land Stewardship project – unites the Leopold Center and the Agricultural Law Center at Drake University in seeking answers to these questions.

“Many of Iowa’s key land use decisions are not necessarily being made by producers living on their farms,” said Leopold Center director Jerry DeWitt. “We have absentee landlords, tenant farmers, or joint owners in one family making choices about production, land maintenance and

conservation. We wanted better information about how to help them make the best determinations that will sustain their land for the future.”

Recent data confirm that more than half of Iowa is farmed under some form of a lease. This project will explore trends in Iowa farmland ownership and the transition of land to a new generation of owners, many of whom will rent or lease farmland to others.

“We’re interested in studying current farm lease agreements and hope to provide information for landowners about how leases can be used to promote conservation and sustainable agriculture,” said Neil Hamilton, director of Drake’s

LAND (cont. on page 2)

Leopold Center studies denitrifying bioreactors – possible help for Gulf ‘dead zone’

By ALLISON SEVERSON Leopold Center Communications Intern

Alok Bhandari hopes that the water from his denitrifying bioreactor in Story County, Iowa will make the northern Gulf of Mexico safer for shrimp than what is coming out of other Midwestern tile-drained fields.

Nitrates from Iowa’s tile-drained landscape have been contributing to an increasingly large “dead zone” in the Gulf of Mexico since the 1980s. As much as 39 percent of the nitrogen buildup has been traced back to the Upper Mississippi River Basin, including Iowa. That’s why the Leopold Center Ecology Initiative is supporting a new multi-year research project led by Bhandari, an associate professor in

the Iowa State University Department of Agricultural and Biosystems Engineering. Bhandari’s project will investigate the value of denitrifying bioreactors as a nitrogen management option for Iowa farmers.

“The goal of this project is to facilitate adoption of nitrogen management practices in Iowa and the Upper Mississippi River Basin and thus promote a more sustainable agriculture,” said Bhandari. “This goal depends on several factors, including cost-effectiveness, social acceptance and performance of practices such

BIOREACTORS (cont. on page 4)

INSIDE THIS ISSUE



7



11

Director’s Q&A: Redefining ag 3

Kirschenmann: The dangers of too much certainty 5

Farm to Fork finds followers in Pottawattamie County 6

High tunnels, high-value crops 7

Core issue: Livestock, diversity, lessons from Iowa’s past 9

Center issues 2009 RFP 10

Center Progress Report moves to on-line only distribution 10

Northwest Iowa farm tour 12



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LEOPOLD CENTER

LEOPOLD LETTER MISSION

The mission of the *Leopold Letter* is to inform diverse audiences about Leopold Center programs and activities; to encourage increased interest in and use of sustainable farming practices and market opportunities for sustainable products; and to stimulate public discussion about sustainable agriculture in Iowa and the nation.

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The Leopold Center for Sustainable Agriculture seeks to identify and reduce adverse socioeconomic and environmental impacts of farming practices, develop profitable farming systems that conserve natural resources, and create educational programs with the ISU Extension Service. It was founded by the 1987 Iowa Groundwater Protection Act. The *Leopold Letter* is available free from the Leopold Center at 209 Curtiss Hall, Iowa State University, Ames, Iowa 50011-1050; (515) 294-3711.



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CROSS-INITIATIVE GRANT HELPS LAUNCH NEW ON-FARM ENERGY WORKING GROUP

LAND (continued from page 1)

Agricultural Law Center. "With the increase in the number of absentee landowners, communicating conservation goals can be a real challenge."

A second trend the study will examine is the proliferation of other legal agreements impacting farmland, such as wind right leases, manure contracts and conservation easements. "As owners enter additional legal agreements on their land, understanding how the agreements may affect future owners or how the land is managed becomes more complicated," Hamilton said.

Drake will use the project's findings to draft a model sustainable agricultural leasing guide. It will explore the impact of traditional farm leasing agreements and practices on agricultural sustainability and land stewardship and offer alternative provisions and practices.

As part of the project, Drake will add a fellow position in the Agricultural Law Center. This new staff attorney will conduct research, inventory and survey land tenure legal agreements and practices, interview landowners and advisers, develop survey tools, and collect and analyze legal agreements. This summer the Ag Law Center has chosen several law students to serve as summer interns to work on different aspects of land tenure and conservation issues.

Land use documentary filmed

During May the Ag Law Center made significant progress on a Drake-funded component of the project creating an educational documentary titled "The Land Remains." Filming was conducted at more than a dozen farms and locations around the state and interviews were taped with Jerry DeWitt and Iowa State economics professor Mike Duffy, among others.

The Drake center plans to develop several versions of the show, including a shorter version for possible screening and a longer educational version with supporting curriculum materials. The first version of the

With the increase in the number of absentee landowners, communicating conservation goals can be a real challenge.

– Neil Hamilton



program is scheduled to be completed by September.

Earlier this year, an Ag Law Center researcher conducted a study to identify and inventory any model agricultural leases used by the legal communities in Iowa and neighboring states, with particular focus on lease provisions relating to soil conservation, good husbandry, and related environmental issues.

Historical focus by Duffy

In addition to the Drake project research and outreach, the Policy Initiative has provided a modest amount of funding to Duffy, who directs the Iowa State University Beginning Farmer Center, to consider other aspects of land ownership and tenure in the United States. He will look at what the future might hold and what changes in land ownership mean for beginning farmers and sustainable agriculture.

Duffy is conducting his historical research as part of an ISU faculty sabbatical and has traveled to New England and Mississippi, and possibly may visit Idaho and California. His work is being coordinated with the project at Drake University.

New grazing publications available

Iowa State University animal science professor Jim Russell has summarized his grazing and animal behavior research in a newly collected *Guide to Managing Pasture Water*. In these publications he addresses topics from a series of research projects supported by the Leopold Center: stabilized stream and pond access; off-stream water, shade and nutritional supplementation to modify animal behavior; and how to manage streamside buffers with grazing.

The publications are available from the Iowa Beef Center and on the Leopold Center Ecology Initiative Web page (go to the Resources page and then Grass & Grazing): www.leopold.iastate.edu/research/eco_files/resources.html

q&a

A conversation with Director Jerry DeWitt

Q. What changes do you see taking place in how people view agriculture?



A garden on the White House lawn and inner-city vacant lots turned into places for people to grow their own food are signals of change. And I sense that people are beginning to reassess their thinking about agriculture.

Traditionally, agriculture has been shaped by the rural landscape and an agrarian ethic. Some 100 years ago, more than 50 percent of our population was directly involved in agriculture; today less than 2 percent are actively engaged in producing food for the rest of the nation and the world.

Although the changes to our land have been great, we have kept our deeply embedded perceptions and ideas. We see “agriculture” as being basically one size, on rolling and picturesque landscapes, with sharp divisions between what is “rural” and what is “urban.” These lines are set by policy, not by common sense or need.

However, I am seeing a change in attitude and I am getting more questions from others such as: What is agriculture? Where is agriculture? Where should agriculture be?

How do we go about redefining agriculture?

First of all, we need to find a new way to talk about it. Our definition of agriculture needs to be more than simply the vast production of several commodity crops or grains and livestock, all undifferentiated and intertwined on an ever depopulating rural landscape. We need to think about agriculture the same way we think about other markets and products. Our agriculture needs to provide the niche product, the valued added commodity, the distinctive food to satisfy ever-growing consumer demands.

Where is the face of the farmer? We are hearing more calls for locally grown items, organic food, meat and dairy products from grass-based systems, and regionally branded foods and products. Is there not room for this type of production in today's agriculture? Is this not also “agriculture”?

Operation size and our history of support for these operations should not define tomorrow's agriculture.

I think these emerging ideas about agriculture come from a new awareness among non-rural residents. Many people, from young to elderly, inner city to suburban, are recognizing the need for greater access to food. They want to connect to their agrarian heritage, some of which may add to a sense of self-fulfillment in times of economic uncertainty.

Iowans and the nation have been slow to respond to these new trends. We appear to have the same parochial divisions between urban and rural. We think agriculture is something that exists beyond the city limits; by statute and history it is separate from our people and our communities. But should that be the model for the future?

How can Iowa cities, communities respond?

We can be a model for a new and bold civic commitment and understanding by providing a vision for our people about food systems that reach beyond the farm gate. We need to consider revamping city government and structure, and reinvigorate their administrative leadership.

Every Iowa community needs to form its own Department of Food and Agriculture. The tasks and opportunities for these new departments are endless. They will help each community boldly create more supportive and responsive systems, rules and programs that embrace food and agriculture within the city limits.

Food production within a city's limits can provide access to more food resulting in better nutrition, stronger local economies, engaged youth education, better health and well being, greater local autonomy and many other benefits. Our current longtime civic departments for parks and recreation, planning and zoning, public relations, etc. are not situated or inclined to effectively embrace and sup-

port such growing needs and trends within our cities.

We need to overcome the barriers preventing citizens from engaging in agriculture within city limits. Why, for example, can't small flocks of chickens or bees be efficiently and safely raised in an urban environment? Why are small-scale greenhouses and vacant lot gardens not embraced as a means to provide greater access to local produce? How can youth be taught entrepreneurial skills each summer in a civic agricultural program? Why are farmers markets relegated to a side street and parking is the major concern? How can farmers be included more as a partner in local communities?

Removing barriers is the first step; creating incentives is the next step. We have industrial parks in many communities... where are the agricultural parks within the city limits?

The opportunities are endless for cities and towns of all sizes to build capacity and enrich their communities in this area. But first we need to think differently – and set up departments of food and agriculture.

If leaders in Iowa cities need to be convinced, I stand ready to meet with them anywhere and any time. We must start the conversation and plant the seeds of change.



See how a Leopold Center grant is helping one county government redefine agriculture, page 6.

PILOT, FULL-SIZE BIOREACTORS PROVIDE LONG-TERM LOOK AT EFFECTIVENESS OF NEW TECHNOLOGY

BIOREACTORS (continued from page 1)

as bioreactors.”

A bioreactor is a large trench through which water from underground drainage tiles passes before leaving the field. This hole or trench is filled with organic matter that is high in carbon, in this case a mix of chips from various hardwoods, that act as a strainer for water coming from the tile. The wood chips “strain-off” nitrogen (appearing as nitrates) in the water by growing bacteria that digest the nitrates before the water flows out of the field and into nearby streams.

Three key “actors” contribute to the process: a source of carbon, (wood chips), bacteria (which grow on and around the carbon matter) and nitrate (present in the runoff), which is food for the bacteria. In addition, oxygen cannot be present, otherwise bacteria will feed on the oxygen and not the nitrate.

Bioreactors capture nitrate in water from underground tile drainage lines at the edge of fields, yielding water that is much cleaner when it enters Iowa streams and rivers.

However, little is known about this technology, such as how effective it can be at removing nitrates. Bhandari hopes to per-

fect a bioreactor design that can remove a high percentage of nitrate and optimize its performance under Iowa field conditions. He will monitor three small-scale and three full-scale bioreactors over two full growing seasons beginning in 2009.

Three pilot bioreactors were installed at the Iowa State University Agronomy/Agricultural Biosystems Engineering Research Farm west of Ames. They are identical in volume but vary in shape so researchers can evaluate the effectiveness of each model. The reactors are 2 feet deep, filled with wood chips, then covered with geofabric and 3 inches of top soil.

Bhandari is monitoring two full-scale bioreactors installed by the Iowa Soybean Association in the West Butrick Creek watershed on the Mike Bravard farm in Greene County and on the Arlo Van Diest farm in Hamilton County. The third reactor is at Iowa State University’s Northeast Iowa Research Farm near Nashua.

While the pilot bioreactors are only about 12 square feet in surface area, full-scale bioreactors require about 25 square feet per acre of farmland drained and a depth of about 4 feet depending on the

www.leopold.iastate.edu

Watch a video about this project in our new On the Ground series:
www.leopold.iastate.edu/research/eco_files/ground.html

location of the tile line. A 100-acre field would require about 2,500 square feet of bioreactor space covered by a grass buffer. Grass is planted over the entire area so that the only thing visible aboveground is a grassy buffer strip.

Several things can help prevent nitrate loss through groundwater runoff besides denitrifying bioreactors; among them are tillage, cropping systems, type of fertilizer and tile-drain spacing. However, even with good management strategies, the levels of nitrogen in drainage water can still exceed approved levels.

Bhandari said he became interested in water quality work several years ago and began to look at what happens in groundwater systems when pesticide levels increase. When asked why this project would matter to Iowans, he said, “This is one more way to protect our surface water, and that is important.”

Bhandari and his team also are looking at the length of time bioreactors will function effectively before the filtering material must be replaced. He predicts that the bioreactors will last at least a decade. Next year, they will compare corn cobs with the wood chips as the carbon source.

Bhandari is working with co-investigator Matt Helmers, Agricultural and Biosystems Engineering; graduate research assistant Laura Christianson; and research associates Carl Pederson, Loren Shiers and Reid Christianson.



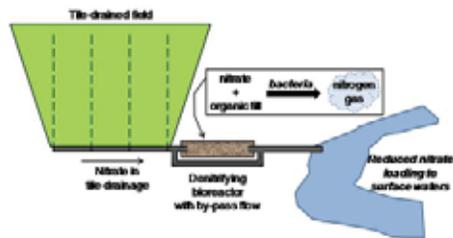
Left, shows construction in April on a field-scale bioreactor near Nashua that will handle drainage from 19 acres.

The drawing below shows how the technology removes nitrates.

Graduate student Laura Christianson and undergraduate student Scott Jacobsen install monitoring equipment in the pilot-scale bioreactor near Ames.

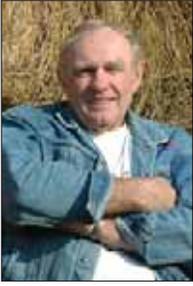
Denitrification Bioreactors

- Biologically mediated reduction reaction
- $\text{NO}_3^- \rightarrow \text{NO}_2^- \rightarrow \text{NO} \rightarrow \text{N}_2\text{O} \rightarrow \text{N}_2$ gas
- Denitrifiers: anaerobic, need carbon and nitrate



Illustration, photos by research team and by Allison Severson.





Future

TOWARD A SUSTAINABLE The dangers of too much certainty

To see the world this way, as a ceaselessly complex and adaptive system, requires a revolution. It involves changing the role we imagine for ourselves, from architects of a system we can control and manage to gardeners in a living, shifting ecosystem.

— Joshua Cooper Ramo, author, *The Age of the Unthinkable*

In his stimulating and insightful new book, *The Age of the Unthinkable*, Joshua Ramo reminds us that when the brilliant Austrian economist, Frederick August van Hayek, received the 1974 Nobel Prize (one of the first in economics), he made an interesting observation in his acceptance speech. Quoting from Hayek's speech, Ramo provides us with important insights that I think are especially relevant to our conversations regarding the sustainability of agriculture in a changing world.

Economists are at this moment called upon to say how to extricate the free world from the serious threat of accelerating inflation, which, it must be admitted, has been brought about by policies which the majority of economists recommended and even urged governments to pursue. We have indeed at the moment little cause for pride: as a profession we have made a mess of things.

The title Hayek gave his speech was "The Pretense of Knowledge," and what he observed has significance beyond the field of economics. In fact, he intimated as much in his speech.

There is much reason to be apprehensive about the long-run dangers created in a much wider field by the uncritical acceptance of assertions which have the appearance of being scientific.

He concluded by warning the audience that if we aim to do more good than harm in our efforts to improve the world, we will . . . have to learn that in this, as in all other fields where essential complexity of an organized kind prevails, [we] cannot acquire the full knowledge which would make mastery of the events possible.

In agriculture we now often see language that assumes a similar pretense of knowledge. A particular agricultural position or practice often is claimed to be "science-based," or "state-of-the-art," which implies that we already "know" all we need to know and therefore our positions need no longer be questioned or explained.

In a predictable world such an attitude may not "make a mess of things" but it can be disastrous in a rapidly changing, unpredictable world – the kind of world which Ramo correctly claims is confronting us.

Gary Nabhan's new book, *Where Our Food Comes From*, provides compelling evidence of the need to rethink sustainability with respect to our current food and agriculture system given the changes we are now experiencing.

Nabhan traces the incredible story of Nikolay Vavilov, the Russian geneticist who devoted his life to finding, cataloguing and preserving the diversity of crop plants that had been nurtured by indigenous farmers for millennia. He provides compelling evidence to demonstrate how that diversity, adapted to local conditions, played a key role in staving off famine in many parts of the world.

Nabhan suggests such an approach can help us meet the food challenges in our own future. Short-circuiting this process with the use of transgenic technologies may be an untenable alternative

because such technologies depend on the cultivated biodiversity inherent in traditional agricultural regions and cultures; however, we are rapidly destroying that diversity as an unintended consequence of transgenic technology.

Facing challenges without diversity tool

In the meantime, our universities, apparently seduced by the contemporary culture that leads us to believe we now "know" how to "fix" any failures with new technological breakthroughs, have increasingly abandoned the preservation and development of seeds and breeds that are locally adapted to the ecosystems in which they exist. This means that farmers throughout the world will be faced with meeting the challenges of new famines, increasing populations, rising energy costs, diminishing fresh water resources, depleting soil health and greater climate instability, all without the diversity of seeds and breeds required to adapt to their new circumstances. *National Geographic* magazine recently published a sobering analysis of "The Global Food Crisis," which describes some of the complex dilemmas that this new situation presents. [Read the article at: <http://ngm.nationalgeographic.com>; search for global food crisis, June 2009]

As Nabhan points out: "The U.N. Food and Agriculture Organization estimates that about three-quarters of the genetic diversity of agricultural crops has been lost over the last century, and that out of 6,300 animal breeds, 1,350 are endangered or extinct."

He contends that the diminished diversity and availability which have taken place in the 90 years since Vavilov's assessment now seriously threaten humanity's survival. Nabhan says that the causes of that genetic erosion of biodiversity are many, and include

- the wholesale replacement of many traditional food varieties by a single cash crop;
- the conversion or fragmentation of agricultural landscapes by industrialization and urbanization;
- the usurping of waters formerly used for crop production for other uses;
- the loss of traditional seed-saving knowledge among the rural populace as farmers start buying hybrid seeds and
- the banning of local production of traditional varieties by plant-patenting legislation and free trade agreements.

Perhaps this is why the United Nations now urges us to change course as we prepare to address the global "food crisis." The president of the United Nations General Assembly is encouraging a shift from technology, trade and aid as the central approaches to meeting our global food challenges, to a new paradigm based on food democracy, food justice and food sovereignty. The UN points out in its recent International Assessment of Agricultural Science and Technology for Development (IAASTD) report that

FUTURE (cont. on page 8)

Local food, local government: Farm to Fork program a success

By ALLISON SEVERSON Leopold Center Communications Intern

“Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it is the only thing that ever has.”

Mead’s quote holds true for most successful local food systems that have been established in Iowa. One good example is in Pottawattamie County, where a brainstorming session led to creation of a local food council and a thriving local food economy.

From the farmers and food processors to the retail outlets and consumers, all play a part in making the community food system effective. What started as a few people talking about a need for more local food and producers has sparked booming farmers markets and more community members gathering together.

These changes began when Shirley Frederiksen, Golden Hills Resource Conservation and Development, and Melvin Houser, Pottawattamie County Board of Supervisors, started to talk about the need for more local food and producers.

Getting government involved

As an elected government official, Houser thought that just as the government supports current farming practices, public health, wellness and tourism, it was about time for the government to be involved in the promotion of a local and regional food system. He and Frederiksen envisioned the benefits stretching across many areas, from tourism to public health.

A Leopold Center grant helped their ideas become a reality when they applied for and were awarded a two-year grant for the project, Pottawattamie County Farm to Fork. Now in its second year, the project aims to develop a mentor program and a strategic plan that will increase the production of locally-raised food in southwest Iowa.

Farm to Fork is part of the Southwest Iowa Food and Farm Initiative (SWIFFI). This is a multi-county coalition of individuals and groups working to build a regional food system in southwest Iowa.

Houser stressed the importance of the local Resource Conservation and Development’s (RC&D) involvement in the project and cause, but also said that it must be a grassroots movement to achieve long-term success.

In the winter of 2007-08, Donna Peters, Western Iowa Development Association, helped write an action plan for Farm to Fork. One of the plan’s goals was to educate growers and eaters. Publications, fliers and handouts have been produced

and spread through the community via friends, families, neighbors, churches and co-workers. “Donna Peters and this action plan were vital tools for our success,” said Frederiksen.

In the fall of 2008, the Pottawattamie County Board of Supervisors passed a resolution to establish a local foods council. The resolution called for an eight-member foods council that would be active in continuing to advance the strategic plan created the previous year.

“The foods council is a diverse set of people, from the grocer to the school nutritionist; they all come to the table seeing this in a different way. A diverse set of people acting as one is a great thing, and really makes this possible,” Houser explained.

Organizers of Farm to Fork are hoping to continue to increase the number of beginning producers in the region, expand the number and diversity of local growers as well as farmer-led businesses, and build stronger relationships between consumers and producers in the region. Helping meet these goals is a new local foods coordinator, Bahia Barry, who was hired to help carry out the strategic plan and expand the Farm to Fork program. To accomplish these things, she has helped organize a food atlas and is working on a database of local producers, as well as a Web site. Building relationships with grocers and restaurant owners is an important part of Barry’s position.

“Having a local foods coordinator is really important to continued success,” Houser said. “She makes contacts with local grocers and restaurants, and has a hand in recruiting new producers.”

Many changes can be seen in Oakland, where Frederiksen said the Riverside Farmers Market attracts more than 100 people downtown on Wednesdays. She said a farmer’s market fund provides a canopy and chairs that encourage community members to sit and socialize.

“This is a great example of a community really coming together

and treating this as a community service event,” Frederiksen said. “Jan Kenkel and Becky VonWeihe are market managers and are doing a great job of bringing the community together.”

– attributed to Margaret Mead

Connections are important

Houser said economic development and a vibrant community are two of the strongest arguments for involvement in local and regional food systems work. Rich Pirog, Marketing and Food Systems Initiative leader, said that the networking, technical assistance and shared ideas among local groups participating in the Regional Food Systems Working Group are as important as the financial help they receive from the Leopold Center.

“Part of the local success relates to the connections made with other people who also are looking at the broader picture of the benefits of local and regional food commerce,” he said.

When asked what someone could do to “get the ball rolling” in his/her own community, Frederiksen advised: “Get like-minded individuals together—go to your board of supervisors and RC&D. They may have already started something. All it takes is a couple of community activists to get together and make the case. The progress can be slow, but it is progress.”

Frederiksen and Houser agree on the benefits of this work, with three that rise to the top of many lists: becoming self-sufficient, creating a sense of community, and renewing a relationship with the land.



Riverside Farmers Market in Oakland Photo by Golden Hills RC&D

Producers extend crop seasons using high tunnel production

By LAURA MILLER Newsletter editor

Even after a chilly, wet spring, Sean Skeeahan and Jill Beebout were able to sell their signature tapestry salad mix on opening day at the Des Moines Farmers Market in early May.

Skeeahan and Beebout operate Blue Gate Farm near Chariton where they grow vegetables on about 1.5 acres. Although most of their crops are grown outdoors, they also have selected varieties ripening inside two high tunnels.

A high tunnel is constructed of bent metal pipe attached to metal posts and covered with a layer of polyethylene. Technically not greenhouses because they have no heat or forced ventilation, high tunnels help Iowa producers extend the growing season both in spring and fall. In mid-summer, Skeeahan and Beebout will have ripe tomatoes about a month earlier than other growers.

That's the competitive advantage that Linda Naeve and Ray Hansen were looking for when they conducted a two-year research project for the Leopold Center's Marketing and Food Systems Initiative. Naeve and Hansen, who work with Iowa State University Extension's Value Added Agriculture program, studied yield potential, profitability and market distribution options in high tunnel systems.

Over the past two seasons, horticulture researchers Hank Tabor and Paul Domoto grew multiple varieties of several high-value crops in high tunnels and outdoors at two locations: in central Iowa at the ISU Horticulture Research Farm north of Ames and in southwest Iowa at the ISU Armstrong Research Demonstration Farm in Cass County. The crops included tomatoes, bell peppers (green and colored), raspberries and blackberries, pole beans and Greek oregano.

"The high tunnel project clearly identified that there is potential profitability but it comes with a whole new set of management issues," Naeve said. "The success of a high tunnel enterprise requires careful planning and a clear business strategy for success."

They found that crop diseases were reduced, but insect pest management needs increased with high tunnel production. Not all crops were profitable, and the best combination is a plan that includes multiple crops per year. Tender varieties of raspberries and blackberries that produce larger fruit than the hardy outdoor varieties grown in Iowa fared well inside the tunnel, but the plants needed careful management.

Many environmental factors can be controlled inside the high tunnel. Plants are watered via drip irrigation. Temperature can be changed by raising or lowering the plastic sides of the tunnel. Row covers can provide some protection during cold weather, enabling some crops to be grown until late October in Iowa. Many diseases that might cause problems in crops grown outdoors create fewer problems inside the tunnels.

However, a high tunnel system has little defense against elements of Iowa's volatile weather such as high winds and hail. A 70 mph wind gust knocked down the tunnel at the Armstrong farm in May 2008, and again in July. A tornado destroyed the Blue Gate Tunnel on May 30, 2008; they restored the structure in August and added a second tunnel this past March.

"That's a real testimony, that Blue Gate found it profitable to replace the high tunnel and add another one," Naeve said. "There's a great future in this growing system because young growers and existing farmers can diversify their production but you need to

Tomato Production in a 30X96-ft. High Tunnel

| Item | Quantity | \$/Tunnel |
|--|-------------|----------------|
| Labor (\$10/hr) | | |
| Cover tunnel | 6 | \$60 |
| Retighten cover | 4 | \$40 |
| Soil prep, planting | 12 | \$120 |
| Scouting, pesticide application | 8 | \$80 |
| Maintenance (stake, weed, prune, etc.) | 35 | \$350 |
| Monitor and ventilation | 8 | \$80 |
| Harvest, grading, packaging | 50 | \$500 |
| Post-season cleanup | 6 | \$60 |
| Supplies/Materials | | |
| Fertilizer | | \$35 |
| Plastic mulch | | \$18 |
| Transplants (including seed) | 360 | \$75 |
| Fuel and electrical | | \$25 |
| Pesticides | | \$25 |
| Lab testing | | \$30 |
| Harvest supplies | | \$500 |
| Scouting supplies | | \$50 |
| Water (\$4.90/1,000 gal.) | 15,000 gal. | \$74 |
| 1/10 of initial costs | | \$860 |
| EXPENSES: Total | | \$2,982 |
| Yield | | |
| 5,200 pounds marketable (\$2/pound) | | \$10,336 |
| Less production expenses | | \$2,982 |
| NET INCOME: | | \$7,354 |

Initial costs estimated at \$8,600 for tunnel, irrigation system, stakes/twine, with a 10-year life span. Calculations do not include land, transaction or marketing costs.

Source: Leopold Center for Sustainable Agriculture



High tunnel raspberries were a profitable crop.

know how to manage them."

Naeve and Hansen are working on a second phase of their "Tunnels to Tables" project. They are producing a workbook and seven-hour training module. "Our intent is to share what we've learned through research at ISU and what other growers have experienced by trial-and-error so new growers won't have to learn from their mistakes," Naeve said.

www.leopold.iastate.edu

Photo gallery, crop-by-crop reports:
www.leopold.iastate.edu/research/marketing_files/tunnel.htm

New volume touts eternal value of grassland to agriculture

Clinton P. Anderson, U.S. Secretary of Agriculture from 1945 to 1948, pointed to the USDA 1948 *Yearbook Grass* as part of a “plan for a more secure agriculture in the United States.” He went on to suggest that grasslands were the “foundation of security in agriculture” and that grass not only enhanced conservation but also supported “good farming” and “prosperity.”

The 1948 version of *Grass* was a visionary text that made the case for the importance of grass in the nation’s life. Grass-based systems, as Henry A. Wallace put it eight years earlier, “must be permanently a part of our agriculture if it is to have the strength it will need in the future.”

In the decades that followed with ample and cheap fossil fuel resources available, agricultural systems no longer relied on grass for its productivity and sustainability. However, energy challenges of the 21st century make this grass-based vision for agriculture newly relevant today.

With a generous grant from the Wallace Genetic Foundation, the Leopold Center’s Ecology Initiative assembled a team to update the 1948 *Yearbook of Agriculture, Grass*. The new book is *Grassland: Quietness and Strength for a New American Agriculture*, published in May by the American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America (ASA-CSSA-SSSA).

The book was edited by Iowa State University Emeritus Professor Walt Wedin, currently adjunct professor in the Department of Agronomy and Plant Genetics at the University of Minnesota; and ISU agronomy professor Steve Fales. Leopold Center Ecology Initiative leader Jeri Neal and Leopold Center Distinguished Fellow Fred Kirschenmann worked with the team of eight national authorities who provided leadership for the project. More than 65 writers contributed to the project.

“This book makes a compelling case for why grassland should be a permanent component of our agriculture,” Neal said. “It places grassland plants into the ecology of farming. Grass-based systems have a vital role in ensuring the sustainability of our agricultural production systems.”

The complete 1948 USDA yearbook is provided on a searchable CD that accompanies the new book. Wendell Berry, a farmer and

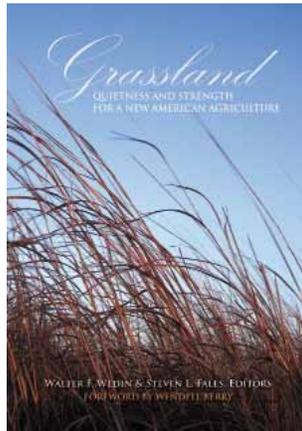
author of more than 40 books and essays about culture and agriculture, provides a moving foreword on the importance of educating future farmers about the land and the roles of grasslands.

“True farmers have minds that are complex and responsible,” writes Berry. “They understand and honor their debts to nature. They understand and honor their obligations to neighbors and consumers. They understand and respect the land’s need to be protected from washing. . . . In the time that is coming, we are going to need many more such farmers than we have, and we will need them much sooner than we can expect to get them. We will get them only to the extent that young people come along who are willing to fit their farming to the nature of their farms and their home landscapes, and who recognize the paramount importance of grass and grazing animals to good farming everywhere.”

The book is divided into three main sections that highlight the voices of grassland advocates through history, examine the many functions of grassland today, and look at the benefits grass-based agriculture can provide when grass is treated as an essential resource.

- “Past Is Prologue,” tracks the history of grassland farming, emphasizing some of the philosophical arguments that advocate for grasslands as a vital component of an evolving American society.
- “The Present: Transitions over 60 Years,” aims to provide the reader the foundation needed to move into the future, including updated information on cropping systems that include perennial grasses and legumes.
- “The Forward Look: Opportunities and Challenges,” examines the role of grass-based agriculture in maintaining the stability of rural communities, including the human health benefits when grasses and legumes are made a primary resource in the food chain.

The book is available for \$80 from ASA-CSSA-SSSA at: www.societystore.org, by phone at (608) 268-4960, or by e-mail: books@agronomy.org. Tri-Society members may purchase copies at the membership rate of \$64.



Grass-based group initiates new projects

The Leopold Center’s new Grass- Based Livestock Working Group is funding three small research and demonstration projects. The group is led by Andy Larson, small farm sustainability specialist for Iowa State University Extension.

Iowa State University Extension specialist Denise Schwab will look at the economics of managed grazing systems. Sarah Carlson and Gary Huber from Practical Farmers of Iowa received funds for a June workshop for direct-marketing meat. ISU Extension specialist Joe Sellers, Inger Lamb from Iowa Native Lands and Stan Buman from Agren, Inc. are working on a demonstration to show how managed grazing can be used to better maintain wildlife habitat. A fourth project will review reports and publications specific to grazing in Iowa and the broader U.S. Cornbelt region in order to fully characterize what is known about the current conditions of grazing in row-crop dominated landscapes and economies.

The cross-initiative working group is supported by a three-year grant from the Leopold Center and is administered as part of the Value Chain Partnerships project.

PREPARING FOR SERIOUS THREAT OF GLOBAL FAMINE

FUTURE (continued from page 5)

technology, trade and aid will continue to be useful tools, but these alone will not help us meet the complex food and agriculture challenges of the future.

Unless we unleash ourselves from our “pretense to knowledge” and our “uncritical acceptance of assertions which have the appearance of being scientific,” we may find ourselves trying to “extricate” ourselves in the decades ahead from the serious threat of global famine.

Livestock and Diversity: Learning from Iowa's past

By FRANCIS THICKE *Guest Columnist*

EDITOR'S NOTE: *Livestock and Diversity* is one of six core issues that help guide the work of the Leopold Center and clarify our role and response in critical areas. We asked dairy farmer Francis Thicke of Fairfield to explain why he believes diversity is important in his farm operation.

Twelve thousand years ago, in the wake of a glacier, the land that would become northern Iowa was a geologic wasteland. Glacial materials from the north had obliterated the biological diversity of the previous era. But then nature's ecological processes began anew, creating—over 12 millennia—a prairie ecosystem with its fertile, productive soils.

How did that happen? Gradually, plants, animals and microorganisms colonized the desolate landscape, creating an increasingly diverse and complex ecosystem. The ecosystem's plants and animals generated organic materials that soil microorganisms used to develop soils from raw geologic materials.

It has been estimated that 50 million bison once roamed the prairies and plains of North America. Bison herds roving the prairie landscape are a model we can use to design animal production systems that are resilient, energy-efficient, and biologically diverse.

Roving bison, prairie plants

When bison herds grazed the tall, deep-rooted prairie plants, they repositied their manure nutrients back to the soil, and their grazing activities stimulated regeneration and robustness of the ecosystem. When herds moved on to fresh prairie, the now-shortened plants had excess root mass and sloughed a portion of it into the soil as the plants recommenced their perennial cycle of capturing sunlight to produce new shoots and roots. The root mass released into the soil after the bison had grazed the prairie plants became food to sustain soil microorganisms and produce humus. Repeated grazing cycles of the roaming bison herds increasingly added to

the soil's fertility and productivity.

Modern livestock production systems can be designed and managed to mimic these ecological processes. These systems also can be more energy-efficient than current industrial animal production methods. The key is to find ways to harness the energy, efficiency and organizing power of nature's ecology.

A grass-based dairy farm illustrates one way to mimic the prairie ecosystem. In a grass-based dairy, the landscape surrounding the milking barn is converted into a polyculture of grasses, legumes and forbs—some of which are planted and some that “volunteer.” This landscape of perennial plants is divided into segments (called paddocks) using inexpensive fencing materials, with cow lanes connecting all paddocks to the milking barn.

After each milking (twice a day) the cows are allowed to graze a new paddock area that is just large enough to provide the cows' forage needs until the next milking time. As the cows rotate through the paddocks, grazed areas have time to recover, allowing plants to regrow to a stage of optimum nutrition for the next grazing episode.

Management is important. If paddocks are allowed too much recovery time, the plants will become overly mature and lose nutritional value. If grazed again too soon, some plant species will not recover fully and die, reducing pasture productivity and diversity. Under good management, plant diversity is maintained or increased and soil fertility is continuously regenerated.

When cows are kept in confinement, the cows' forage must be mechanically harvested in the field, hauled to the facility, stored, then taken out of storage each day

to feed the animals. And, the cows' manure must be collected, stored and eventually hauled back to the fields. All these operations require fossil fuel energy.

By contrast, a well designed grass-based dairy accomplishes the same objectives by the farmer simply opening the gate to the next paddock. The cows harvest their own forage and spread their manure. And they enjoy their work!

Modern paradox

Allan Nation, editor of the *Stockman Grass Farmer*, summarized the irony of modern confinement animal production by pointing out that it is the nature of cows to move about and the nature of grass to stand in one place. But with confinement animal production we have turned it backwards and made the cows stand in one place and made the grass move to the cows.

Dairy farmers who switch from confinement to pasture-based systems find that cows are healthier in their natural environment. Improved animal health may also be partly due to a diet high in freshly grazed forage being better suited to ruminant animals than diets high in grain concentrates that are normally fed to cows in confinement systems.

An additional benefit of grass-based dairies is that milk produced by grazing cows is higher in nutritional components that nutritionists tell us are beneficial to human health, including omega-three fatty acids, conjugated linoleic acids, beta carotene, and some vitamins.

Two major challenges loom on the horizon of tomorrow's agriculture: 1) a growing scarcity and rising cost of fossil fuel energy, and 2) an intensification of the effects of climate change, particularly manifested as greater extremes of weather events, including intense rainfall events and flooding.

One way to address both challenges is to put livestock back onto the landscape in ways that mimic nature's ecology in order to create animal production systems that are energy-efficient, resilient, and biologically diverse.

 www.leopold.iastate.edu

Read more about the Leopold Center's core issues:
www.leopold.iastate.edu/about/core.html



Francis Thicke and his wife Susan own and operate a 75-cow, grass-based, organic dairy near Fairfield. They process their milk on the farm and market their dairy products through grocery stores and restaurants in Fairfield. Francis has a Ph.D. in soil fertility and has served as the National Program Leader for Soil Science for the USDA-Extension Service in Washington, D.C.

Center's research summaries now available on-line only

By MARY ADAMS Outreach and Policy Coordinator

Since 1992, the Leopold Center has published its *Center Progress Report*, a publication containing summaries of research projects completed during the previous year. Readers learned about the wide variety of studies and demonstrations that the Center had funded and helped guide to completion.

Earlier this year the decision was made to cease publication of the *Center Progress Report*, for both financial and environmental reasons. The Center will continue to share its latest research results with the public, but these summaries will be provided in a different format. Instead of appearing in a paperbound volume, these 2009 research summaries will be available

only on the Center's Web site for reading or reprinting.

"This change in delivery method will save money for the Center and also will allow us to provide the very newest results from our three research initiatives to the larger public much more quickly. Most of our readers are used to receiving information on-line and we hope the transition will be an easy one for them," notes Center director Jerry DeWitt. "While we regret the loss of the paper version of the *Center Progress Report*, posting the summaries on-line is an environmentally responsible decision that positions the Center squarely within the directives of the ISU campus sustainability mandate."

Center seeks 2009 pre-proposals for projects

It's that time of year again, as the Center issues its annual Request for Pre-proposals (or RFP). The 2009 RFP explains in detail the priorities that will guide the selection of innovative new projects as part of the Leopold Center's long-running competitive grants program. Each of the Center's initiative areas – ecology, marketing and food systems and policy – has a separate section in the RFP.

Who may apply? Investigators representing any Iowa nonprofit organization/agency and/or educational institution (such as soil and water conservation districts, schools and colleges, and regional development groups) may submit pre-proposals; there are no restrictions on project partners or collaborators.

What is required? A one- to two-page concept paper about the proposed project.

When is it due? Concept papers should be submitted to the Center by 5 p.m. August 19. The documents are reviewed by Center staff and Advisory Board members to see how they fit the requirements in the RFP as well as their economic, environmental and community/social sustainability. Funding for approved projects will begin in early 2010.

Where is the RFP available? Go to the Center's Web site: www.leopold.iastate.edu/research/rfp/2009.html or request it by calling (515) 294-3711.

What types of projects is the Leopold Center looking for? Briefly, the RFP outlines topics for each initiative:

- **Ecology:** Projects that model agro-ecological farms, those that put "living

roots in the ground" for more of the year or increase carbon capture and reduce net energy costs by increasing on-farm biodiversity, and advances in practices and management that help improve soil quality and its water-holding capacity.

- **Marketing and Food Systems:** Projects that support existing working groups in the Value Chain Partnerships project; look at the community, health, safety, economic and environmental impacts of Iowan-grown foods; promote energy efficiencies within the food, fiber and energy value chain; offer education to increase market opportunities and reduce risk for new, immigrant and transitioning farmers; and explore strategies to increase locally-grown affordable food for Iowa's schoolchildren.
- **Policy:** Projects that reduce barriers to sustainability at various scales, increase effectiveness of existing land use policies, or those that encourage energy conservation and/or renewable energy in food, feed and fiber systems.
- **Other:** Projects that enhance cross-initiative work in grass-based livestock production and farm energy alternatives.

Who do I contact with questions?

For inquiries about each initiative's focus areas in this round of project solicitation, contact the appropriate initiative leader: Jeri Neal for Ecology (515) 294-5610, wink@iastate.edu; Rich Pirog for Marketing and Food Systems (515) 294-1854, rpirog@iastate.edu; or Jerry DeWitt for Policy (515) 294-3711, jdewitt@iastate.edu.



The Center will offer new one-page project synopses of the research results at the on-line site, as well as the usual longer summaries for every completed project. Rather than issuing only one volume of reports per year, new summaries will be added to the page quarterly as investigators submit their findings to the Center.

Copies of the remaining paper volumes of the *Center Progress Report* from 2001 through 2008 are available by writing to the Leopold Center at 209 Curtiss Hall, ISU, Ames, IA 50011, or by calling (515) 294-3711.

News & Notes

Understanding Common Terms Used in Discussions about Climate Change and Agriculture is the name of a new resource from the Leopold Center. The glossary was written by Associate Director Rich Pirog and former ISU graduate student Rebecca Rasmussen. Each of the terms is accompanied by definitions and their sources, as well as Internet sites that offer more information. The glossary is on the Leopold Center Web site at: www.leopold.iastate.edu/research/marketing_files/glossary.pdf or in hard copy by request, (515) 294-3711.

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A new Leopold Center program is supporting a Visiting Faculty opportunity at Iowa State University. The 2010 faculty member will work with the Center's Ecology Initiative and with ISU faculty and staff to examine systems-based approaches to agricultural production that protect and improve the long-term health and resilience of agricultural communities and associated natural systems. The Center hopes to launch the program during the 2010 school year.

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Following Leopold into your own wilderness

By DEVAN McGRANAHAN *Special to the Leopold Letter*

By most measures, the first day had been a failure. Out of shape, out of breath, and nearly out of daylight, I stumbled across a meadow towards the first trail sign in hours. I learned that the camp I had set my sights on was still several miles away, and I felt my heart sink. No amount of anticipation for this hike was able to offset the fatigue induced by three days and nights of driving and sleeping in the pickup, or the breathlessness of climbing beyond 9,000 feet after a winter stuck in a basement lab in Iowa. I was resigned to sloughing off my pack not eight miles from the trailhead, just inside the boundary of the vast wilderness.

This year marks 100 years since Aldo Leopold began his career in the Southwest, and I decided that a celebration was in order. Thus, I put together a Southwestern adventure of my own, starting with the annual Society for Range Management conference in Albuquerque, New Mexico. Not only are the SRM meetings an important event for an aspiring rangeland ecologist, but this year they were being held in the heart of Leopold's former country.

On the same trip, I was able to spend a week backpacking in the Aldo Leopold Wilderness, a subset of the Gila National Forest that Leopold himself tapped for designation as our country's first wilderness area back in the early 1920s.

While most Leopold pilgrims seek out his beloved Shack on the Wisconsin "sand farm," having grown up on a farm in Iowa I already was familiar with the agricultural landscape that he nurtured in his later years. I am interested in the early Leopold: the man who himself explicitly advocated the extermination of wolves in the name of wildlife, long before describing, with sincere regret, the now-fabled "fierce green fire" he witnessed die in a mother wolf's eyes just after he and his friends unloaded their rifles on her. I wanted to see the land where Leopold cut his teeth, straight out of college, the land where he learned to think, write, and above all, learn from his mistakes.

Leopold's wilderness

Leopold was one of the earliest modern advocates of wilderness, by which he meant "a continuous stretch of country preserved in its natural state ... big enough to absorb a two weeks' pack trip..." Upon establishing my camp embarrassingly close to the boundary of the wilderness that bears his name, I wondered whether or not he would consider me soft. But as I settled down beside a roaring fire with a cup of tea and a hot supper, I began to think more expansively. What did Leopold mean by wilderness? How deep into it must one go to develop an ecological conscience?

I stirred the fire with a stick and my thoughts with some whiskey, and ultimately decided that I probably didn't need to be there at all. Leopold never insisted that we actually had to go into the wilderness to appreciate it; in fact, he specifically spoke to the opposite: "Is my share of Alaska worthless to me because I shall never go there?" Leopold advocated that we appreciate what wilderness was like; he understood that it would not be the same for all.

That night I began to wonder if I hadn't already had a wilderness experience. I spent my first year out of college traveling from farm to farm across southern Africa, learning how wildlife conservation is practiced on private rangelands. Southern Africa was a wilderness, of sorts, in that everything was foreign to me and I had to build not only my day-to-day living but also my thinking from the ground up. I had to be quick with observation and insight to put it all together.

And like Leopold, I made my fair share of mistakes, overlook-

DEVAN McGRANAHAN is a Ph.D. candidate in the ISU Department of Natural Resource Ecology and Management. His research looks at response in the plant community to patch-burn grazing in southern Iowa and northern Missouri. Leopold Center Distinguished Fellow Fred Kirschenmann partially supported McGranahan's February 2009 trip to New Mexico.



ing an important aspect of grass physiology in a report on grazing management, and even slightly misrepresenting Leopold himself in an article for a farmer's newsletter.

Relieved of the pressure to strike deep into the forest to understand Leopold's wilderness, I was now free to reflect in the sunshine of my suddenly cozy meadow and think through Leopold, not just about him. Readers familiar with Leopold's nature essays might be taken aback to discover how progressive Leopold's social criticism was.

For example, in an early version of "The Land Ethic," Leopold basically predicts organic and fair-trade labeling and government certification, appealing to the role of the consumer conscience in guiding the marketplace towards sustainability: "Must we view forever the irony of educating our sons with paper, the offal of which pollutes the rivers which they need quite [as] badly as books? Would not many people pay an extra penny for a 'clean' newspaper? Government may some day busy itself with the legitimacy of labels used by land-use industries to distinguish conservation products, rather than with the attempt to operate their lands for them."

Prescription for a sustainable future

In this manner, Leopold is as relevant today as he was 70 years ago. I see people of my generation referring to Leopold's philosophies as prescriptions for a more sustainable future.

For example, as my wife ponders how landscape photography can contribute to our understanding of ecological processes from the point of view of Leopold's land ethic, she reminds us how Leopold encouraged us to include in our definition of science "the creation and exercise of wonder, of respect for workmanship in nature." From the scientific side, Leopold recognized that "few wildlife managers have any intent or desire to contribute to art and literature, yet the ecological dramas which we must discover ... are inferior only to the human drama as subject matter for the fine arts..."

Likewise, when my colleague here at Iowa State, Travis Cox, seeks to describe how a society can use ecology as a broad but fundamental framework for defining sustainability, he finds clarity in Leopold's observation that "a thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise." After all, "no 'language' adequate for portraying the land mechanism exists in any science or art, save only ecology. A language is imperative, for if we are to guide land-use we must talk sense to farmer and economist, pioneer and poet, stockman and philosopher, lumberjack and geographer, engineer and historian." Leopold mentions "love" four times in "The Land Ethic."

I challenge all of us to revisit Leopold, even if it is for the first time. Remember that the man is far from infallible, a point that I find makes him much more trustworthy. And although reading about the bears and the wolves of the High Country has a certain aesthetic when one does it beside a campfire in New Mexico, I believe that we all will find Aldo Leopold wherever our wilderness might be.



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Highlight Events

More field days, events

Check Leopold Center Web
calendar: [www.leopold.iastate.edu/
news/events.htm](http://www.leopold.iastate.edu/news/events.htm)



Above, Leopold Center staff and advisory board members tour Dykstra Dairy outside Struble in June. The group also learned about Dordt College's "gateway to sustainability" project with corn, soybean and small grain/forage in a three-year rotation.

July 26-27, Postharvest handling workshops

Hosted by the Fruit and Vegetable Working Group, participants will learn about harvest, washing, grading, sorting and packing vegetables for wholesale and retail markets. Afternoon sessions are July 26 at Rock Spring Farm, Decorah, and July 27 at Black's Heritage Farm, Ames.

August 25, Neely-Kinyon Field Day

This popular field day at the Iowa State Research and Demonstration Farm near Greenfield offers the latest results from long-term organic field plots supported by the Leopold Center and research on aphid-resistant soybeans. Activities begin at 4 p.m.

August 27-29, Whiterock Conservancy celebration

The conservancy and Creating Great Places of Coon Rapids are planning a variety of activities to mark the 50th anniversary of Soviet Premier Nikita Khrushchev's historic visit to Iowa and the Garst farm. Details on the Web: www.whiterockconservancy.org

October 27, Pesek Colloquium

Shahid Naeem, chair of Columbia University's Department of Ecology, Evolution and Environmental Biology, will discuss biodiversity in China, Sub-Saharan Africa to the Great Plains and Iowa – for the annual Pesek Colloquium on Sustainable Agriculture coordinated by the ISU Wallace Chair for Sustainable Agriculture and co-sponsored by the Leopold Center. The lecture will begin at 8 p.m. in the Great Hall of the ISU Memorial Union in Ames.