



LEOPOLD CENTER
FOR SUSTAINABLE AGRICULTURE

2013 - 2014 Annual Report

Table of Contents

- 3 Director's Message
- 4 That "Creative" Tension
- 5 Former Associate Director Retires
Advisory Board Chair
- 6 Staff and Advisory Board
- 7 Financial Update
- 8 Sound Bites
- 9 Demise of the Passenger Pigeon
- 10 Economic and Environmental Outcomes
- 12 Spencer Award
- 13 Shivvers Lecture
- 14 GPSA Students Benefit from Funding
- 15 CESP Report
- 16 Horticulture Staff Support
- 18 Iowa Learning Farms
- 19 Wallace Chair
- 20 Ecology Initiative
- 22 Marketing and Food Systems Initiative
- 24 Policy Initiative
- 26 Cross-Cutting Initiative
- 28 Competitive Grants Program

Mission: The Leopold Center was established by the Iowa Legislature as part of the Iowa Groundwater Protection Act of 1987. Its legislatively mandated goals are to identify and reduce negative environmental and socio-economic impacts of agricultural practices, contribute to the development of profitable farming systems that conserve natural resources, and cooperate with Iowa State University Extension to inform the public of new findings.

Vision: The Leopold Center for Sustainable Agriculture explores and cultivates alternatives that secure healthier people and landscapes in Iowa and the nation.

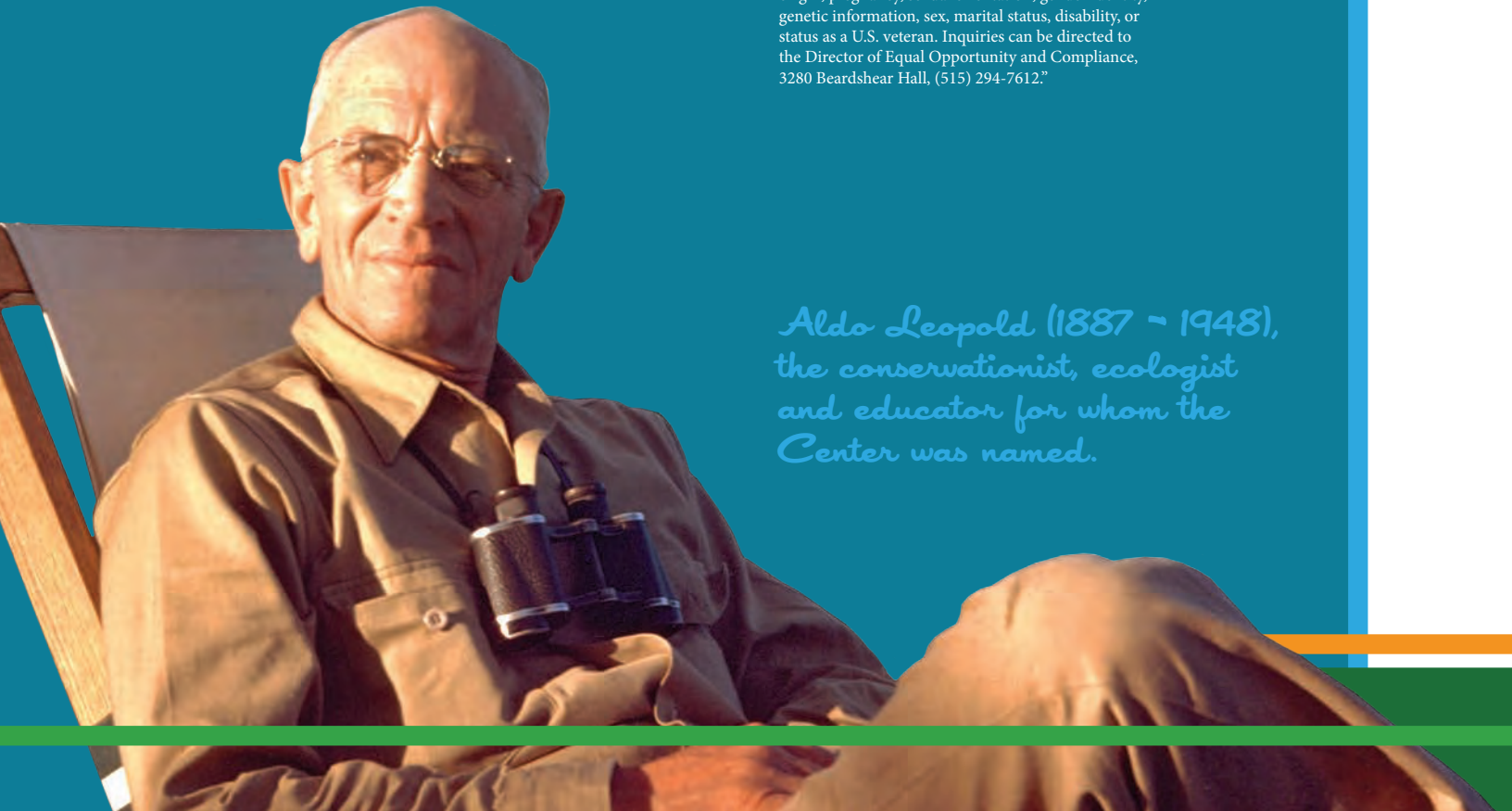
Photos by Leopold Center staff except where noted.

Information for this report was compiled by Leopold Center staff with the help of its researchers and educators, who are committed to improving Iowa agriculture and the lives of Iowans.

Edited by Mary Adams
Design by julssdesign, Ankeny, Iowa

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*Aldo Leopold (1887 - 1948),
the conservationist, ecologist
and educator for whom the
Center was named.*



Director's Message

Wow, another year has passed. As Grandma used to say, "Time moves fast when you stay busy." And we have been busy at the Leopold Center. As I review what we have been working on this past year, I see that lots of people, places and issues have played roles in our activities.

We completed a legislative review document and conducted leverage and impact analyses on several projects that have received multi-year Center support. I am happy to report that we have continued to fulfill our mission by providing funding to researchers so they can advance the science and benefits that arise from their research. Overall, for every \$1.00 we have invested through our competitive programs, these successful projects have leveraged our funds over four-fold.

As you might have expected, we also have been focusing a lot of effort on many different aspects of soil health. Nutrient dynamics, soil erosion, carbon deposition, and water infiltration are just a few of these areas. We will continue to emphasize this part of our work because Iowa's soils are too valuable to ignore. We must continue to find new ways to help landowners do more to protect and maintain this vital resource.

We also have continued to support and work with important partners around the state. Iowa Learning Farms, Iowa Water Center, Leopold Heritage Group, Practical Farmers of Iowa and Dairy Iowa are just a few of the organizations we are working with. We also have ongoing projects with many scientists and researchers at the universities, colleges and other organizations within the state. Sustainability is a big subject area and our efforts and friendships are broad as a result.

As Director, I also had the opportunity to participate in events which help connect the Center with the wider world of sustainability stakeholders. In June I traveled to the Iowa Lakeside Laboratory in Milford, Iowa to meet Dr. Michael Lannoo and a panel of invited visitors. Our discussions focused on the mission and impact of the Lab and opportunities for collaboration in the future. I also had the opportunity to attend a conservation heritage meeting at the National Conservation and Training Center near Sheperdstown, West Virginia. The organizers of the meeting brought together various conservation, environmental and sustainability organizations to discuss our common purpose and missions as reflected in the work of our famous namesakes such as Aldo Leopold.

Visitors continue to come to the Leopold Center as they always have. In collaboration with the Iowa International Center, we have hosted visitors from Brazil, Hungary, Nigeria and Ethiopia. Students from American University, Washington University and Furman University also arrived at our door. We find that many visitors come to the center as a result of their interest in sustainability. We are always happy to meet with visitors, learn from them and discuss the work we do for agriculture, consumers and Iowa landowners.

We invite you to visit, too. Our door is always open and we would love to hear from you.

Mark Rasmussen
Director





That "Creative" Tension

We all know there's plenty of inherent tension in farming—weather conditions, erratic markets, crop disease, livestock ailments, rising input costs, and rural community stress. The average farmer is pretty much always facing the condition of "tension" defined as "the state of being stretched tight." But these days there are other tensions plaguing rural life. Tension can be found in "ideas or qualities with conflicting demands or implications." Farmers are coping with plenty of conflicting demands—from mega-agribusiness, consumers, government agencies, animal welfare groups, environmental activists and political lobbyists.

But if you use tension as a verb, it can mean applying a force to something that tends to stretch it. That's what the Leopold Center tries to do—in a positive way—by applying research, science and education to stretch the agricultural imagination in Iowa. This is "creative tension," which is applied or exists to create new, more effective solutions. Moving from the current reality to a more resilient future inevitably involves trekking down a tension-laden path, but the fruits of creative tension offer a way forward.

The Center's mission is to investigate and share alternative agricultural practices that will allow producers to operate in a more economically and environmentally sound manner. We've used our funding carefully to alleviate some of that unsettling tension and move toward the desirable state that Aldo Leopold touted in *The Land Ethic*, "conservation is a state of harmony between men and land." The Leopold Center aims to be that "place of understanding" for all of Iowa's thorny agricultural dilemmas.

Our Marketing and Food Systems Initiative (MFSI) is looking at a variety of options for farmers to produce and sell their crops in different ways. Food hubs (a key MFSI area of interest) are getting a lot of attention, even at the federal level, and these hubs

allow farmers to aggregate their products while leaving them more time to produce those higher dollar-generating crops. Yes, these are horticultural crops, but with local food attracting more attention all over the country, Iowa has a chance to shine as the home place for plenty of home-grown fruits and vegetables. Selling those goods to schools, institutions and restaurants gives everyone a proud new marketing pitch—and those Iowa-grown products taste better, too.

The Cross-Cutting Initiative, which takes on projects that span more than one scientific discipline, sponsors studies on small grain production, winter canola, aquaponics, and the real potential of a biomass industry in Iowa to support energy production. This portion of the Center's research portfolio includes long-term work on crop rotations and organic crop production—two options that open up possibilities for farmers looking for new ideas and revenue streams.

In the Ecology Initiative, research addresses the critical natural resources that farmers want to preserve in order to maintain their land in prime condition. They know they need good soil health to insure maximum crop growth and withstand changing climate conditions. Investigators who work in the Center's Ecology area are examining cover crop functions, soil nutrient dynamics, grazing management tactics, prairie-grass buffers and other tactics to keep nutrients out of streams and rivers, and a variety of other options that affect the quality of water in Iowa, an issue at the forefront of the state's natural resource concerns these days.

The answers aren't all readily at hand—they require dedication, time and energy to search out. The Leopold Center already has made a decades-long commitment to looking for these solutions and making them available to the people who need them to earn a living and to make Iowa an example of responsible, successful agricultural achievements. We're doing what we can to ease the ingrained "tension" for Iowa farmers and at the same time preserve the value and majesty of Iowa's land and water.

Mary Adams
Editor

Former Center Associate Director Retires from ISU

Michael Duffy, ISU Extension agricultural economist, served as the Leopold Center's associate director from 1992 to 2005 under two directors, Dennis Keeney and Fred Kirschenmann. He conducted a number of projects connected to the Center's Policy Initiative. But his first involvement with the Center came in 1987 when he was one of a small group of sustainable agriculture proponents at ISU who met to assemble the framework for what would become today's Leopold Center. When he left the Leopold Center in September 2005, the advisory board chair wrote to him: "Your efforts to support and guide the Center have played a major role in enhancing the Center's reputation throughout the country, and your departure leaves a void in the Center's organization."

At the Leopold Center he found time to conduct research projects on a wide range of topics—

- the real external costs of commodity agriculture,
- Community Supported Agriculture (CSA) operations,
- the use of land trusts in Iowa,
- the financial impacts of ag chemical use,
- the effects of farm size on profitability,
- alternative ag enterprises and their financial potential, and
- conservation practice costs for landlords and tenants.

He never lost sight of the fact that even the purest sustainability option has to make financial sense for a farmer to adopt it. Another important piece of his research showed that the conventional wisdom that "bigger is better" wasn't always true for farm operations, that a midsize operation might have some real fiscal advantages.

During his career at ISU he also served as head of the Beginning Farmer's Center, faculty mentor in the Graduate Program in Sustainable Agriculture, manager of the yearly Iowa Land Values Survey, organizer of the annual Soil Management and Land Valuation conference, and he collaborated with the ISU Extension farm management specialists. His work on the land values survey made him the "go-to" person for information about farmland values in Iowa. At his retirement reception, the economics department chair noted that Duffy was the faculty member who had been quoted more often in the *New York Times* than any other professor.

Duffy retired from Iowa State University on April 30, 2014 after 28 years in the economics department. The Leopold Center staff wishes him well in his retirement.

Michael Duffy



View from the Board Chair



I have served on the Advisory Board for the Leopold Center for Sustainable Agriculture for the last seven years. In that time, the Center has continued to build a culture of excellence in aligning research dollars with projects that possess significant intellectual merit and target the critical problems facing crop and livestock agriculture throughout Iowa. Working groups such as our Regional Food Systems Working Group have grown into nationally recognized success stories, and the Center has begun to take our funded projects from the research and demonstration stage to producers in key watersheds where we believe land use change can make meaningful differences in water quality and soil health.

This last effort – in essence, "graduating" successful research projects to the point where the data generated can help inform Natural Resources Conservation Service practice standards or how farming is done across the state – is a challenge the Board is actively engaged in helping the Center navigate. Moving from proof of concept in a few fields or pastures to adoption of new methods of agriculture on the landscape is an exercise in change management. Change is never an easy process, and agricultural practice in Iowa is influenced by a wide array of stakeholders. We know the Leopold Center cannot act in isolation. Rather, the Center can position itself as a fulcrum for change by leveraging our collective expertise to build partnerships with producers, private sector agribusiness enterprises, and state agencies.

As we look to the forthcoming years, I am excited to see the Center play a stronger leadership role in scaling up the efforts of our core research mission to concrete action on the ground. The Center has amassed considerable intellectual capital since it was created by the Groundwater Protection Act (1987). How and where we invest that capital will help determine whether we can move closer to the Land Ethic passionately articulated by our inspiration, Aldo Leopold.

Keith Summerville

Leopold Center Board Chair; 2013-2014



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Matt Helmers speaks to Leopold Center Advisory Board, June 2014, at ISU Research Farm.



2013 - 2014 Leopold Center Advisory Board

Dennis Dahms / Professor of Geography,
University of Northern Iowa

Bill Ehm / Director, Environmental
Services Division, Iowa Department
of Natural Resources

Kamyar Enshayan / Director, Center
for Energy and Environmental Education,
University of Northern Iowa

Dale Farnham / State Soil Conservation
Committee, Ames

Dan Frieberg / Agribusiness Association
of Iowa, West Des Moines

Doug Gronau / Farmer, Iowa Farm
Bureau Federation, Vail

Maynard Hogberg / Professor of Animal
Science, Iowa State University

Erin Irish / Professor of Biological
Sciences, University of Iowa

Susan Jutz / Farmer, Practical Farmers
of Iowa, Solon

Paul Lasley / Professor of Rural
Sociology, Iowa State University

Aaron Heley Lehman / Farmer,
Iowa Farmers Union, Polk City

Marc Linderman / Professor of
Geography, University of Iowa*

George Malanson / Professor of
Geography, University of Iowa*

Steve Mickelson / Professor of
Agricultural and Biosystems Engineering,
Iowa State University

Michael Naig / Deputy Director,
Iowa Department of Agriculture
and Land Stewardship*

John Olthoff / Professor of Agriculture,
Dordt College, Sioux Center

Jennifer Steffen / Farmer, District Soil
and Water Commission, Birmingham

Keith Summerville / Associate Dean,
College of Arts and Sciences, and Associate
Professor of Environmental Science and
Policy, Drake University (Board Chair)

*served part of the year only



Finances for Years Ended June 30, 2014 and 2013

Funds Received	2014	2013
State AMA Receipts	\$1,722,748	\$1,291,419
ISU Allocations	431,682	430,927
Foundation Funds	199,596	191,749
Staff Leveraged External Grants & Projects	108,973	100,717
Extension Funds	60,000	0
Incentive/Discretionary Accounts	365	610
Total Funds Received	2,523,364	2,015,422

Funds Expended		
Personnel	818,049	752,706
Operations	138,588	137,086
Competitive Grants & Grant Infrastructure:		
Ecology Initiative	528,309	592,888
Policy Initiative	87,788	67,592
Marketing Initiative	250,448	229,907
Cross-Cutting Initiative	235,997	296,638
Special Commitments	26,500	0
Competitive Educational Support Program	7,323	7,942
Total Competitive Grants & Grant Infrastructure	1,136,365	1,194,967
Foundation Accounts	210,160	328,541
Staff Leveraged External Grants & Projects	122,431	140,886
Total Funds Expended	2,425,593	2,554,186
Increase/(Decrease) in Funds	97,771	(538,764)

Funds, Beginning of Year	1,560,865	2,099,629
Funds, End of Year	\$1,658,636	\$1,560,865

Competitive Grants AWARDED by Initiative

Ecology	\$298,570	\$126,660
Policy	56,121	62,955
Marketing	160,906	121,224
Cross-Cutting (XP)	216,220	98,396
Total	\$731,817	\$409,235

The format of the financial statements in this annual report reflects the ongoing efforts for more transparency begun in prior years. The state Agriculture Management Account (AMA) receipts are presented on an accrual basis and the Competitive Grants and Grant Infrastructure funds expended include only the cash paid out during the year (not the amount awarded).



Leopold Center by the Numbers

Programs	FY2011	FY2012	FY2013	FY2014
Active Grants	89	71	81	114
New Grants	33	31	40	35
Number of Pre-proposals	54	74	54	48
Active Working Groups	10	13	10	10
Iowa Counties with Active Projects	58	49	47	47
Principal Investigators	67	57	64	76

Outreach

Publications (Papers, Books, Etc.)	25	59	73	74
Website Unique Visitors (Monthly Average)	16,388	6,452*	6,483	7,043
Website Activity (Monthly Average)	80,873	19,800**	18,773	19,046
Educational Events	179	163	164	253
Reported Leveraged Funds by LC Projects	\$1.817M	\$1.82M	\$5.18M	\$5.71M

Center Stats

Employees	10	10	13	14
Interns/Students	10	4	4	4

* New website launched September 2012 with different web tracking system.

**Includes only average monthly page views for nine months under different tracking system.

Mark Rasmussen
with Sen. Joe Bolcom



Sound Bites

Amid all the standard yearly activities, the Leopold Center also engages in a variety of outreach and education events and initiatives. Here are just a few from the past year:

Legislative Breakfast

During the Iowa legislative session, the Center sponsors a breakfast and “meet and greet” session to help inform interested legislators about the research and education being carried out by the Center with taxpayer funds. This year’s event was held on February 26 in the Legislative Dining Room of the Iowa State Capitol. Several advisory board members and the ISU legislative liaison (Joe Murphy) joined the Center staff to share information with lawmakers.

Iowa Water Center

The Leopold Center joined with the Iowa Water Center and the U.S. Geological Survey in a call for research proposals on climate variability and its effects on water resources. Leopold funds supported new and continuing work on three climate- and water-related projects that will serve Iowans. Center staff also helped plan the annual Iowa Water Conference held March 3-4, 2014 at ISU’s Scheman Building in Ames. The conference included a special track featuring Leopold-related speakers and topics.

Visitors

Each year groups and individuals contact the Center to discuss sustainable agriculture. Once they realize the Center does not operate its own research facility, they appreciate the opportunity to meet Center staff and members of the sustainable agriculture community at ISU. Some of the groups making a stop at the Center office this year were:

- students from American University in Washington, D.C.;
- two professors from ISARA-Lyon, a French graduate college specializing in agricultural, food and environmental science;
- Korean academics and agricultural practitioners;
- European visitors from Bulgaria, Denmark, Latvia, and Romania who came as part of an International Leadership Program through the Iowa International Center; and
- individuals who sought information or advice on land management, conservation practices, and farm planning.

Ames Reads Leopold

As part of an annual national program to keep Aldo’s Leopold’s vision fresh in the public mind, the Center has helped sponsor public readings of *A Sand County Almanac* in the Ames community. On April 26, 2014, members of the public read from the Leopold classic at Ames High School auditorium, and listened to music from a local band, in a move to encourage local youngsters to become interested in environmental issues.

Distinguished Fellow

Fred Kirschenmann, Distinguished Fellow at the Leopold Center, maintains a rigorous round of high-profile writing assignments, public appearances and keynote addresses, along with active participation in a variety of national and local sustainable agriculture boards and organizations. He divides his time between the Leopold Center and the Stone Barns Center for Food and Agriculture in Pocantico Hills, New York, where he continues to serve as the President of the Board.



Students from
American University



The Demise of the Passenger Pigeon Offers Lessons for Today

Species extinction is receiving increased attention as climate change and habitat loss adversely affect the future survival of many species worldwide. Sadly, this isn't the first time that human actions have wreaked havoc on the animal kingdom. In 1914, the last surviving passenger pigeon died in a Cincinnati zoo. This was the culmination of 50 years in which the passenger pigeon population in the United States declined from billions to one and then to none as a result of uncontrolled market hunting and the resulting disruption of nesting colonies.

“The Extinction of the Passenger Pigeon: Lessons from the Past for a Sustainable Future” was the topic of a lecture by Stanley Temple, Senior Fellow and Science Advisor with the Aldo Leopold Foundation of Baraboo, Wisconsin, on March 6, 2014 in the ISU Memorial Union Great Hall. His talk marked the centennial of the extinction of the passenger pigeon. Temple used the example of the passenger pigeon to point out the similarities to our world's ongoing extinction crisis and the fragility of our relationships with other species.

For more than 30 years, Temple was the Beers-Bascom Professor in Conservation in the Department of Wildlife Ecology at University of Wisconsin-Madison, a position originally held by Aldo Leopold himself. Leopold penned an essay on the passenger pigeon's flight into extinction history in *A Sand County Almanac*.

In addition to the Leopold Center, the lecture cosponsors were ISU Natural Resource Ecology and Management, the Graduate Program for Sustainable Agriculture, College of Agriculture and Life Sciences and ISU Committee on Lectures, funded by the Government of the Student Body.



Stan Temple



Leopold Center Evaluators Document Economic and Environmental Outcomes

How do we gather the facts and stories that show how Leopold Center investments impact the lives of Iowans and the land on which they depend? The Center staff includes two evaluators, evaluation coordinator Corry Bregendahl and program assistant Arlene Enderton. This year, their evaluations focused on measuring impacts of two Initiatives: Policy and Marketing and Food Systems (MFSI).

SALT Evaluation

Arlene Enderton worked with Ed Cox at the Drake Agricultural Law Center to determine the measurable impact of the Sustainable Agricultural Land Tenure (SALT) project. The Leopold Center has invested \$225,000 in this effort since 2009, with some funds coming directly from the Policy Initiative. The SALT project provides resources that encourage landowners and tenants to create land lease agreements that include conservation provisions. The project also informs farmers, landowners, and service providers about farm tenancy laws, landowner obligations to conserve soil, and landowner rights to influence how their land is farmed.

The essential reference, “*The Landowners Guide to Sustainable Farm Leasing*,” was produced along with a series of brochures and online videos that reached more than 2,000 people. Nearly 2,300 acres of farmland have been placed into conservation leases as a result. See the results at www.leopold.iastate.edu/salt.

LFFI Assessment

The Leopold Center evaluators also measured change associated with two MFSI efforts, one was a state local food initiative and the other was a regional working group. First, a comprehensive evaluation of the Local Food and Farm Initiative (LFFI) was completed. Although this is an ISU Extension and Outreach project, the LFFI emerged from the Leopold Center’s 2011 Local Food and Farm Plan, a legislatively mandated set of policy and funding recommendations for strengthening Iowa’s local food economy. The LFFI is administered by Craig Chase in association with the MFSI.

In 2012-2013, LFFI invested nearly \$37,000 in seven one-year projects. Among the highlights:

- An additional \$661,000 was leveraged by project directors of those seven projects, for a leverage ratio of nearly \$18 raised per dollar invested.

- Outreach efforts targeted 1,145 people.
- Thirty-nine unique organizations participated in LFFI projects.
- Twelve new jobs were created.
- Six farmers received training.
- Six farmers established a collaborative marketing relationship to serve a retailer and a school.

For more information, see www.leopold.iastate.edu/lffi.

RFSWG Accomplishments

The evaluators worked with a group of regional food coordinators to track the collective impacts of the Regional Food Systems Working Group (RFSWG). The network has been funded for the past 10 years by external grants and the Leopold Center, but most recently by a two-year competitive grant through the MFSI. The RFSWG is coordinating local and regional food systems work in 91 of Iowa’s 99 counties.

Working with the RFSWG steering committee and food coordinators, Bregendahl and Enderton designed and implemented a process by which all regional food coordinators were asked to tap local networks to gather local food sales and purchasing data in their respective regions. Aggregated data were published in a statewide report, a two-page impact sheet, and 11 regional reports featuring stories of participating farmers and local food buyers.

Results showed significant impact on Iowa’s economy in terms of local food sales, purchases, job creation, and financial leverage. Nearly 30 media outlets reported on the findings, Harvest Public Media developed a series called the Local Food Challenge, and three states in the Midwest inquired about replicating the data collection process. Participating regional food coordinators report the evaluation has generated new attention, partners, and funding at the regional level. A second year of data has been collected and will be released in 2014. (www.leopold.iastate.edu/local-food)

Impacts on Iowans

While it is important to characterize the empirical impact of Leopold Center investments in broad strokes, it is equally important to bring meaning to those impacts by documenting stories about how the investments are affecting the everyday lives of Iowans and the landscape. Enderton investigated these impacts





Researchers working with drainage lines and buffers.

and chronicled them in a series of stories. Here is a sampling. More details about each of these stories appear on this web page: www.leopold.iastate.edu/change#stories.

Perennials: Nature's Water Treatment "Plant"

The Leopold Center has been funding research and collaboration on improving water quality since 1990. One key investment has been the use of perennial plants or "buffers" along waterways to absorb excess nitrogen and phosphorus commonly used to fertilize agricultural fields. These buffers act as nature's water purification "treatment plant" by absorbing excess nitrogen and phosphorus, preventing it from moving within watersheds. As a result of this work and in cooperation with innovative landowners, nearly 10 miles of riparian buffers were established along Bear Creek in central Iowa's Hamilton and Story counties.

Through several Leopold Center grants, ISU researchers have taken the buffer research a step further by diverting some of the water flowing through tile drainage lines into the buffers, calling them "saturated buffers." Initial research shows they removed 100 percent of the nitrogen from tile water by filtering it through the buffer. Recently, the lead investigators secured a \$500,000 grant from the USDA to study *how* the saturated buffer removes nitrogen from the water and where the nitrogen ends up.

Dream to Farm

In southwest Iowa, demand for nutritious local food outstrips supply and agriculture classes at Iowa Western Community College (IWWC) were overflowing. The college's Director of Sustainability partnered with the local RC&D, the Leopold Center, and the USDA Iowa Rural Development office to start a farming education program called Dream to Farm. The first courses were offered in 2012 and have continued through 2014. The program involved not only community college instructors, but also farmers and other community partners with expertise in different parts of local food systems. Of the first 20 graduates, seven are producing for local markets and another seven are scaling up or working in other areas of the local food movement. The course, aided by some timely social capital investment, kept a dairy operation from failing. A graduate of the program started an urban farm in Omaha that serves low-income families and a restaurant with a creative payment scheme.

Immigrants Find Refuge in Iowa Farming

Twenty-one former refugees have found a haven in Des Moines at Global Greens, an urban farm managed by Lutheran Services in Iowa (LSI). The farm was started after a group of former refugees from war-torn Burundi, Rwanda, Iraq, and Burma traveled to Washington, D.C. to attend a conference on the Office of Refugee Resettlement's "Refugee Agricultural Partnership Program." Inspired by what they learned, they submitted a proposal to the Leopold Center to fund further learning at immigrant incubator farms and develop a plan to create something similar in Des Moines. Phase I involves establishing gardens close to concentrations of past refugees. Phase II supplies an incubator farm where immigrant community gardeners move to larger plots and receive training. Phase III transitions the farmers to conducting independent business operations. Already, one farmer is insured and selling products at farmer's markets and through the Iowa Food Coop (another past Leopold Center investment).

Global Greens incubator participants in Des Moines.





(left to right)
Jennifer Steffen,
Mark Rasmussen,
Matt Liebman (award
winner) and Elaine Spencer

Crop Scientist Matt Liebman Wins 2013 Spencer Award

Matt Liebman came to Iowa State University from the University of Maine because he was looking for an academic community that embraced sustainable agriculture. In 2007, he was chosen as the second Henry A. Wallace Endowed Chair for Sustainable Agriculture. His long-running ISU experiment in crop rotations has received wide-ranging attention for its focus on using less energy and fewer purchased inputs, while building on the advantages of diverse ecosystems. On December 5, 2013, he accepted the Spencer Award for Sustainable Agriculture in recognition of his visionary field work and his commitment to finding better ways for farmers to use their land.

Elaine Spencer, the Seattle attorney who with her brother Robert endowed the annual Spencer Award for Sustainable Agriculture, presented the award to Liebman. She commended him for his good working relationships with farmers and for the value of his research. "I am quite certain that if the framers of the Morrill Acts could have seen to the present, they would have envisioned Dr. Matt Liebman as exactly who they were hoping their public universities would spawn," she said. "They would have wanted and expected that the land grant universities were focused on the future, on how universities could solve challenges of not just the moment but of future generations."

Speaking for the advisory board committee that chose Liebman for the award, Jennifer Steffen pointed to his leadership in prairie conservation strips research and his extended rotations research that has received national attention. "Matt says, 'American farmers are highly intelligent, they learn and adapt quickly when they have sufficient

motivation and when new opportunities present themselves,' so let's help Matt open up the door of opportunity," Steffen exhorted her advisory board colleagues.

Liebman, determinedly modest in the face of his many achievements, noted that he's been inspired greatly by farmers he's worked with during the past 30 years. He also acknowledged the complexity of the systems on which agriculture depends: "Over the years, I too have come to recognize that if we are to ever live in a world where farms are sustainable, environmental quality is protected, and nutritious food is available to all, then we need to value the web of life in which we all are embedded. One key to this is to encourage and embrace diversity."

He told the audience at the Leopold Center advisory board meeting where the award was presented: "I can say I've learned through personal experience that integrating diverse sets of crops with livestock leads to healthier, more productive soils and greater, more stable yields; that mixing annual crops with perennial species used as forages and conservation buffers leads to cleaner water and more types of wildlife; and that promoting market connections between a wide array of Iowa farmers and consumers leads to multiple opportunities for economic development and improved nutrition."

The Spencer Award, which has been given since 2001, honors the memory and accomplishments of Norman and Margaretha Spencer, who farmed near Sioux City for 40 years.



Matt Liebman



2014 Shivers Lecturer Drills Down into Soils

This year's speaker for the annual Shivers Memorial Lecture was a guy who likes to get down and dirty—Ray Archuleta, the “Soils Guy.” His well-attended presentation—Soil Health and Sustainability—on April 1, 2014 at the ISU Memorial Union was an exciting, high-energy look at the damage we've done to our soils and the practical steps we can take to revive and renew those valuable soil resources.

With the assistance of Rick Bednarek, Natural Resources Conservation Service (NRCS) State Soil Scientist for Iowa, Archuleta first entertained the audience with a graphic soil demonstration—showing what happened when water made contact with heavily tilled soil and no-till soil—using samples from Iowa and his home in North Carolina. During his time in Iowa, Archuleta also met with a group of ISU graduate students prior to his lecture and gave a presentation on soil quality at the University of Northern Iowa in Cedar Falls.

Archuleta is a soil agronomist at USDA's Natural Resources Conservation Service who travels widely across the country spreading the word about soil health. His work promotes conservation practices such as no-till farming and the use of cover crops that can rehabilitate depleted soils.

He has more than 25 years of experience with the NRCS, working in New Mexico, Missouri, Oregon, and now at the NRCS East National Technology Center in Greensboro, North Carolina. He has held positions as a soil conservationist, nutrient and irrigation specialist, water quality project manager and area agronomist.

A podcast of his lecture is available at www.leopold.iastate.edu/archuleta.



Lexicon of Sustainability posters shown before the lecture.



Ray Archuleta (right) explains soil demonstrations to lecture attendees Ron Rosmann (middle) and Wayne Bott (left).

ISU Grad Students Benefit from Leopold Center Funding

The Graduate Program in Sustainable Agriculture (GPSA) has received support from the Leopold Center since it began in 2003. This year the program lost its longtime, very efficient coordinator, Charles Sauer, and Angela Stone replaced him. Mary Wiedenhoef of the ISU agronomy department continues to serve as the faculty administrator for the program.

In FY2014 GPSA used Leopold Center dollars to fund three research assistantships. The stipend recipients described their work:

Jacqueline Nester

MS-MCRP in Community and Regional Planning

My research is centered on the policies involved in food insecurity in the United States. More specifically, I want to understand if pieces of policy or the lack thereof that hinder members of society from exiting the cycle of persistent reliance on the emergency food system. I hope to conduct surveys and interviews to get a deeper, more personal look at how our food system provides for low-resource Iowans. From these surveys and interviews, I hope to find trends that detail how those frequenting emergency food aid resources use state-supported food assistance. Using these results, I then hope to present a true picture of how emergency food systems are being used in Ames, Iowa.



Jacqueline Nester

Naboth Bwambale

MS in Sociology

Low and declining soil fertility continues to be a major challenge to farming among rural smallholder farmers in Uganda whose major source of livelihoods is agriculture. This situation is associated with food insecurity and poverty. Although improved soil fertility management (ISFM) practices and technologies have been promoted, their adoption is modest among smallholder farmers. My study is based on the central premise that addressing soil fertility management constraints requires understanding of farmers' local knowledge and the context within which decisions are made to innovate, adapt, adopt and/or maintain ISFM. The objectives of this study are to understand (1) how farmers' perceptions and knowledge influence their decisions to utilize improved soil fertility management practices and technologies and (2) key socioeconomic factors that influence their decision making processes. Using a multiple case study approach, an in-depth interview guide will be used to collect data from selected farmers in Mukungwe and Kabonera sub-counties in Masaka District, and Lwankoni sub-county in Rakai District, Uganda during July 2014.



Naboth Bwambale

Marie Louise Ryan

MS-MCRP in Community and Regional Planning

In summer 2014 I am laying the foundation for spending a year in Nepal researching gendered barriers to rice diversity in Nepal's marketplaces. By identifying the choke points of diversity in the rice supply chain, I hope to determine whether markets can be used as a promotional tool for Nepal's traditional rice varieties and can empower women to take the lead in agro-biodiversity conservation initiatives.





Aronia berries,
freshly harvested.

Competitive Educational Support Program Offers Support for Iowa Events

The Leopold Center provides financial assistance for a variety of sustainable agriculture outreach activities through its Competitive Educational Support Program (CESP). Iowa-based applicants may receive up to \$1,000 for one-time educational events, programs, workshops, conferences or displays that further the mandated mission of the Center. (See details at www.leopold.iastate.edu/grants/education.) Applications are reviewed by several Leopold Center staff members and an advisory board member, and the program is managed by communications specialist Laura Miller.

Here are the events the Center assisted during FY2014:

September 2013

Horizons, A Family Service Alliance; \$575 for promotion and speaker fees associated with the first annual harvest party in Cedar Rapids at Wellington Heights Community Garden maintained by volunteers in a blighted neighborhood classified as a food desert.

Proverbs Ministries of Homestead, Iowa; \$500 for speaker costs and educational demonstrations at an aronia field day at Homestead, Iowa. Attendees came from Iowa, Missouri, Minnesota and Wisconsin.

ISU Wallace Chair for Sustainable Agriculture; \$500 for the 2013 Pesek Colloquium for Sustainable Agriculture in Ames, Iowa, featuring soil scientist David Montgomery, and attended by about 630 people. (Lecture is archived at www.leopold.iastate.edu/2013-pesek-colloquium)

October 2013

Iowa Environmental Council; \$500 for the Council's annual conference, At the Tipping Point: Creating Momentum for a Healthier Environment, at Drake University and attended by about 240 people.

November 2013

Living Soil Compost Laboratory; \$500 to support a four-day course, Cultivating the Soil Food Web, at the Maharishi University of Management in Fairfield. The course featured lectures by Elaine Ingham, chief scientist at the Rodale Institute, and was open to the community and completed by eight students.

December 2013

ISU Community Design Lab; \$400 for a holiday dinner program to plan a school garden at Carver Elementary School in Des Moines. An estimated 300 people, including students and families, participated in the event, which offered materials in both Spanish and English.

Various dates and locations, January-June, 2014

Ames Breakfast Lions Club; \$750 to offer Pizz-A-Thon, a soil-to-fork curriculum, to nearly 500 elementary middle school students in Cedar Rapids, Ames and Waterloo, Iowa.

February 2014

Johnson County Soil and Water Conservation District; \$400 to mail an invitation to more than 1,000 women in Johnson County to attend a Women, Land and Legacy Listening Session in Iowa City. More than 80 women attended the event.

March 2014

Iowa Food Systems Council and the Iowa Food Access and Health Work Group; \$1,000 for the 2014 launch of the Cultivate Iowa campaign that encourages gardening and produce donations. The event at the Iowa Arboretum near Luther, Iowa, featured Gary Oppenheimer, founder and director of AmpleHarvest.org with about 100 people in attendance. (Lecture is archived at www.leopold.iastate.edu/cultivate-iowa)

Iowa Stormwater Education Program; \$1,000 for nationally known, streambank stabilization expert Dave Derrick to present at the 8th Annual Iowa Water Conference in Ames, Iowa.

April 2014

ISU College of Liberal Arts and Sciences; \$500 for the College's Signature Themes workshop, "Economic, Environmental and Societal Sustainability," presented by Wes Jackson, founder and president of The Land Institute. A total of 67 ISU faculty and staff from 28 units and departments attended the Ames event and participated in the panel discussion.

May 2014

Eat Greater Des Moines; \$300 to screen the documentary, Growing Cities, in Perry and Johnston, Iowa.

Harvest party at Cedar Rapids community garden.



Joe Hannan



Hannan and Nair Link Horticulture to Leopold Center

Thanks to an unrestricted estate gift, the Leopold Center has provided financial assistance for two ISU horticulture staff members for the past three years. Joe Hannan and Ajay Nair have been working with fruit and vegetable growers who are prime targets of the Center's MFSI and local food activities.

Joe Hannan is an Iowa State University Extension and Outreach (ISUEO) field specialist in horticulture. He supports Iowa's vibrant local food industry by working with commercial fruit and vegetable growers to expand and improve their operations. He is editor and author for the *IowaProduce* monthly newsletter, which now reaches more than 375 subscribers including extension staff, farmers, and industry supporters. Each year, newsletter content has been upgraded and more guest authors are featured.

Due to the success of the newsletter and a need for more frequent communication and sharing with subscribers, Hannan extended the *IowaProduce* to the Facebook and Twitter networks. These social media platforms allow him to share more photos and videos than he could with the electronic newsletter. (Hannan notes that content on Facebook/Twitter is different from or in addition to the newsletter content.)

Check out the *IowaProduce* Facebook page at: <https://www.facebook.com/iowaproduce> or see earlier issues at e-newsletter archive: <http://www.iowaproduce.org/pages/newsletters/newsletter.html>

Hannan works closely with fellow ISU Extension horticulturists Ajay Nair, Patrick O'Malley, and Linda Naeve to offer commercial fruit and vegetable production classes across Iowa. Last year, the team presented classes on transplant production, irrigation design and management, invasive pests, and tomato grafting. In addition, Naeve and Hannan lead the high tunnel team, offering the "High Tunnel 101" program to help growers decide if they wish to purchase a high tunnel, how to construct it and how to begin production. The need for the introductory high tunnel course is starting to taper off, so only one session was held in 2013. The team continues to develop and offer new advanced high tunnel workshops including advanced tomato production and advanced bramble production in partnership with the Iowa Fruit and Vegetable Growers Association. These sessions were offered in the fall and spring, and each had about 15 to 20 participants. The team will continue to expand this partnership for the 2015 fiscal year.

Hannan is actively involved in several committees and groups including the Iowa Food System Working Group (a part of ISU Extension), the Iowa Fruit and Vegetable Growers Association, and the Midwest Fruit Workers group. He currently serves as co-leader for the Central Iowa Ag Team (CIAT) that aims to bring together extension specialists with an interest in agriculture to discuss current issues and build interdisciplinary teams.

Ajay Nair is an assistant professor of horticulture at Iowa State. A major portion of his Leopold Center funds were used to set up the Sustainable Vegetable Production Lab at Iowa State (www.extension.iastate.edu/vegetablelab), and Nair serves as the lab's principal investigator. The lab features up-to-date tools, equipment, and instruments to conduct greenhouse and field-based vegetable production research. The lab staff also carries out nutrient extraction for soil and tissue samples and studies soil quality indicators such



CIAT
Horticulture Tour



as microbial diversity to document long-term impacts of production practices on soil microbial populations. The lab maintains a strong working relationship with researchers (Cindy Cambardella and Tom Kaspar) at the National Laboratory for Agriculture and Environment, who assist and collaborate on projects focusing on soil quality and health.

Leopold Center funds were instrumental in attracting talented graduate students to the program. Currently the lab is conducting studies on strip tillage in cucurbit production, organic broccoli and pepper production, use of biochar for commercial vegetable production, summer cover crops, role of plastic mulches in vegetable production, mitigating plant stress in high tunnels, season extension strategies, and new and diversified crops for Iowa. The lab has trained 10 undergraduate students in research methodologies and helps them acquire skill-sets in conducting field-and-lab experiments in vegetable production.

Dissemination of research results to growers through field days, seminars, and workshops also has been important. Workshops on transplant production, succession planting, nutrient management, tomato grafting and pest management, cover crops, and advanced high tunnels have been presented in partnership with USDA-Sustainable Agriculture Research and Education (SARE), the Leopold Center, Practical Farmers of Iowa, and the Iowa Fruit and Vegetable Growers Association.

On-farm trials have been a key part of the research activities. In the last two years Nair has set up seven on-farm trials at grower plots. Topics included summer cover crop integration in vegetable cropping systems, effects of plastic mulch color on tomato production, nutrient scavenging properties of cover crops, and high tunnel crop production. The lab actively engages grower organizations, researchers, individual growers, extension staff, and vegetable industry personnel in developing a road map to support and grow the vegetable industry in Iowa. Among the important collaborators are the Iowa Food System Working Group, Practical Farmers of Iowa, the Iowa Fruit and Vegetable Growers Association, the USDA Natural Resources Conservation Service, the Iowa Department of Agriculture and Land Stewardship, and USDA-SARE.

Nair has taken the lead in organizing the Annual Fruit and Vegetable Field Day which attracted 94 and 87 participants in 2012 and 2013, respectively. The event at the ISU Horticulture Station north of Ames showcased projects in sustainable fruit and vegetable production, insect and disease management, soil fertility, high tunnel crop production, tree fruit physiology and variety selection.

The lab is actively involved in planning the regional Great Plains Growers Conference. This event is organized by six land grant universities and extension services in the north central region: Kansas State University, University of Missouri, ISU, University of Nebraska, Lincoln University in Missouri, and South Dakota State University. Six hundred fruit and vegetable growers attended the conference in 2013. Nair served as associate chair in 2013 and is chair of the 2014 planning committee. His responsibilities include prioritizing research and extension activities for specialty crops in the north central region, facilitating multi-institutional research, coordinating the annual conference and leading the organization to better serve current and future needs of fruit and vegetable growers. Nair also serves as the chair of the Vegetable Crop Management Working Group of the American Society for Horticultural Science. As chair, he facilitates organization of workshops, colloquia, symposia, and discussions to promote horticultural science and identify and address critical needs of the vegetable industry.



Ajay Nair (top and far left) with graduate students.

Iowa Learning Farms Offers Conservation Education for Iowans of All Ages

Iowa Learning Farms (ILF) is a partnership among the Leopold Center, Iowa Department of Agriculture and Land Stewardship, Iowa Department of Natural Resources (USEPA Section 319), Natural Resources Conservation Service, Iowa State University Extension and Outreach, Conservation Districts of Iowa, Iowa Farm Bureau, Practical Farmers of Iowa, and the Iowa Water Center.

For the past three years, the Leopold Center has provided \$50,000 annually to Iowa Learning Farms and Water Rocks! to promote water quality and conservation in a variety of innovative ways.

Water Rocks! Programming Begins

Water Rocks!, a new statewide youth education campaign about all things water, launched in fall 2013. The Water Rocks! team specializes in fun, memorable ways to learn about water including K-12 classroom visits, light-hearted educational videos, music videos, Conservation Station displays, a computer game, geocaching, a teacher summit event, and college student internships.

Between July 2013 and June 2014, the Water Rocks! team participated in 104 community and youth outreach events that engaged 11,392 learners. There are currently 47 Water Rocks! videos on YouTube and TeacherTube, with more than 50,000 combined views. In 2014, the Iowa Motion Picture Association honored the Water Rocks! program with 15 awards for educational production, original music, visual effects, direction, and documentary achievements.

The inaugural Water Rocks! Teacher Summit was held June 11-12, 2014, with 28 teachers and high school students attending from eight Iowa school districts. The workshop included presentations by experts and the Water Rocks! team showed the participants how to use the classroom learning modules they developed.

Educator Nathan Stevenson talks with visitors to the Conservation Station about the importance of soil and what rain can do to unprotected soil.



Water Rocks! partners include the Leopold Center, Iowa Department of Natural Resources (USEPA Section 319), Iowa Water Center, Iowa State University Extension and Outreach, and personal gifts of support.

Education for Farmers

Iowa Learning Farms marked its 10th anniversary in 2014. What began in 2004 as a five-year research project has grown to become a valued resource for valuable information on conservation practices.

ILF sponsors field days and workshops year-round, gathering farmers together to share learning experiences about no-till, strip-till, cover crops and other conservation strategies. Between July 2013 and June 2014, ILF hosted 33 farmer events that reached 1,693 attendees.

According to an ILF-conducted evaluation of responses from farmers who completed the follow-up surveys in 2013:

- 86 percent who attended an ILF field day from 2008 to 2013 made a change in behavior.
- An average of 37 percent increased surface residue management on 83,757 new acres of strip-till or no-till.
- An average of 44 percent increased surface residue management on more than 42,000 new acres of cover crops in 2013. ILF estimates that this represents 20 percent of all cover crops planted in Iowa in 2013.

The Iowa Cover Crop Working Group continues its on-farm demonstrations on seven sites using a cereal rye cover crop on corn-soybean acres. ILF hosted a series of cover crop field days and workshops and published the Year 5 yield results and five-year soil effects in two documents. (See them at www.extension.iastate.edu/ilf/content/cover-crop-research.) Additionally, the working group is studying other aspects of cover crop implementation, including the benefits of cover crop mixes as well as seeding methods for cover crops in Iowa.



Webster County NRCS district conservationist Sam Adams pulls cover crops out of the ground to show the root development at an ILF field day at the Smeltzer Learning Farm near Otho.



Julie Mueller, in the lab and the field.



Wallace Chair Support Aids Graduate Student and Research

The Henry A. Wallace Chair for Sustainable Agriculture, currently held by ISU agronomy professor Matt Liebman, annually receives \$20,000 of support from the Leopold Center. The funding is secured under an agreement signed in 1997 when the endowed chair was created.

Liebman's research, teaching, and outreach activities focus on ways to use ecological processes to create farming systems that are productive, profitable, resilient, and environmentally sound. His specific interests include comparisons of different crop rotation and crop management systems; weed ecology and management; and the use of native perennial species for soil and water conservation and biofuel production.

He is a team member of three cropping systems projects in central Iowa, all of which have benefitted from Leopold Center support: the Marsden Farm rotation experiment, the Science-based Trials of Row-crops Integrated with Prairie Strips (STRIPS) experiment, and the Comparison of Biofuel Systems (COBS) experiment. More information about his activities and responsibilities connected to the Wallace Chair activities can be found at www.wallacechair.iastate.edu.

Funding from the Leopold Center during FY2104 contributed to the support of graduate student Julie Mueller, who is pursuing an M.S. degree in Sustainable Agriculture and Agronomy. Some of the funds were used to cover a portion of her salary (stipend), benefits, and tuition. The ISU Department of Agronomy provided \$15,358 to supplement the financial support Mueller received from the Leopold Center so the Wallace Chair funds were well-leveraged.

Mueller began her graduate studies at Iowa State University in 2012. Her research is based at the Neal Smith National Wildlife Refuge and is a part of the STRIPS project (www.prairiestrips.org and www.leopold.iastate.edu/strips-research-team) located there. Mueller's work focuses on measurements of soil properties, including microbial biomass, bulk density, and water infiltration rate, within prairie conservation strips and adjacent cropland.

Additional funds from the Leopold Center supported research projects led by Liebman.



Ecology Initiative Cultivates Links Between Agricultural Production and Conservation Lands

The Ecology Initiative, coordinated by Jeri Neal, made considerable strides in using soil health and water quality research to bridge and reconnect agriculture and conservation interests. Initiative activities ranged from research to training to implementation and included a variety of partners. New web pages were launched on the Center's website, one summarizing the extensive contribution of Center-funded research to the practices recommended in the Iowa Nutrient Reduction Strategy and another addressing the relevance of climate change to the Center's work. (See www.leopold.iastate.edu/nutrients and www.leopold.iastate.edu/climate)

New Ecology partners such as the Midwest Conservation Biomass Alliance advanced the "prairie for energy" frontiers and complemented current Center work with perennial grasses and forages. Existing partners in the regional Green Lands, Blue Waters consortium came together to plan for watershed and regional extension of research on three- and four-year extended rotations and Science-based Trials of Rowcrops Integrated with Prairie Strips (STRIPS), and to provide training and materials to explore agroforestry opportunities. Two key practices, STRIPS and saturated buffers, are headed to Iowa farms for on-the-ground implementation and testing.

Integrating rowcrop fields and prairie: STRIPS (Science-based Trials of Rowcrops Integrated with Prairie Strips) Phase II – Implementation

The Ecology Initiative has supported this effort since 2002 when it provided funding for initial investigations. Research trials showed impressive positive benefits for a small conversion of land into prairie strips: 40 percent reduction in runoff, 95 percent reduction in soil export, 84 percent reduction in nitrogen export, 90 percent reduction in phosphorus export, a four-fold increase in plant species and twice the number of bird species with three times the abundance. By 2013, landowners, agency stakeholders and team members recognized the potential of STRIPS as both an in- and edge-of-field practice with immediate applicability at landscape scale in corn and soybean cropping systems. They launched an implementation phase for the research that included hiring an on-the-ground coordinator to develop and facilitate the layout of STRIPS on private lands and ISU research farms. The Ecology Initiative produced three new publications in 2013 as part of a series of documents to enhance information transfer: *The Cost of Prairie STRIPS*, *Small Changes, Big Impacts: Prairie Conservation STRIPS*, and the *STRIPS FAQ flipbook*. (See www.leopold.iastate.edu/strips-research-team)

Jeri Neal



Bridging field and stream: Saturated buffers

Previous research showed that riparian buffers can effectively intercept overland flow (and offer other benefits), but tile-drained fields often route belowground water under the buffer directly into waterways. With Ecology Initiative support, USDA-ARS scientists researched saturated buffers, a technology to capture and treat water from tile drainage. Using this technology, a shallow lateral line redirects flow from a main tile line into the buffer, where it percolates into the soil or is taken up by vegetation. A 1,000-foot saturated

demonstration buffer at the long-standing (20-year) Bear Creek Riparian Demonstration Site near Roland, Iowa, has an estimated lifespan of 20 years, drains 25 acres, and cost \$5,000. If these results hold for pilot studies at other locations, authors compute that this practice has the potential of preventing 18 million pounds of nitrate-N from entering Iowa streams each year. An outcome of these early results has led to USDA-NRCS developing an interim practice standard, Vegetated Subsurface Drain Outlet (#739).

Moving toward resilience: Diversified crop rotations

By leveraging opportunities through partners, the future looks good for demonstration and adoption of a new approach to crop production where more familiar production agriculture can move significantly toward conservation agriculture. Research results from a 13-year Leopold Center project compare conventional corn-soybean (2-year), corn-soybean-small grain/red clover (3-year) and corn-soybean-small grain/alfalfa-alfalfa (4-year) cropping systems. The findings show that diversified crop production yields highly significant reductions in soybean disease incidence and severity, declines in weed seed density in soil, improved crop yields, massive reductions in aquatic toxicity, more soil organic matter and potentially useable nitrogen (N) for crops, significant reductions in fossil energy use, and improved net profitability.

Special projects

ESP2014-01 “Sediment source contributions to lake sedimentation in agricultural watersheds in Iowa.”

Quantifies the relative contributions of topsoil erosion versus streambank erosion in 15 Iowa watersheds. J. Downing and C. Filstrup, ISU ecology, evolution and organismal biology

ESP2014-02 “Simple and Fast Detection of *E. coli* in Agricultural Water Sources and Runoff.”

Advance water quality monitoring by development of a low-cost, paper-based device for detecting water-borne pathogen indicators (such as *E. coli*). R. Cademartiri, ISU chemical and biological engineering and materials science and engineering and M. Soupier, ISU agricultural and biosystems engineering

ESP2014-03 “Blurring the lines between working and conservation lands: Bird use of prairie strips on farmers’ fields.”

Tests how native bird species richness varies with landscape context, specifically, prairie strips surrounded by prairie vs. row-cropped fields. L. Schulte and M. Harris, ISU natural resource ecology and management

ESP2014-04 “Increasing the number of herbaceous species appropriate for restoration of nutrient capture by forest remnants in agricultural landscapes.”

Evaluates local vs. non-local herbaceous perennial transplants for forest understory for nutrient uptake and performance and make recommendations to local growers for geographic regions from within which plant material should be sourced, and which species would be most beneficial to begin to grow and sell. J. Thompson, C. McMullen and E. Altrichter, ISU natural resource ecology and management

Iowa Nutrient Reduction Strategy draws on Leopold Center foundations

The Iowa Nutrient Reduction Strategy is a science and technology-based approach to assess and reduce nutrients delivered to Iowa waterways and the Gulf of Mexico. The strategy outlines voluntary efforts to reduce nutrients in surface water from both point sources, such as wastewater treatment plants and industrial facilities, and nonpoint sources, including farm fields and urban areas, in a scientific, reasonable and cost-effective manner.

Authors of the Iowa Nutrient Reduction Strategy (INRS) reviewed hundreds of scientific articles related to nitrogen and phosphorus use in agricultural systems as part of a plan to reduce the environmental impact of these substances.

- 47 percent (50) of the articles listed in Section 2.2 of the INRS (related to nitrogen management) were authored or co-authored by a researcher receiving Leopold Center funding for research related to the topic of the paper.
- 40 percent (60) of the articles listed in Section 2.3 (related to phosphorus management) were authored or co-authored by a researcher who received Leopold Center funding for research related to the topic of the paper.

Results of the Nonpoint Source Science Assessment, an evaluation of agronomic practices for reducing nitrogen and phosphorus loss, are included in the INRS and are listed in on pages 6-10 of Section 2.1 of that document.

- 82 percent of the practices listed in the INRS were informed by LCSA-funded research or projects.

A list of Nonpoint Source Science Assessment Team members is included in Section 2.5 of the Iowa Nutrient Reduction Strategy.

- Eight (33 percent) of 24 Nonpoint Source Science Assessment team members have received Leopold Center funding to support 21 unique past projects related to water quality or nutrient management.

The Iowa Nutrient Research Center (INRC), created at Iowa State University in 2013 by the Iowa legislature, funded 10 projects in 2013-14. Half of the new projects expand on work previously funded by the Leopold Center.



Marketing and Food Systems Initiative Expands Its Influence

The Marketing and Food Systems Initiative (MFSI) was directed by Craig Chase with support from Lynn Heuss, Savanna Lyons and Courtney Long (both beginning in January) and Alice Topaloff (beginning in May).

Lucie Amundsen, Local Food Summit Keynote Speaker



Local Food System Summit attendees

Among the key Marketing Initiative efforts during the year were

- moving forward on competitive grants,
- developing and administering mini-grants,
- final transitioning of the Regional Food System Working Group (RFSWG) to independent status,
- continuing to make progress on Iowa food system growth through the Local Food and Farm Initiative (LFFI),
- initiating the development and coordination of the Iowa Food System Working Group (IFSWG) within ISU Extension and
- connecting local food supporters and organizations more readily through small grant projects.

Regional Food System Working Group (RFSWG)

The Leopold Center's long-term funding of the RFSWG funds ended in June 2014. The RFSWG will continue to meet quarterly, but will become part of the Local Food and Farm Initiative supported by the state of Iowa. The Leopold Center will remain involved in helping to evaluate the statewide impacts of the work conducted by the 15 regional working groups. Further evolution is likely as the regional organizations and the IFSWG both move forward with similar goals and objectives and operate in the same geographic regions.

Local Food and Farm Initiative

The final report highlighting efforts of the FY13 Local Food and Farm Initiative (SF-509) was submitted to the state in August 2013. In addition to describing the progress made during the year, the report outlined recommendations for further work related to business development (food hubs, food processing centers, etc.). The Iowa Legislature approved, and the Governor in May signed a renewal of LFFI for the 2014-15 fiscal year at the funding level of \$75,000. A program assistant (Alice Topaloff) was added to the Leopold Center staff to help determine the current state of knowledge about processing centers, shared-use kitchens, and farm incubators.

A local food system summit ("It's Your Business: Expanding Opportunities in Iowa's Food System") was held in April 2014 with approximately 100 people attending to discuss progress made related to business development. (See www.leopold.iastate.edu/2014-iowa-local-food-conference.) State experts shared their knowledge and experience to stimulate the discussion on logical next steps in Iowa's local food system development. The event focused on food hubs and how to sustain them, processing centers and integrating value-added products, and current marketing strategies for increasing the bottom line of the business.

MFSI mini-grants

These two non-competitive mini-grants being supported by the Marketing and Food System Initiative received extensions to complete their work.

- Joanna Hamilton (former Leopold Center MFSI intern) to develop a decision maker's or practitioner's guide for best practices related to starting a food hub. Organizational structure (form versus function), decision-making processes, food hub deliverables (aggregation point, light processing, marketing, and/or other food hub activities), and review of USDA case studies will be included in the guide.
- Phase II of graduate student Kevin Duerfeldt's study focusing on a SWOT (strengths, weaknesses, opportunities, and threats) analysis for the various types of food hubs in Iowa.

Iowa Food System Working Group

The Iowa Food System Working Group (IFSWG) was established to increase the efficiency and effectiveness of an overall ISU Extension and Outreach program in local food systems and maximize the resources available to all ISU Extension units. Extension units are grounded both in academic disciplines and geography. However, many topics of interest to Extension clientele such as local food system development are interdisciplinary, complex, and must involve multiple programmatic activities and delivery methods. The connection between the Iowa Food System Working Group and ISU Extension and Outreach will increase the outreach of efforts funded through MFSI and the Local Food and Farm Initiative. Learn more about the IFSWG at www.iowafoodsystem.org.

New publications and cool tools

Among the publications and helpful tools developed through the Marketing Initiative:

Four videos were developed focusing on "Why Local, Why Now" and can be found on the Leopold Center's You Tube Channel at <https://www.youtube.com/user/LeopoldCenter>

Production Planning for Aggregators. This guide is designed for aggregators, those businesses and organizations that create a single sales outlet through which large-volume buyers can purchase products from several local farmers. This fact sheet reviews the basics of coordinated production planning, explains how aggregators operate, and suggests things to consider when getting started. (See www.leopold.iastate.edu/aggregators)

Local Food System Toolkits. The first in a planned series of toolkits is a guide for creating a program using pre-packed food boxes delivered weekly and picked up by employees at their workplaces. It is marketed to employers, such as businesses, universities and hospitals that want to make locally grown food

more accessible for their employees. The document was prepared with the Iowa Food Hub and ISU Extension and Outreach and was written by graduate student Savanna Lyons. (See www.leopold.iastate.edu/worksite-toolkit).

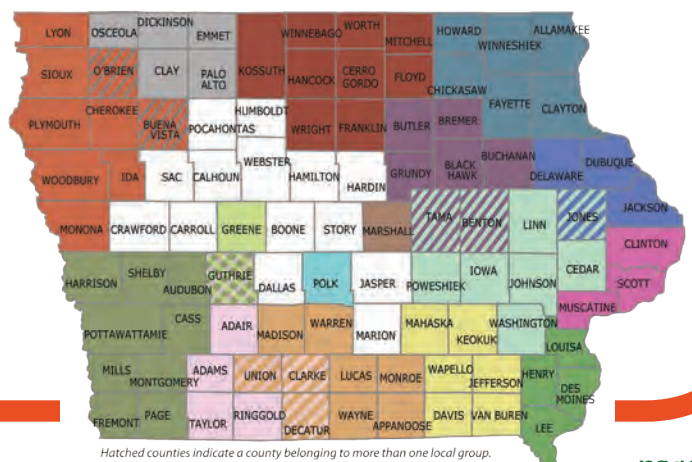
Iowa CSA Farms. This 2014 directory lists 75 Community Supported Agriculture (CSA) enterprises in Iowa, shown by county and the 20 regions within ISU Extension and Outreach. (See www.leopold.iastate.edu/iowa-csa-farms)

Outreach for food systems

The Leopold Center joined the Sustainable Agriculture Food Systems Funders (SAFSF) group in 2013. SAFSF (which has about 85 members) is an international network of grant makers that works "to foster communication, shared learning and information exchange about issues connected to sustainable agriculture and food systems." Craig Chase, MFSI leader, served on the planning committee for the June 2014 conference held in Denver, Colorado. Corry Bregendahl, Leopold Center evaluator, presented at the conference regarding the collective impacts of food systems projects. Both Chase and Bregendahl believe that SAFSF will provide opportunities for future collaborations.

In 2013 the Leopold Center became a sponsor for the *Journal of Agriculture, Food Systems and Community Development* (JAFSCD), a widely recognized, peer-reviewed journal related to food systems work internationally. The journal was founded in 2010 to fill the gap in the applied research literature on farming and food systems-based community development, and covers issues such as regional food value chains, urban food systems, farmland protection, and food sovereignty. The journal focuses on public policy, research, and practice in food systems work, and emphasizes accessible scholarship in the trans-disciplinary field of food systems. As part of the Center's five-year sponsorship agreement, it can take advantage of sponsorship advertising, guest editorial space, and a connection to a wide network of people engaged in work similar to MFSI.

Regional Food Systems Working Groups



Hatched counties indicate a county belonging to more than one local group.

Policy Initiative Continues Support of Drake Land Tenure Project

Neil Hamilton



The Leopold Center's Policy Initiative conducts research on local, state or regional policies that affect the sustainability of natural resources and Iowa agriculture. It also supports policy-related aspects of work being conducted by the other initiatives. The advisory board has requested that the initiative not engage in public advocacy or promotion of specific policy alternatives. Initiative activities were managed by Mary Adams, outreach and policy coordinator.

Sustainable Agricultural Land Tenure (SALT)

The Sustainable Agricultural Land Tenure (SALT) Initiative continued to promote and conduct outreach on existing SALT materials and provide updates and development of new resources for landowners, farmers, and their advisors based on additional research and changing laws. The Drake (University) Agricultural Law Center directed by Neil Hamilton has been the lead agency for this project.

Outreach for SALT

Outreach efforts included presentations and conference exhibitions. A presentation on conservation and land ownership was given by Drake Agricultural Law Center staff for a Women, Land and Legacy workshop in Northwood with 70 attendees and a Women, Food and Agriculture Network (WFAN) meeting in Indianola with 20 people present. Drake staff also spoke at the National Association of State Agricultural Development Agencies on land tenure for new and beginning farmers and the need for landowners to look beyond rental rates in selection of tenants. SALT resources were exhibited, and written and video materials distributed at the Soil and Water Conservation Society's annual conference. Drake staff participated in a panel for 60 landowners and farmers on transitioning farmland and business assets at the Two Rivers Co-op in Pella. They discussed discussing the impact of fractionated interests in land and how transition arrangements can aid stewardship. Drake staff also provided expertise derived from SALT research at a meeting on the expansion of a Conservation Certification program for farmers hosted by the Conservation Districts of Iowa and Agren, Inc.



Matt Russell

A presentation at the American Agricultural Law Association annual conference in Madison, Wisconsin, focused on information about land access and land use issues for farmers selling products locally. More than 100 attorneys specializing in agricultural law were present. Drake Ag Law Center staff also attended the November 2013 "Women in Sustainable Agriculture" conference, hosted by WFAN where legal information on developing sustainable farm leases and renting land to beginning farmers was made available to 400 attendees. Center staff participated in an advisory meeting conducted by American Farmland Trust in Chicago on the development of a national landowner survey to gain critical information on land tenure arrangements in relation to conservation concerns and sustainability.

Funding from the Policy Initiative infrastructure fund was used to conduct two more Iowa workshops for military veterans interested in agriculture, one in Storm Lake and one in Red Oak. These were attended by more than 30 farmers with diverse interests. In conjunction with a statewide conference in December 2013 and the two workshops held in February 2014, these educational events have reached more than 120 Iowa farming veterans.

SALT interviewing results

Results of SALT interviews and a survey of conservation professionals, including NRCS and Soil and Water Conservation District staff, have been conducted. The responses to questions about the primary challenges to conservation in general are broad-ranging, but a significant number of respondents view tenure issues, whether it is geographic distance from the land or the fractionation of ownership interests in corporations and LLCs, as a substantial concern. A very common response to the question of what actions landowners can take to better ensure conservation is the incorporation of conservation lease provisions or review of the conservation plan with the tenant and conservation professional present. Less common, but perhaps as significant, were remarks illustrating challenges in dealing with landowners when tenants and farm managers are acting as middlemen, or sometimes even roadblocks, to communication with landowners, and the hindrance that fractionated interests can cause in conservation program implementation.

Additional conservation lease provisions also have been developed that will provide landowners with examples of how to incorporate specific conservation practices into their leases, including limiting tillage and disallowing any fall tillage, with a fuller explanation of how to monitor and enforce such provisions. Sample provisions were provided to Allamakee County SWCD staff, who are directly helping landowners implement conservation practices in their lease arrangements.

Ongoing research and resource development produced a new FAQ document on Conservation and Trust Ownership, which addresses the rights and duties of those creating trusts, trustees, and beneficiaries in relation to ensuring the sustainable management of trust assets that include farmland.

The SALT Initiative also has leveraged funding from the USDA Natural Resources Conservation Service (NRCS) to develop case studies of five pairs of Iowa landowners and tenants who are addressing sustainability and resilience in their land tenure

arrangements. The project will include written materials describing the negotiation process as well as monitoring and enforcement of conservation provisions if necessary. Video interviews of the case study participants will be posted on the SALT website, www.SustainableFarmLease.org

The Sustainable Land Tenure Working Group funded by the Policy Initiative met February 25 in Des Moines at the Drake University Law Clinic with 15 attendees. Center director Mark Rasmussen talked to the group about the future direction of the Leopold Center's policy work and his interest in pursuing research on the "vulnerabilities" (economic, political and biological) in the current agricultural structure.

SALT research on land tenure arrangements and extreme climate events continues with interviews of landowners and farmers on the impact, if any, of extreme climate events on land tenure arrangements. Legal research has focused on the impact of risk management tools to cope with extreme weather and their impact on land tenure as well as the potential for mitigating the impacts of climate change through insurance mechanisms.

The Drake Agricultural Law Center will have Matt Russell and Ellen Essman take on the SALT research and outreach as the current staff attorney, Ed Cox, transitions to private practice in Centerville, Iowa. Cox has been one of the Center's most exemplary principal investigators, extremely cooperative, quick to credit the Center, and thoroughly professional in his dealings with the Center. We will miss working with him.

Other activities

The Drake Agricultural Law Center and ISU collaboration continued as Ed Cox and Michael Duffy analyzed results from the ISU 2012 Land Ownership and Tenure Survey as part of a competitive grant from the Policy Initiative. Results from an earlier Iowa Trust Association Survey in which they were involved showed that 86 percent of those surveyed managed trusts with farmland, 14 percent of the trusts had provisions regarding conservation, and about one-third had land in conservation programs.

Duffy also used Policy infrastructure funding to prepare a document on conservation practices and the costs of adopting those practices. It is available at: www.leopold.iastate.edu/conservation-practices



Ed Cox

Cross-Cutting Initiative Spans Crops, Energy and Climate

Bio-dome – aquaponic and hydroponic food production – Reiman Gardens Conservatory



The Leopold Center's Cross-Cutting Initiative focuses on research that impacts Iowa's key agroecological systems. The initiative oversees research and demonstration projects investigating agricultural alternatives outside of Iowa's mainstream agricultural systems, sustainable energy production, and livestock production, including research that may mitigate some of the negative climate change impacts of agricultural practices. During FY2014 work in these areas was directed by program coordinator Malcolm Robertson.

Agroecological systems

Long-Term Agro-ecological Research (LTAR). In 2014, the Neely-Kinyon Long-Term Agroecological Research (LTAR) Experiment entered its 17th year, reaching another significant milestone in sustained research. The Leopold Center has been a longtime supporter of the LTAR experiment. The project, led by ISU agronomy and horticulture professor Kathleen Delate, looks at how to gauge the viability of organic cropping systems in relation to agronomic, economic and soil quality effects in conventional cropping systems. Results from this experiment have provided background and supporting evidence for other organic research that examines the effects of organic practices (compost, cover crops, crop rotations, no-till) on yields, soil quality and water quality in farming systems. LTAR has had other notable successes over the years, such as being awarded \$239,969 of externally leveraged funds, linking 21 key organizational, agency and institutional partners and increasing farm income for 100 organic and transitioning producers by 11-20 percent.

With Leopold Center backing, LTAR researchers continue to investigate the effect of organic system approaches on crop yields, soil quality, global climate change mitigation and economic performance. A new project component will examine the soil microbial structure and community in each plot, comparing organic and conventional systems.

Energy and indirect climate effects

University of Iowa Biomass Partnership Project. Thanks to Leopold Center funding, a pilot project, the University of Iowa Biomass Partnership Project (UIBPP), was able to advance faster and farther than otherwise would have been possible during the past two years. Eleven investigators from University of Iowa, Iowa State University, University of Northern Iowa, and the U.S. Forest Service collaborated with individuals from John Deere Corporation, Iowa Department of Natural Resources (Director's office, GIS, and Forestry), Amana Forestry, U.S. Fish and Wildlife Service, U.S. Department of Agriculture, and others. During the pilot stage, the UIBPP facilitated whole-group and electronic meetings and acquired graduate and undergraduate student interns (voluntary and paid) to work on the project. Two undergraduate student class projects were hosted, a project brochure and infographics were produced, 11 public presentations (including one at the 2013 Iowa State Fair) were delivered, a concept for a fuel sustainability index (for stage II of the project) was established, and a project website created. (<http://www.sustainability.uiowa.edu/biomass>)

The group was instrumental in establishing Iowa's first miscanthus production field on 15 acres south of Iowa City. In partnership with the Johnson County Conservation Board, the group sponsored an ecological restoration project that used wood chips generated from land clearing as biomass fuel. The information from these projects will bring the UI closer to one of its target sustainability goals of 40 percent renewable energy consumption on the campus by 2020.

Sustainable production of bioenergy from food waste. U.S. food waste can contribute significantly to the municipal solid waste totals sent to landfills. This waste potentially is a rich source of energy, but its state of decomposition is problematic in landfills and is linked to other environmental ills.

As part of the waste reduction effort, the Cross-Cutting Initiative funded a project to determine the bioethanol production potential of pre- and post-consumer waste collected from ISU Dining. The investigator gathered data about the quantity and composition of these wastes and how much energy could be produced. Results demonstrated the potential of plate food waste to produce bioethanol in a sustainable manner without the need for an expensive pretreatment step.

Currently bioethanol production relies on cornstarch or alternatives to cornstarch, including lignocellulosic material such as corn stover and algae, which are being investigated. However, these options require expensive and energy-intensive pretreatment. Large-scale production of algae has special challenges, including difficulty recovering the oil produced. Food waste has many advantages: it does not compete with food crops, it is less expensive than any other energy production feedstock investigated, its costs are stable, and it does not require environmentally harmful pretreatments. An article written for *Biomass and Bioenergy* noted that implementing the processes described in the piece would mean that U.S. dining facilities could see a decrease in the cost of food waste disposal at the same time as benefiting the environment. The results also were presented November 2013 at the American Institute of Chemical Engineers annual meeting.

Alternative Agriculture

Funding received from the Leopold Center for aquaponics research has fostered the construction of one of the nation's first replicated aquaponics research systems at Iowa State University. Data garnered from this continuing research effort has provided the basis for development of an economic viability assessment initiative for aquaponics in Iowa. The research facility doubles as a teaching facility for students and an extension programming site. More than 30 tours of the aquaponics facility have been given to researchers, extension personnel, high school teachers, college and high school students, and private industry representatives. Allen Patillo, an ISU Extension specialist, has worked with the Cross-Cutting Initiative on this project.

The expertise gained from the aquaponics project has led to two valuable partnerships. ISU's Reiman Gardens included an aquaponics demonstration in its 2014 educational display. FarmTek, Inc. has developed several scales of "turn-key" aquaponic production systems and a Controlled Environments Agriculture School based in part on this research. Aquaponics research has been featured on Iowa Public Radio, Iowa Public Television, central Iowa news stations and other media outlets.

Special Projects

XPSP2014-01 "Use of adaptive grazing management to provide multiple ecological services while increasing profitability of beef cow-calf production in Iowa."

Create an interdisciplinary issue team to look at grazing and animal management practices used at the 2,000-acre McNay Research Farm in south-central Iowa and design a long-term adaptive grazing plan for the farm that is based on findings from Leopold Center-supported grazing research, soil quality and diverse plantings. J. Russell, ISU animal science

XPSP2014-02 "The prospects and challenges of organic dairy farming in Iowa: A case study."

A look at the challenges that organic farmers in northeast Iowa face in managing production systems and supply chains in a rapidly expanding market for organic dairy products. P. Jayashankar, ISU business management

XPSP2014-03 "Reiman Gardens Aquaponics Project."

Demonstration showing a hydroponics and aquaponics system at the Reiman Gardens Conservatory. T. McLaughlin, ISU Reiman Gardens

XPSP2014-04 "Horticulture/Agriculture Education Studies 465 Fruit and Vegetable Marketing Website."

Funds will be used to develop a website accessible to university faculty, staff, and students to market fruit and vegetables produced by ISU Top Shelf Farm and the ISU Horticulture Research Station. M. Honeyman, ISU Research Farms

XPSP2014-05 "Persistence of alternative stable states in grassland habitats managed with light grazing."

Research will determine whether observed increases in butterfly, reptile, and small mammal species richness persist in areas exposed to light grazing three years after cattle were removed from grassland habitats. L. Lown, Polk County Conservation



Center Competitive Grants Program FY2014

The Leopold Center funds a wide variety of research, education and demonstration projects aimed at increasing the sustainability of Iowa agriculture. The projects are selected after a rigorous competitive process that includes issuing a Request for Pre-proposals (RFP) in June, multiple reviews and assessment of full proposals submitted in November and ends with awarding of funds in January.



Ecology Initiative

The Ecological Systems Research Initiative funded nine proposals received from the Summer 2013 RFP. Five projects received renewals for a second or third year of funding and 11 projects were granted no-cost extensions or slated to end.

New Ecology grants – FY2014

Total amount awarded – \$298,570

Total number of projects – nine

Biochar and managed perennial ecosystems: Testing for synergy in ecosystem function and biodiversity, 3 years

S. Harpole and L. Biederman, ISU ecology, evolution and organismal biology

Biochar is a major by-product of low-temperature pyrolysis from the thermal decomposition of wood or grasses to produce heat, electricity or biofuels. The goal is to investigate the ecological impacts of biochar on the interactions among native prairie plants, soil organisms and their soil environments. Information will stem from field-based initiatives to determine the effects of these soil amendments prior to widespread application.

The complex role of tall fescue in grassland ecology, 3 years

D. Debinski, ISU ecology, evolution and organismal biology; R. McCulley, University of Kentucky plant and soil sciences; and D. Engle and J. D. Scasta, Oklahoma State University natural resource ecology and management

The effects of grazing and burning management on tallgrass prairie remnants and restorations are explored. Researchers investigate the potential of fire and grazing interaction to reduce tall fescue abundance and/or alter the endophyte infection rates of tall fescue, an exotic grass commonly used as forage for beef cattle and that also shows up as a prairie invasive.

New

Economic impacts of soil erosion in Iowa, 1 year

R. M. Cruse, ISU agronomy; M. C. Shelley, ISU statistics; C. L. Burras, ISU agronomy; J. Tyndall, ISU natural resource ecology and management; and M. Miller, ISU agronomy

This study aims to quantify soil erosion and topsoil depth lost across Iowa's HUC 12 watershed regions, determine how these values correspond to lost corn and soybean yield, and estimate the economic value of this loss. This Iowa Water Center project complements ongoing USDA Corn CAP grant efforts.

Enhancing botanical composition, wildlife habitat and carbon sequestration of pastures in south central Iowa through soil disturbance by mob grazing of beef cattle, 3 years

J. Russell, ISU animal science

Mob-grazing is ultra-high stock density grazing, where a large concentration of animals is restricted to graze a small area, usually for a very short period of time. This project looks at how mob grazing affects forage type and structure and soil quality over multiple years. The long-term objective of the study is to evaluate the strategic use of mob-grazing on pastures in south central Iowa to improve their botanical composition for forage, as well as wildlife habitat, carbon sequestration and water infiltration.

Evaluating canola (*Brassica napus*) as an alternative oilseed crop and enhancing winter cover in Iowa, 3 years, extended

M. Wiedenhoft and S. Gailans, ISU agronomy

One of the objectives of this project is to increase the amount of information available to growers about canola as a 'third' crop in Iowa. Investigators also want to gather more data about winter cover crops in Iowa. The team will assess the economic and ecological impacts of alternative cropping systems and different crop rotations. Data gathered will be used to assess the viability of canola as a crop for Iowa and make cropping recommendations to farmers.

New

Determining threshold responses of plant-soil feedbacks to nitrogen deposition, 1 year

L. Biederman, and S. Harpole, ISU ecology, evolution and organismal biology

This project will study how nitrogen deposition affects the stability of coupled-plant-soil systems in perennial grasslands. Investigators will monitor N-deposition and gaseous N-levels along an east-west gradient experiment across Iowa. The work will contribute to understanding how nutrient deposition levels may be managed in prairies proposed for biofuel cropping or to mitigate agricultural nutrient and soil loss.

Grazing prairie: Improving species diversity while maintaining cattle and goat productivity and resting home pastures, 4 years, extended

D. Ryan and L. Appelgate, Iowa Heartland Resource Conservation and Development, Ankeny; L. Lown, Natural Resources Specialist, Polk County Conservation Board

The investigators seek to increase species diversity at Chichaqua Bottoms Wildlife Area in Polk County by grazing cattle on a 263-acre reconstructed prairie and browsing goats in three oak savanna areas degraded by invasive species. Calf-weaning weights, body condition scores, and the economic value of winter forage harvested or stockpiled on resting home pastures also will be measured.

Implementing an ISU Extension Master Grazer Certification course, 3 years

H.J. Sellers, ISU Extension, Chariton; and M. Drewnoski, ISU animal science

Development of a Master Grazer Certification Program for Iowa State University potentially can increase the animal and environmental performance and economic competitiveness of Iowa's grazing livestock systems. This project builds on the successful Leopold Center-funded "Greenhorn Grazing" program. It will focus on farmer adoption and adaptation of practices, building mentoring skills and developing social networks.

New

Covering the ground: A transformative approach to scientific learning for greater cover crop adoption in Iowa, 1 year

F. Miguez, ISU agronomy; J. Tyndall, ISU natural resource ecology and management; J. Gordon Arbuckle, ISU sociology; G. Roesch, ISU natural resource ecology and management; and A. Basche, ISU agronomy

The investigators will organize farmer focus groups to discuss modeling predictions about the long-term costs and benefits of cover crops in corn-soybean rotations. These discussions will yield information about farmer perceptions of cover crops, the likelihood of adopting this conservation practice, and the barriers to adoption. This information will enhance the work of the Climate and Sustainable Corn CAP and Midwest Cover Crops Council to increase farmer adoption of cover crops as a conservation practice.

Integrating project knowledge and models: The next step in developing a Payment for Ecosystem Services scheme for the Big Creek watershed, 1 year, extended

L. Schulte-Moore, J. Tyndall and T. Isenhardt, ISU natural resource ecology and management; J. Gordon Arbuckle, ISU sociology; K. Franz, ISU geological and atmospheric sciences; E. Heaton and M. Liebman, ISU agronomy; and M. Helmers, ISU agricultural and biosystems engineering

The investigators will further the development of a pilot Payment for Ecosystem Services (PES) framework. Focusing on central Iowa, they will integrate data and knowledge from prior research in the Big Creek watershed in preparation for using an ecosystem services model called InVEST. Widely used outside of Iowa, this model is popular for its capacity to link providers (farmers, landowners) with beneficiaries (the public) by estimating the dollar value of multiple ecosystem services.

Investigation of bacteria transport and resistance mechanisms and implications for water quality from confinement swine and beef grazing production systems in Iowa, 3 years

M. Soupir, M. Helmers, and R. Kanwar, ISU agricultural and biosystems engineering; M. Thompson and A. Mallarino, ISU agronomy; and L. Jarboe, ISU chemical and biological engineering

This research team will investigate the fate and transport of bacteria from land that receives manure applications. A monitoring study will examine the impact of different agricultural systems on water quality and address emerging issues related to antibiotic resistance in pathogens. In addition, investigators will study the mechanisms of pathogen transport, specifically, if pathogens are attached to manure, soil or sediment particles during transport and identify related environmental factors.

New

Management and performance of Iowa cover crops, 1 year

J. Comito, Iowa Learning Farms; M. J. Helmers, ISU agricultural and biosystems engineering; J. L. Benning, ISU sociology; and T. Kaspar, USDA-ARS National Laboratory for Agriculture and the Environment, Ames

This Iowa Learning Farms project continues the efforts of the Iowa Cover Crop Working Group to determine long-term soil quality and crop yield changes resulting from planting cover crops on farms. The grant supports the 2014 cover crop planting on seven farmer-partner sites, as well data collection on soil quality and crop yield indicators for fall 2014 and spring 2015.

Performance of cropping systems designed to reduce nitrate leaching into shallow municipal well aquifers, 5 years

R. DeHaan, Dordt College, Sioux Center

This on-farm project featuring public-private collaboration will assess cropping systems with the potential to produce a reasonable return for farmers, while simultaneously reducing the risk of nitrate-N movement into the shallow aquifers that supply water for the city of Sioux Center.

Predicting long-term cover crop impacts on soil quality using a cropping systems model, 1 year, extended

F. Miquez, S. Archontoulis and A. Basche, ISU agronomy

This project will monitor crops and soils at a corn-soybean field site with a winter rye cover crop to provide information for a process-based model, APSIM. The model is eventually expected to facilitate use of cover crops in Iowa by providing improved understanding of crop production/cover crop management under Iowa soil and climate conditions.

New

Quantifying nitrogen credits and impacts of cover crops on soil biology and health in vegetable cropping systems in Iowa, 1 year

A. Nair, ISU horticulture extension; K. Delate, ISU horticulture and agronomy; C. Bregendahl, Leopold Center for Sustainable Agriculture; G. Artz, ISU economics

The study will collect data on cover crop nitrogen credits, nitrogen scavenging capacity, biomass generation capability, weed suppression properties and effects on soil quality and health in vegetable cropping systems. It will survey traditional crops (cereal rye, oats) and nontraditional cover crops (brassicas, mustards, peas, clovers, etc.). Cost-benefit analyses and enterprise budgets will be created for different cover crop types.

New

Quantifying the effects of alternative surface inlet protection strategies on water quality, 1 year

M. Shipitalo and M. Tomer, USDA-ARS National Laboratory for Agriculture and the Environment, Ames

The investigators will quantify water flow rates and quality from field sites into surface inlets with three different water conservation practices: blind inlets consisting of subsurface perforated drain pipes; grass filter strips that surround the inlet; and compost-filled filter socks that surround the inlet. Researchers will test effectiveness, land use requirements and management expense for each practice.

Quantifying the effect of perennial vegetation on soil and water quality, 3 years, extended

T. Isenhardt and R. Schultz, ISU natural resource ecology and management, and K. Schilling, Iowa Department of Natural Resources

The investigators are using data from a well-established research site (Bear Creek in Story County) to interpret the influence of perennial vegetation on soil biogeochemical processes. The information will be used to develop a tool to assess the potential impact of changes in land use on the quality of stream water.

Winter rye cover crop effect on corn seedling pathogens, 3 years

T. Kaspar and T. Moorman, USDA-ARS National Laboratory for Agriculture and the Environment

While cover crops are an excellent management tool for sustainable agriculture, decreases in corn yield have been observed following winter rye cover crops. This project tests the hypothesis that glyphosate-killed rye cover crops are hosts for corn seedling pathogens. There will be studies in a controlled environment and on-farm field studies, as well as testing of management strategies to prevent or minimize corn yield decreases.

New

Soil health and productivity in riparian grass buffers: A re-evaluation after 13 years, 1 year

J. W. Raich, ISU ecology, evolution and organismal biology; R. C. Schultz, ISU natural resource ecology and management

The investigators will revisit 24 riparian grassland buffer plots established in 2001 along Bear Creek to collect data on soil properties, plant biomass and productivity, root biomass, soil food web community structure and soil respiration. The 2014 data will be compared with what was collected in 2001 to quantify how land-use conversion from pasture or row crops to buffer strips has changed soil health and productivity of the landscape after 13 years.

New

Understanding microbial contributions to soil aggregation and organic matter accumulation, 1 year

K. S. Hofmockel and E. Bach, ISU ecology, evolution and organismal biology

The investigators will characterize soil bacterial and fungal communities and the rates at which they break down plant-derived carbon in soil from three different farming systems: continuous corn, prairie and fertilized prairie. This project continues work started by the Comparison of Biofuel Systems (COBS) group.

New

A smartphone-based device for measuring soil organic matter, 1 year

M. Lu, ISU mechanical engineering and electrical and computer engineering; R. M. Cruse, ISU agronomy

The researcher proposes to develop, calibrate and pilot a camera and software system for smartphones that allows users to rapidly measure soil organic matter (SOM) content in the field. The pilot project will test data from the smartphone device against lab-based soil analysis to improve the accuracy of its calculating software.

Suitability of winter canola (*Brassica napus*) for enhancing summer annual crop rotations in Iowa, 1 year, extended
M. Wiedenhoeft, R. Martinez-Feria and A. Lenssen, ISU agronomy; and T. Kaspar, USDA-ARS National Laboratory for Agriculture and the Environment, Ames
Growing winter canola after summer annual crops such as corn or soybean might improve grain production and soil management, but represents a challenge in the cooler climates of the Upper Midwest. Investigators will conduct field trials to test the viability and short-term profitability of incorporating winter canola into the corn-soybean rotation, either as a winter cover crop or as a third cash crop frost-seeded with red clover.

Use of grazing management to mitigate greenhouse gas emissions while increasing soil organic matter and water-holding capacity of cool season pastures in southern Iowa, 3 years
J. Russell, ISU animal science; W. Powers, Michigan State University; and T. Isenhardt, ISU natural resource ecology and management
The investigator's long-term goal is to quantify the effects of grazing management on the flux of major greenhouse gases, and assess the relationships among greenhouse gases, soil organic carbon sequestration, botanical and chemical composition of vegetation, and physical characteristics of soil in southern Iowa grasslands. The grazing systems compared are continuous stocking, rotational stocking and mob-stocking.

Marketing and Food Systems Initiative

The Marketing and Food Systems Initiative funded seven pre-proposals received from the Summer 2013 RFP. Four projects were given extensions to complete their work or were slated to end.

New Marketing Initiative grants – FY2014
Total amount awarded – \$160,906
Total number of projects – seven

Establishing shared-use processing facilities at three possible locations in central and south central Iowa, 1 year, extended

J. Porter, Neighborhood Investment Corporation, and G. Huber, Iowa Food Cooperative
The nonprofit Neighborhood Investment Corporation has been working with the Iowa Food Cooperative to develop a shared-use processing facility in the unused kitchen at the Robert W. Mickle Neighborhood Resource Center in Des Moines. The kitchen is a potential location for the development of new food-related small business enterprises. In addition to the Mickle Center, two additional sites will be analyzed as potential locations.

Implementing a seasonal cycle menu for public schools featuring Iowa-grown and processed foods, 1 year, extended

T. Wiemerslage, ISU Extension and Outreach, Decorah

This project expands previous work to launch the Farm to School program in 18 school districts by creating a seasonal cycle menu for public schools. The menu will help public schools meet the requirements of the Healthy, Hunger Free Kids Act and provide a predictable demand for Iowa-grown and Iowa-processed foods to assist farmers in planning. Investigators also will train high school and middle school youth to teach and mentor younger students.

Coordinators at an Iowa Food Hub "Worksite Food Box" dropoff site, preparing deliveries for pickup. (Photo courtesy Iowa Food Hub)



Finley Cox planting garlic.



Digging sweet potatoes

New

Increasing the capacity of a local food hub to service the public school market, 1 year

T. Wiemerslage, Northeast Iowa Program and Communications Coordinator, ISU Extension and Outreach, Decorah

The investigator will continue work in the northeast Iowa region focusing on bringing local foods to schools. This project will work with the Northeast Iowa Food Hub to double the current amount of local food purchases in four school districts. Objectives include finding accessible prices for farms, processors and schools; finding models and methods that create networks between farms and schools; and creating distribution models that include schools and leverage existing resources.

New

Insurance benchmarking for Iowa fruit and vegetable producers, 1 year

S. Worley and L. Kolbe, Practical Farmers of Iowa, Ames

For a second year, the investigators will collect baseline data on fruit and vegetable production in Iowa to help create a crop insurance program that reflects the unique and diverse needs of fruit and vegetable farming businesses. This includes training fruit and vegetable farmers on how to collect records for a nationwide crop insurance data collection project as well as collecting actual fruit and vegetable production and sales data from 10 farms in Iowa.

New

Market development and logistics for local food distribution in the Cedar Valley, 1 year

R. Wobeter, Local Food Program, University of Northern Iowa, Cedar Falls

This project will expand the reach of local foods in the Cedar Valley region by establishing a worksite community supported agriculture (CSA) program supplied by the Iowa Food Hub. The investigator will identify staff interested in managing the local food distribution site, institutional buyers who can access local food through the site, and area food purchasers and producers who may profit from awareness of local foods options and accessibility through the project.

New

Planning grant for the establishment of a food enterprise center, 1 year

J. Grimm, Iowa Valley RC&D, Coralville; J. Singerman, Prairie Ventures, LLC, Iowa City; and J. Burt-Fogarty, Regional Food Systems Working Group, Iowa City

The investigators seek to determine the level of community interest in creating a food enterprise center (FEC) or food hub to serve stakeholders in Johnson and Linn Counties. This includes researching other models of FECs and food hubs around the country that have expanded local food systems in their communities, as well as networking with community leaders in various local organizations and institutions to gauge interest and identify potential partners for a full feasibility study for a FEC or food hub in the area.



Machinery sharing – using a mechanical weeder

New

Small-farm business development incubator for refugee farmers, 1 year

N. Wuertz, Director, Refugee Community Services at Lutheran Services in Iowa, Des Moines

The incubator training program offers Iowa immigrants and refugees the opportunity to work small farm plots with some training and guidance. In this phase of the program, the project investigator will work with a small subset of the beginning farmers to develop small-farm businesses, with the ultimate aim of transitioning to them to independent operators.

New

Using spatially explicit supply/demand and local participants' perspectives to integrate urban agriculture with community planning, 1 year

J. Thompson, J. Tyndall and M. Moore, ISU natural resource ecology and management; and L. Naeve, Value Added Agriculture, ISU Extension and Outreach
The investigators will conduct focus group studies with residents, city officials and institutional and non-governmental organization representatives in Des Moines (IA) to assess interest, assets and barriers to urban agricultural resources. This data will help outline how and where urban agriculture may be desired or made accessible, and the resources available through non-governmental and municipal resources for vitalizing urban agriculture.

New

Agricultural Urbanism Toolkit, 1 year

N. Anderson, Community Development Specialist, ISU Extension and Outreach; and C. Long, ISU Community Design Laboratory

The investigators will collaborate with three Iowa communities to identify food system resources and needs for an agricultural urbanism toolkit. Issues such as health, walkability and transportation, equity, and business development and connectivity will be addressed, with the goal of connecting urban and rural food systems.

Policy Initiative

The Policy Research Initiative funded two proposals received from the Summer 2013 RFP. One other grant continued for a second year of operation.

New Policy Initiative grants – FY2014

Total amount awarded – \$56,121

Total number of projects – two

Sustainable Agricultural Land Tenure and risk management for extreme climatic events, 1 year, extended

E. Cox, Drake University Agricultural Law Center, Des Moines and J. Gordon Arbuckle, Jr., ISU sociology

After conducting interviews to determine the key land tenure issues related to climate changes, the investigators will develop outreach materials to offer landowners/farmers information on possible tenure arrangements that help protect the land from extreme climatic events while also altering practices that contribute to climate change. They will utilize their findings to formulate policy recommendations on leases, crop insurance and risk management strategies.

New

Reducing local regulatory barriers to local foods: Municipal zoning for local foods in Iowa guidebook, 1 year

G. Taylor, ISU community and regional planning

The investigator will produce a guidebook for city officials with information about municipal zoning and land use regulations as they relate to community gardens, vacant lots converted for production, or sales through non-traditional establishments. Models of zoning code language will be sought from around the country. The guidebook will include language that reduces barriers to urban agriculture while promoting production and sales activities. The work continues the efforts of the Regional Food Systems Working Group (RFSWG) to support the local foods movement in Iowa.

New

Sustainable Agricultural Land Tenure: The legal rights and duties of entity ownership of Iowa farm land and the next generation of landowners, 1 year

N. Hamilton and E. Cox, Drake University Agricultural Law Center, Des Moines

Through the Sustainable Agricultural Land Tenure (SALT) Initiative, investigators will produce a “Legacy Report” for farmers, landowners and their legal advisors that illustrates how property is passed on to the next generation of farm owners, particularly by identifying current and best land management practices that emphasize sustainability and resilience of the land’s resources. The project will identify sustainable land management options relevant to the specific property being passed on, and create legal resources for courts to rely on to aid cases involving farmland resource mismanagement.

Cross-Cutting Initiative

The Cross-Cutting Initiative funded six pre-proposals received from the Summer 2013 RFP. Another four projects were renewed for a second or third year of funding or given extensions to complete their work.

New Cross-Cutting Initiative grants – FY2014

Total amount awarded – \$216,220

Total number of projects – six

Capturing indigenous knowledge of small grain production, 1 year

D. Larsen, Practical Farmers of Iowa, Ames; and S. Gailans, ISU agronomy
Practical Farmers of Iowa (PFI) has identified a knowledge gap among Iowa farmers about how to grow, harvest and handle small grains such as oats, wheat, barley or triticale. This gap is a prominent hurdle to greater adoption of small grains in diversified rotations. PFI proposes to capture what remains of small-grains production knowledge from six long-time Iowa farming couples. Their knowledge, archived in the form of interviews, photographs and video documentation, will be a resource available for the long-term.

Demonstrating farrowing alternatives for small farms: Insulated tents for sows and pigs, 3 years

J. Harmon, ISU agricultural and biosystems engineering

The work of the ISU Hoop Group continues with this demonstration of a circular, insulated tent, or yurt, for farrowing pigs in a bedded, crate-free environment, and by developing a management guide for farmers regarding managing sows and pigs in bedded, crate-free systems. The demonstration yurt was erected at ISU's Allee Demonstration Farm near Newell and operated for farrowing pigs.

Attracting pollinators and natural enemies to add value to Iowa agriculture, 3 years

M. O'Neal and D. Lewis, ISU entomology; M. Gleason, ISU plant pathology and microbiology; C. Haynes, ISU horticulture and agriculture education; A. Joseph, Iowa Department of Agriculture and Land Stewardship; and M. Duffy, ISU economics
The investigators are developing an outreach program to show Iowa stakeholders how they can increase the ecosystem services of wild pollinators and natural pest enemies. They will implement a paired-comparison experiment on five ISU farms throughout the state to test the hypothesis that adding a refuge of perennial plants attractive to beneficial insects will improve the delivery of ecosystems services to soybean and melon production. They will calculate a partial budget to isolate the effects of the beneficial insects-enhancement treatment on the value of the marketable harvest of muskmelon and soybean.

New

Linking soil and water quality with crop performance across a continuum of tillage and management strategies: Enhancing sustainability through soil-health-promoting practices, 1 year

K. Delate, ISU agronomy and horticulture; C. Cambardella, USDA-ARS National Laboratory for Agriculture and the Environment, Ames; A. Johanns, ISU Extension and Outreach, Osage
The study will look at how soil microbial diversity varies depending on different land management strategies (from a range of combined options for cover crops, tillage and extended rotations). The investigators will quantify factors including the types of microbe communities present (fungal vs. bacterial), microbial biomass, organic matter and carbon sequestration, weed populations, crop yield and water quality and quantity for various cropping systems.

New

Cultivating conservation: Bringing ecology, economics and ethics together, 1 year, extended

T. Papanicolaou, civil engineering, (formerly University of Iowa) University of Tennessee

This project will develop a holistic framework to help farmers and producers make good land stewardship decisions, based on ongoing research at the Clear Creek watershed in southeast Iowa. The framework will utilize quantitative metrics that account for ecological, economic and ethical aspects of decision-making. The model can then be used to evaluate hypothetical scenarios, assigning a monetary value to the benefits and consequences of different farming systems.

New

The University of Iowa Biomass Energy Sustainability Index: A decision-making tool for the University of Iowa Biomass Partnership Project, 1 year

L. Christiansen, I. Gronstal Anderson, F. Milster, A. Ward, E. Tate and T. Priest, University of Iowa, Iowa City; E. Heaton, L. Schulte Moore, R. Hall and J. Tyndall, Iowa State University

The investigators will develop a toolkit to inform policy decisions and evaluate options for producing sustainable biomass feedstock in the production of renewable energy. In the past, decisions about biomass production have relied only on an economic index (lowest price = best option). Investigators with the Biomass Partnership Project at the University of Iowa will consider a range of environmental, social and economic factors to evaluate biomass feedstock.

Impacts of conventional and diversified rotation systems on crop yields, profitability, soil functions and environmental quality: Stage II, 1 year, extended

M. Liebman and M. Castellano, ISU agronomy; and A. Johanns, ISU Extension and Outreach, Osage

This grant supports ongoing research at the ISU Marsden Farm concerning the agronomic, ecological and economic effects of diversifying crop rotations. The investigators will estimate soil erosion potential and make measurements of soil nitrogen-related processes. They will continue to quantify the economic characteristics of the low-input-high-diversity cropping rotations compared to the conventional corn-soybean system.

New

Impacts of conventional and diversified rotation systems on crop yields, soil functions and environmental quality: Stage II/Year 2, 1 year

M. Liebman and M. Castellano, ISU agronomy

The investigators will look at soil nitrogen dynamics in a conventional 2-year rotation (corn-soybean) and two more diverse systems: a 3-year rotation (corn-soybean-oat + red clover) and a 4-year rotation (corn-soybean-oat + alfalfa-alfalfa), both of which periodically receive cattle manure. Measurements to test this hypothesis will be made at the Cropping Systems Research Team plots at the ISU Marsden Farm.

New

Food safety, economics and environmental impacts of aquaponics in Iowa, 1 year

D. A. Pattillo, ISU natural resource ecology and management; K. A. Rosentrater, ISU agricultural and biosystems engineering; and A. M. Shaw, ISU food science and human nutrition

The investigators will continue research on aquaponics systems which raise fish and grow herbs and vegetables in a closed loop system that recycles most water and nutrients. The project aims to identify how to eradicate potential disease-causing microorganisms in the system; quantify the economic costs, benefits and other impacts associated with setting up the system; and document the environmental impacts associated with the system.

New

Suitability of winter canola (*Brassica napus*) for enhancing summer annual crop rotations in Iowa, 1 year

M. Wiedenhoef and R. Martinez-Feria, ISU agronomy

The project continues previous research (conducted for E2013-16) to gauge whether winter canola (*Brassica napus*) is a suitable cover crop for Iowa corn-soybean operations. The project will help determine how time of canola seeding in the fall affects crop establishment and productivity, to quantify the short-term economic feasibility of winter canola as an alternative to other cover crop options.

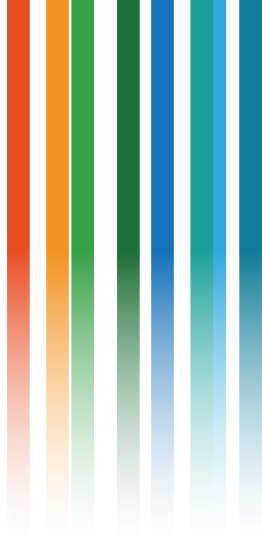
Aronia berry harvester



Five cropping systems being tested in Northwest Iowa near Sioux Center



Michelle Soupir examines bacterial cultures from pastures and water.



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