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The Farm as Natural Habitat

Abstract

I want to tell you a little bit about how this book with my mother actually came about, and then read from my long list of bitter complaints about what's wrong with U.S. agriculture, particularly in Iowa where industrialization is at its most extreme. It's important to see how environmental degradation, water pollution, soil degradation and other problems that we are seeing both within our state, in the Gulf of Mexico and other places around the world, tie into our loss of biological diversity. We often separate our natural resource degradation from biological diversity or species loss, and I believe they are two parts of the same set of issues.

Disciplines

Agriculture

The Farm as Natural Habitat¹

Laura Jackson, University of Northern Iowa

It's a pleasure and an honor to share some of my ideas with an audience in Ames at ISU, and I'm grateful to the Shivvers family and Gamma Sigma Phi for investing in this series of conversations about agriculture and ecology.

I have been an admirer of the Leopold Center since its inception. It was a brave act that the Iowa State Legislature engaged in to challenge the status quo in Iowa at a time when sustainable agriculture had barely any credibility as a scientific enterprise, much less a profit-making enterprise.

As Paul Johnson, one of the key writers of the Iowa Groundwater Protection Act from which the Leopold Center sprung, has said, "Conservation is not just about building another terrace. It is sharing the land with a hundred thousand other species." I think that's a wonderful way to frame the mission of the Leopold Center.

The Leopold Center has obvious allegiance to the ecological ideas of Aldo Leopold, and remains the only institution of its kind in the country. It is a source of great jealousy among other agricultural states, so you should feel privileged to have this wonderful institution here, and I've been pleased to serve on its board.

I want to tell you a little bit about how this book with my mother actually came about, and then read from my long list of bitter complaints about what's wrong with U.S. agriculture, particularly in Iowa where industrialization is at its most extreme. It's important to see how environmental degradation, water pollution, soil degradation and other problems that we are seeing both within our state, in the Gulf of Mexico and other places around the world, tie into our loss of biological diversity. We often separate our natural resource degradation from biological diversity or species loss, and I believe they are two parts of the same set of issues.

Then I will look at different ways that people are changing this, how farmers, ecologists, researchers, consumers and policy makers are addressing these issues to make the farm a more natural habitat. Finally, I have some thoughts on what we must overcome in order to make that change happen on a large scale.

The book project

The book, *The Farm as Natural Habitat*, was inspired beginning in 1993. I had just moved to Iowa to start at the University of Northern Iowa, and my mother had just moved to Minnesota from Kansas to work with the Land Stewardship Project. Our experiences in Kansas, a heavy agricultural state, were not enough to prepare us for

¹ A transcript of the 2005 Shivvers Memorial Lecture presented at Iowa State University in Ames, Iowa, October 19, 2005. Dr. Jackson is a professor of biology at the University of Northern Iowa, Cedar Falls, Iowa. Sponsored the Leopold Center for Sustainable Agriculture and the Iowa State University chapter of Gamma Sigma Delta Honorary Society for Agriculture.

Iowa's vast expanses of corn and soybeans. It was truly shocking to see an ecological sacrifice zone with virtually no native plant or animal species for miles and miles and miles. I am always astounded that I can get on Highway 20 in Cedar Falls and drive west for six hours and not see -- with the exception of riparian zones along the rivers -- a single patch of native vegetation that hasn't been planted by the Department of Transportation. There are very few places on this planet where you can drive a six-hour transect and see nothing but agriculture.

Less than one-tenth of 1 percent of our prairies remain, and Iowa and Minnesota in the early 1990s were on the cusp of a grave ecological and economic transformation, the separation of livestock from crops in the form of hog confinements, often now owned by nonresidents or by corporations rather than family farmers. This was a big shift in Iowa's economy.

At the time, defenders of this trend supported it as inevitable and, in fact, necessary to maintain our rank in pork production. The public more or less swallowed this characterization, despite the protests, the manure spills, the declining rural property values and new wave of rural unemployment. At the time when I came to Iowa, there were 35,000 farmers selling hogs, and this year there are fewer than 10,000. Total production is unchanged.

So while some saw this transformation as acceptable, Mom and I were confused because we had both been on farms where people were doing things very differently and not buying into the inevitability idea. My mother was going to visit Land Stewardship Project farms throughout Minnesota and I was visiting farms of people from Practical Farmers of Iowa. We were seeing rotational grazing, prairies being planted and agroforestry, all kinds of creative and diverse ways to make a living and restore nature on their farms.

We thought that consumers needed to know they had a choice in the kind of food that they bought, that they could vote with their food dollars for a food system that they believed in, that there were workable alternatives. We enlisted the help of Brian DeVore, an agricultural journalist who got his degree here, to tell some of these stories using farmers' own words.

We also wanted to call attention to Aldo Leopold's vision of the land as one organism not separate parts -- a forest here, nature over there, scenery here, and another area for food production. We also wanted to reach an audience of conservation biologists -- myself included -- who far too often have ignored the land between the coasts and between the mountains, because there's apparently little left to save.

Conservation biology has been obsessed by wilderness, by pristine, by large tracts of land that could be owned by government, and this area of the country did not fit that bill. But agriculture is the primary cause of habitat loss for endangered species, right up there with urban development and much greater than logging or grazing. Agriculture affects 70 percent of species on the endangered species list, and we thought it was time to help people connect their grocery list to the endangered species list.

Disappearing grassland. We can trace former grassland in this map of grain elevators [see Figure 1, Appendix 1] produced by Cargill. The map shows grain elevators around the country, and you can see not only the tall, mixed, and short grass prairies, but also the Palouse Prairie in the far Northwest, Central Valley of California, the Cache Valley of Utah, the Coastal plains, Texas and the southeast coast of the United States. Every dot is a grain elevator and that pretty much summarizes what happened to our grasslands.

In most areas of the Upper Midwest, land in agricultural production is barren dirt for nine months of the year. Because of our corn/soybean rotation, we're looking at a system only collecting solar energy about three months of the year. The rest of the time the land has very little cover on it, very little green leafy cover to collect solar energy, which can be seen in satellite photography.

Figure 2 [see Appendix 1] is a greenness index, measured by satellite photography, showing how much green is on the land averaged over the two-week interval from June 4th to June 17th. The maximum amount of solar energy comes to Iowa on or around June 21, and Figure 2 shows that a big chunk of the Corn Belt is virtually bare, brown to yellow, on the same days that solar energy is at its maximum. What a waste, right?

The first two-week period in which the deep green appears over the Corn Belt in satellite photographs is July 2-15. That's how long it takes to get to the point where photosynthesis is being fully utilized on the Iowa landscape. And by September 24 we're back to brown and yellow again.

So as an ecologist looking at energy being utilized by the ecosystem, I notice that we're really just using a tiny fraction of the energy that comes into our state, which is, after all, 42 degrees north. We don't have a lot of sun compared to other parts of the world, and we should be using more of it.

There are other consequences that I'll discuss in a bit, but I want to look at the history of agricultural production [see Figure 3, Appendix 1]. It hasn't always been like this. Between 1860, when we first started plowing down the prairies, until about 1960, we maintained a roughly equal proportion of row crops and what I call sod crops -- hay or pasture in rotation with crops, or small grains like oats, barley, wheat and rye. Sod crops were in the rotation because they were necessary; in some cases, legumes and hay provided nitrogen for corn. They also were needed in the rotation for weed control and they fed or bedded livestock.

It's only been in the last 40 years that we've begun to see this monoculture of annual grains that are only actively producing energy --collecting solar energy -- for such a time during each year.

The other part of this equation, again speaking as an ecologist and thinking about energy relationships, is what we do with that grain once it is harvested. Of course, it is fed to

livestock. But the emphasis on cash grain has also meant an emphasis on livestock away from the farm in some sort of a confinement system, which leads to other nutrient issues.

Impaired water quality. One of the known environmental consequences of our intensive monocultural cropping system is deterioration of our groundwater supply. The list of impaired water in Iowa is growing every year and we still do not have a good plan to fix things. A lot of the 1.5 billion pounds of nitrogen applied to our soil every year, about 50 to 60 percent, ends up in the corn grain; the rest is at large in the ecosystem.

Some of it stays in the soil for a while. Some of it ends up in the Mississippi River and the Missouri River and goes down to the Gulf of Mexico, with of course a load of sediment, about 550 million metric tons, plus the nitrogen and phosphorous also carried by the sediment. All this leads to a zone of low oxygen with no fish, no shrimp, and it's getting bigger every year. There are hundreds of these hypoxic zones near estuaries around the world where industrial agriculture has over-fertilized, resulting in reduced production of fish and reduced livelihoods of people who depend on the fish.

Decreased soil quality. This is another area of degradation that we must face. There are different kinds of organic matter in the soil, and all are important for utilization of minerals and for soil structure. Some of the organic matter that has been around for a thousand years is breaking down under our current system of farming, and as a result we are losing tilth, the basic building blocks, soil pores and crumb structure that tie everything together. It's sort of like cutting down an old growth forest that doesn't grow back very quickly.

Loss of biodiversity. We're seeing a number of losses of species diversity and an abundance of crops in our agricultural regions. Notable are the loss of large vertebrates, such as pallid sturgeon and the interior least tern, associated with the Missouri River where they are being affected by hydroelectric dams used for flood control and for channelization. We're seeing similar losses on the Mississippi River where agricultural use of the river for moving barges of grain and pesticides is affecting local ecosystems.

We also are seeing a loss of grassland nesting songbirds such as the bobolink and western meadowlark. These songbirds migrate from Argentina and Central America every year and attempt to nest in the former prairies. At one time they could nest in agricultural grasslands, in farmers' hayfields, but today there are so few of those left that their numbers are declining. While none are near extinction, we have seen a real loss of songbirds in our region.

Prairie remnants. I mentioned the one-tenth of 1 percent we have left, and these remnants, even though they have been protected by the state preserve system, they are tiny, fragmented, isolated and always under assault by the agriculture that's around them. The fragmentation leads to problems with the genetics of the plants that are in small populations there, the loss of pollinators because they can't fly from one prairie to the next across miles of cornfields.

We also see sediment running onto our prairies. For example, Steele Prairie in Cherokee County is about 160 acres in size and there's at least a half meter of sediment building up in waterways from nearby farm runoff. This has led to an explosion of reed canary grass, which is edging out of all the other prairie wetland species.

The Rock Island Prairie near Cedar Rapids is being affected by highway development. The development about a quarter mile wide will be next to the prairie and will probably disrupt the population of skipper butterflies but there's no other place for the highway to go. It's difficult to ask people to give up their family farm for a highway, so the road goes through our remaining natural areas.

Social impacts. Table 1 [see Appendix 1] shows the results of a study conducted by Erin Tegtmeier and Michael Duffy on the external cost of U.S. agricultural production to taxpayers. How much is environmental degradation costing us? According to this 2004 study, costs add up to billions of dollars each year to deal with water, soil and air that have been degraded, mitigating damage to wildlife and ecosystems, and dealing with human pathogens, pesticides and other challenges to our health.

Those figures do not even include the cost of federal agencies assigned to deal with these issues. That's another \$3.7 billion. So agriculture costs us twice. It costs us once at the grocery store and then it costs us again when we pay our taxes.

Hunger and obesity. At least 11 million people in the U.S. are hungry, another 23 million are food insecure, and then to top it all off, we have a large number of adults who are either overweight or obese, and a growing number of children as well.

Are we really feeding the world with corn and soybeans? Considering just subSaharan Africa where there's a lot of hunger, less than 1 percent of our corn and bean exports go to these places.

Alternative systems and working for change

Some very interesting studies are underway that look at what our options might be to change land use and agricultural practices, ensure that we keep people on the land and rural communities healthy, and manage the environmental impacts much more efficiently.

A wonderful study was done by Iowa Staters, including Mike Burkhart and others, who looked at Shelby and Crawford Counties in Iowa. They used GIS to model soil loss and nitrogen leaching under different types of agricultural systems. Currently, the area is about 70 percent corn and soybeans, even though the landscape has very steep hillsides and fragile loess soils that are easily eroded.

They modeled a system that included three years of oats, hay and pasture (the sod crops that I mentioned earlier) with another three years of row crops. Using that system they could reduce erosion to half of the tolerable level. Currently, the region is about two

times the tolerable level of soil erosion but by changing the system they could bring erosion way down.

It was the same with leachable nitrogen. When they converted the landscape from corn and soybeans to a longer crop rotation, something that grandfathers and great-grandfathers knew how to do 60 years ago, leachable nitrogen went down to one-third of what is under the current system. They also gained soil organic nitrogen instead of losing it.

This study tells us, at least given our current models of how things work, that addressing the problems of our current system is a very real possibility. The alternate system that Burke et al. studied also included a lot of livestock to eat that hay and pasture, but that's another topic.

I would like to now talk about three themes that need to be involved in changing our current agricultural production system into something better: perennials, people and policy.

Perennials. Perennial vegetation is what this prairie was made of for the last several thousand years -- grasses and forbs. Those perennials have long, deep roots that can capture the nitrogen, keep the soil in place, and you all know when there is a nine-inch rainfall in 24 hours in July, a lot of soil moves off of the land. That would never have happened under a prairie ecosystem.

Our primary ecological tool for change is to increase the percentage of perennial vegetative cover on the landscape and still make a living, and several ways have been suggested to accomplish that. The Land Institute is working on development of perennial grains. This is an organization in Kansas that my parents founded in the mid-1970s and they are taking annual crops and breeding them with their perennial relatives to increase the seed yield. They also are working with other researchers in other parts of the country and they have had some success in bringing up those yields and maintaining perennality.

Other ways include ecosystem restoration by 1) reducing soil disturbance, 2) biological N fixation, 3) reintegration of the food web, and 4) re-creating large scale grasslands

Reducing soil disturbance: The restoration of the tall grass prairie ecosystem doesn't mean restoring prairie plants. It means restoring ecosystem services that come from the prairie structure that we once had, such as reducing soil disturbance and tillage. We have done that with no-till, and people are very proud of the fact that we have moved from heavy tillage to no-till, so no-till has been a benefit, but no-till still has bare dirt on the soil and no deep perennial roots for most of the year. We need to perennialize those crops to have deep root systems and diversify so that plants are collecting solar energy in June when we get solar radiation.

Switching to biological nitrogen fixation: The native legumes of the prairie, plus lightning strikes, were the only exogenous nitrogen inputs to the prairie ecosystem. We

could go back to that if we intensify the recycling of nutrients within the system. Currently we have a through-put system. We throw a lot on and we waste a lot and that causes offsite impacts, but we're going to try to get it back to a system where we're intensely recycling nutrients.

Reintegrating the food web: This also has to do with reintegrating crops and livestock on the land as opposed to separating them. Now we grow the corn here, put cattle in a feedlot in west Texas, and keep the elements of the food chain separate. The basic element of ecology that you learn in fourth grade is that there's a food web, and we belong to it, and when we separate out the crops from the livestock, there will be inefficiencies, like nitrogen and phosphorous losses.

I did a study a number of years ago with Liz Gilbert and Dennis Keeney about hog confinement operations and their manure management plans. When we tallied up how much nitrogen and phosphorous they were applying to fields, we found out that they were applying three times the nitrogen and nine times the phosphorous of what was needed by the crops. And it was all legally within their right to apply that much nitrogen and phosphorous to the land. That's the problem with not having the food web integrated.

Re-creating large scale grasslands: Grasslands are needed both for the biodiversity (for grassland birds and other creatures) and for water quality purposes. Protecting remnants is just protecting whatever little bits and pieces of prairie are left.

There has been progress in Iowa in developing more perennial systems and options for people who are trying to transition even a small part of their land from annual row crops to perennials. One of those projects is the Leopold Center's grasslands program. They are working with all kinds of different approaches, all kinds of different producers who may want to convert a small part of their operation to rotational grazing or some other use of the land. There's also a consortium of states involved in the Green Lands, Blue Waters Project that is attempting to do the same thing on a larger scale.

A system I found in Australia was very fascinating, with warm season grasses oversown with oats so there's a continuous cover of plants. After doing some poking around I found that other farmers were doing the same thing independently in Kansas, so this is another option that's worth considering, at least at lower latitudes.

Some of the other things involve farmers going to organic production because they can get better prices and it better suits their needs. Tom Frantzen, who taught me practically everything I know about organic production, starts with oats in the first year and underseeds with clovers and grasses so there's continuous cover for a second year. In the third year it might stay in hay or go to pasture. This is the first three years of the crop rotation, which looks an awful lot like a prairie to me.

Other options that are working now for people include intensively managed rotational grazing. Dairy farmers in Wisconsin and other areas have the cows walk out and eat the grass rather than bringing the grass to the cows -- now there's a novel concept! Cows do a

very efficient job of harvesting that grass all by themselves and then providing milk. If farmers can get a specialty market for their milk, they are much better off.

Farmers who have been operating these grass-based dairies are finding that grassland nesting birds are showing up in droves. A graduate student of mine found that when you compare the birds on remnant prairies and savannas with birds in rotationally grazed pastures, they compare quite favorably. These rotationally grazed pastures look enough like a prairie that birds will go there to nest, which is a kind of ecological restoration. The farmer still makes a living, still produces food for people.

Another very tiny movement is the adoption of native warm season grasses for pastures in certain parts of the year. An example is in Winneshiek County, now in its third year of establishment. It is all warm season grasses plus a perennial native rye and some wildflower species. It's considered a kind of insurance policy for drought because these grasses will tolerate enormous amounts of drought compared to the cool season Kentucky Bluegrass and so forth of the regular pastures.

People. Where do people fit in here? The ecological improvements can't be made until people are on board to buy food that they can identify with these ecological improvements. There's no way we can produce things in an ecologically sound manner and then put it into the same grain bin as everybody else. You can't make a living doing that. So the organic market, the direct market at farmers markets, and restaurants like Rudy's Taco in Waterloo means that the farmer gets paid for not just a commodity, but something that has identity and value. The Leopold Center has pioneered in this area, making these food systems accountable and identifiable to particular places and particular people. The idea of an eco-friendly label, an eco label, is another thing that's caught on to help give these products identity.

Another wonderful thing that's happening is agrotourism. One of the best examples in Iowa is the newly fledged Whiterock Conservancy, a coordinated effort with the Garst family. They are taking about a 4,800-acre area near Coon Rapids that is in their family and, with the help of the Iowa National Heritage Foundation and the Iowa Department of Natural Resources and the Leopold Center, are trying to make a go of it as a kind of place where people could ride bikes, hunt, fish, canoe, watch birds. And they have exceptionally dark night skies which is good for stargazing.

They are trying to put together a coordinated package of experiences for travelers that would include a lot of different entrepreneurs in the neighborhood providing different kinds of services, whether that be a bed and breakfast or a tea garden or something else like horseback riding. It's a wonderful tribute to the legacy of the Garst family.

A national organization called Wild Farm Alliance is also doing its part. Their mission statement is this: "We envision a world in which community-based ecologically managed farms and ranches seamlessly integrate into landscapes that accommodate the full range of native species and ecological processes."

One of the things they have done lately is to work with organic farmers to develop particular standards to assure that organic farms meet one of the goals that is legislated into the USDA organic standards -- biological diversity. So they are beginning to put these ideas on the ground in real ways with farmers and to both support them and to help them in their efforts to maintain biological diversity.

Policy. Figure 4 [see Appendix 1] is a map of the United States showing the ratio of federal subsidy payments to farm gross cash income in 2001, like the percentage of farm income that's coming from the federal government. The big black spot is Iowa, of course, in which more than 45 percent of farm income is from the federal government.

In my simple-minded way as an ecologist, these payments are the driving force behind why we farm the way we farm. Farmers are smart, rational, and they respond to incentives that have been offered to them over decades of farm policies. These policies have been a driving force in encouraging annual row crop production, among other things.

In order for my ecological dreams to work, policy needs to change. There's no way it will fix itself. We need to balance the interest of taxpayers, eaters and farmers, and I believe those taxpayers and eaters and farmers all are wishing for healthy environment in which to raise their children.

We need to reward clean water, carbon sequestration, biodiversity. These are the multiple benefits that agriculture can provide our society. We could decide to support these benefits instead of bushels, right? This happens to a certain extent in Europe, and it's an effort attempted by the Conservation Security Program in the Farm Bill.

We also need to make conservation policy performance-based instead of practice-based. Right now if you go into a Farm Service Agency office you might get some government cost share to build a certain number of feet of terrace. In a performance-based system, you would get money from FSA to reduce the nitrate in your tile lines by five parts per million. This method gives farmers a lot of different options for solving problems. They are no longer tied to particular practices that have been dictated to them. They can try ways that might work in their farming system, so it makes room for creativity.

Also research at agricultural schools. Ag schools have lost funding from state and federal government, and that's driven them into the arms of corporations. It's more difficult to get funding for basic ecological research and things such as figuring out how to reduce weed pressure in your crops without pesticides. There are tremendous opportunities to make federal incentives for agricultural colleges to do even more with sustainable agriculture.

Obstacles to large scale change

So what's stopping us from doing this? In terms of getting the public on board to support changes in policy, we have to remember some things. One is that the public image of agriculture is brought to you courtesy of -- you take your pick -- ADM, Monsanto, Cargill, et cetera.

Corporate public relations images of agriculture convince the outside world that everything is fine. Everyone can look on the back of their box of corn flakes and see a happy farm scene with happy animals and a father and daughter walking into a golden sunset. It doesn't necessarily match what's actually going on, so getting the attention of the public about the connection between their food and the land and how they can make a difference is going to be difficult.

A second difficulty is in the structure of our regulatory systems. Marion Nestle's book, *Food Politics*, found that USDA nutritionists have been heavily influenced by the food industry to not say things about corn syrup, meat and this, that and the other. I don't know what to say about the latest food pyramid, but certainly the story behind the earlier food pyramid was that food companies pressured USDA scientists to change the story, to change the science, and that pressure continues.

There also is a very tight relationship in some cases between agricultural colleges and the corporations that control a lot of the major food processing in the country. Eighty percent of the corn exports, 80 percent of the corn milling and 80 percent of the beef packing are owned by four corporations.

So when you have just a few companies, as has been documented by Mary Hendrickson at the University of Missouri, controlling the vast percentage of the food processing in the United States, those companies also are controlling a lot of the science, or at least influencing it. They may be influencing regulations, advice given to consumers, and consumers' impressions of what agriculture is like.

Another point I want to make is that there's a big difference between hope and reality, between what we want and what nature gives us. The ability or inability of the land to provide should demand our strict attention. It should demand our profound caution and our respect for uncertainty, surprise and limits.

They learned this in Australia. When you go there you find that Australians are keenly aware of the limits of their landscape to provide for them because the soils are so old and infertile. Over and over, human beings on this planet have failed to fully appreciate the vast veto power of nature over what we would like it to do. We are beginning to confront that even on our own very rich, very resilient continent. Often we are fooled by seemingly lush forests and soils, only to find that trees grow extremely slowly. The soils are highly erosive.

This is the message of Jared Diamond's new book, *Collapse: How Societies Choose to Fail or Succeed*. I think it is really pertinent to the questions that we're facing here in the Midwest and in the rest of the country. It's an ambitious book, a globe-trotting synthesis of history and geography and ecology. Diamond analyzes failed civilizations like the Norse Vikings in Greenland who lasted for about 300 years and then starved to death.

The Anasazi in the southwestern United States, the Mayans of the Central American Plateau, and the Easter Islanders in the South Pacific. Why did they fail? What happened? What was in the mind of the last Easter Islander to cut down the very last tree on that tiny island?

A second theme in Jared Diamond's history of ecological failure is that an inordinate amount of energy and precious human and natural resources get poured into precisely the wrong thing: bad investments. The Easter Islanders found a forest of giant palms seven feet across, 60 feet high. By the time they were done, they were cannibals, living in chaos and want.

The Easter Islanders couldn't have predicted that their soils were poor and that the fertility wouldn't be renewed. They didn't have a soil scientist, so how could they have understood that kind of complexity. But they also were convinced that it was very, very important to build magnificent statues on massive stone platforms without benefit of cranes or fossil fuel. Their island had the perfect soft stone to do it.

Over time, as various clans competed for dominance on this tiny island, the statues grew in size. They became larger and people became more adept at moving these 60-foot tall statues nine kilometers across the island on wooden rails pulled by perhaps 200 people tugging on ropes, heave-ho style. And the wooden rails and ropes to transport the statues took a lot of resources -- their forests, their soils. They had to feed people to perform this heavy work. Each set of statues had to be larger and greater than the next, and at a certain point, as living conditions were deteriorating, as their forests were disappearing before their eyes, they decided that what they really needed to do was to add red hats -- 12,000-pound red stones on top of the statues.

Hindsight is 20/20, and perhaps we should forgive them, but what if they had invested their effort, treasure and hope in tree planting and soil building instead of six-ton red hats. Psychologists tell us that the greater the sacrifice, the more we invest, the less willing we are to cut our losses and give up on the investment.

So how do we recognize these red hats? How do we recognize the things that we are ceaselessly investing in that are not doing a good job? How do we avoid them? Does anybody have any nominations for red hats?

May I suggest bushels per acre? It's going to be hard to give up on this demanding god that we have pleased so well for so many years. Scientifically, culturally, in terms of physical infrastructure, we have to give up on the red hat of high yields.

The Stockholm Syndrome is another psychological phenomenon that we need to struggle with. Patty Hearst was a newspaper heiress in San Francisco from a hugely rich family. In the late 1970s she was captured by the wonderfully named Symbionese Liberation Army. Soon she was carrying this machine gun and going out with them to rob banks.

If you become a captive and begin to look at your captors as friends and allies instead of what they are -- kidnappers -- then you suffer from the Stockholm Syndrome. In the pressure to comply with the demands of your kidnappers, you forget who you are, who your real friends are, and who your family is.

Patty Hearst did this. She lost her sense of self. Indeed, when you are a captive, it takes extraordinary focus not to be seduced into this way of thinking. Midwesterners are constantly at risk of mistaking our captors as our friends and saviors.

Our high-energy corn and bean system is a kidnapper, not our friend, even though we may have to get along with it for the time being because it's all we have. That's the same situation of someone who has been kidnapped.

But we need to remember that it is the land and the health of the land that is our true family, our true source of wealth and strength and long-lasting security and support. We need to respect the interdependent web of life, the theme suggested by the Schivvers family.

The interdependent web of life is the seventh principle of the Unitarian/Universalist faith and it's the idea that we all depend on this ecosystem for our lives. This seventh Unitarian principle has always bothered me a bit because "respect" is a wimpy word, something that brings to mind images of saying "ma'am" and "sir" at the right time. I'm much more interested in what action it requires, so I have a quick story, and then I'll finish.

My grandfather on my mother's side, when his wife died, came to live with our family. He was an elderly man and one year we went to the Rocky Mountains. I remember my mother and father exclaiming about the wonderful scenery and the clear, trickling streams, the giant boulders and snowcapped peaks. Grandpa could only comment, grumpily, that, "This country is so poor that you couldn't raise a family disturbance."

Poor? The Rocky Mountains? What could he have been thinking?

When he was young, he and his wife joined many other hopeful people in Montana. They were 1920s homesteaders who went to Montana and got their butts whipped. They nearly starved. The acreages they were given by the federal government were far too small to support a family. In fact, my grandparents lost an infant there, and eventually gave up, returning to Kansas.

This is respect for the interdependent web of existence. It is closer to a fear of limits and practical realization of limits. Lately we've seen a lot of denial of science and denial of limits: New Orleans, the battle over evolution being taught in schools, peak oil, global warming, and if you can think back far enough, tobacco, lead, DDT. Maybe this kind of arrogance is part of the human condition. It's time to get out of denial and show some healthy, fearful respect for the web of existence in the Midwest and the land we call home.

Appendix 1

Figure 1. Grain elevators and former grasslands

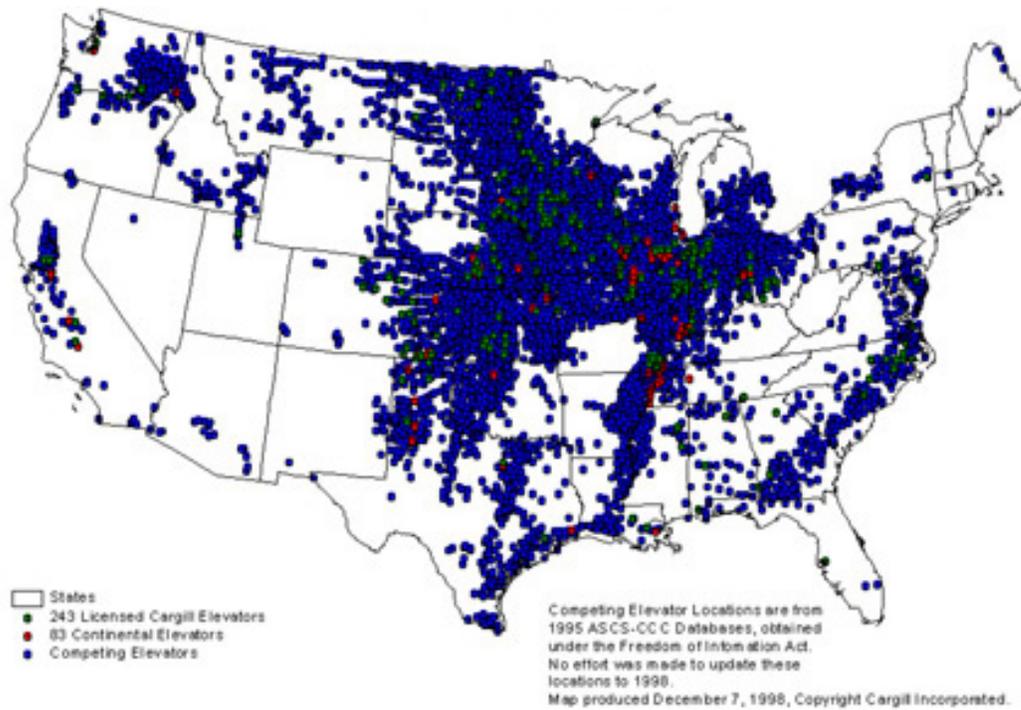


Figure 2. U.S. Green Index, June 4-17, 2003

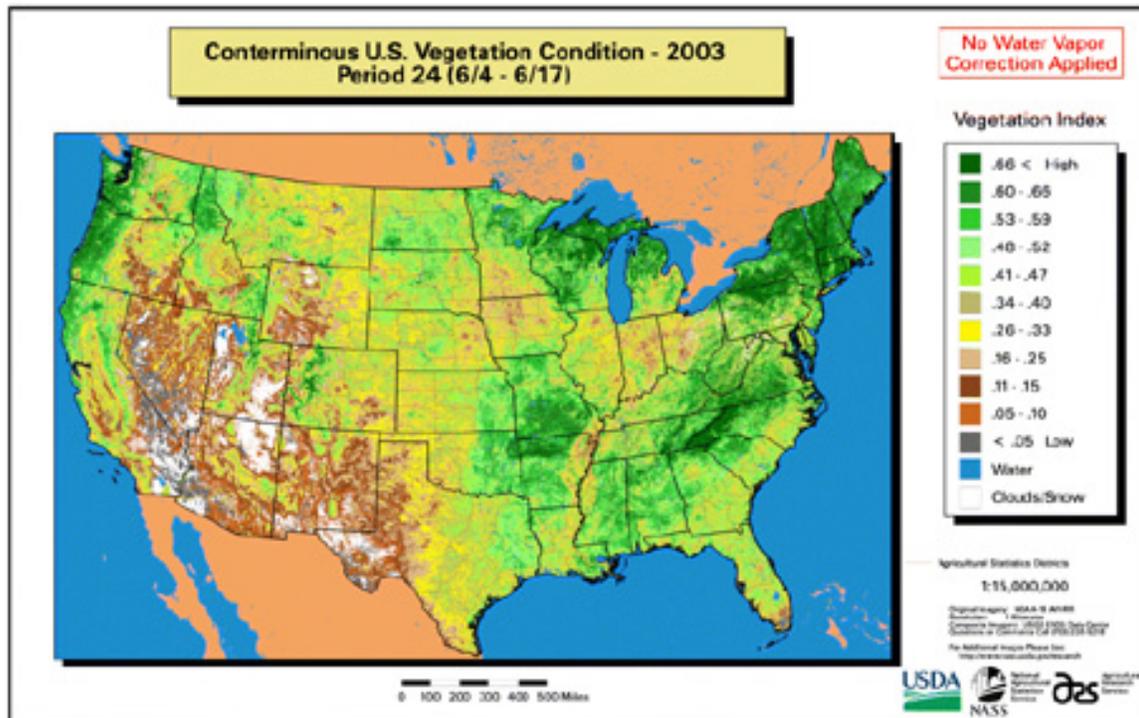


Figure 3. 140 Years of Land Use Change in Iowa

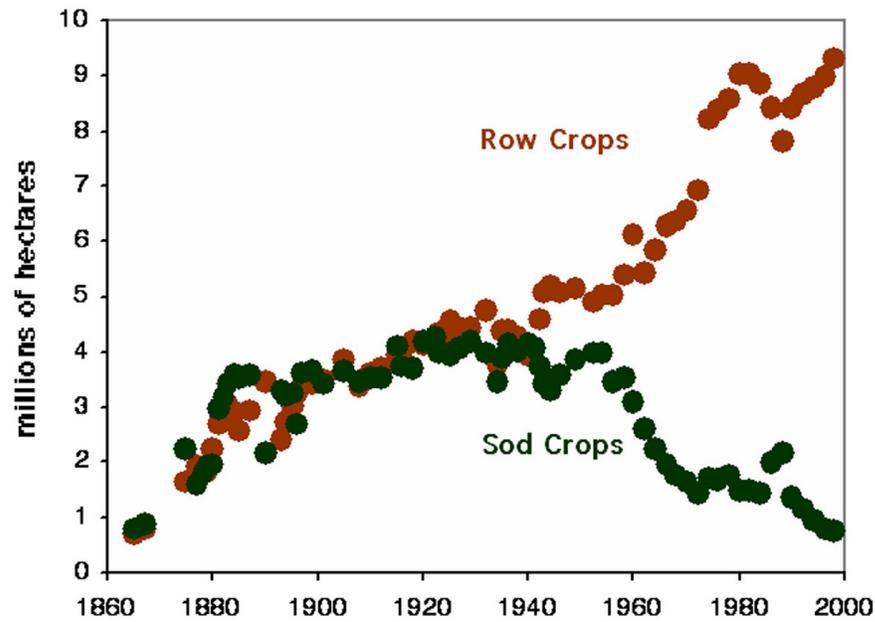
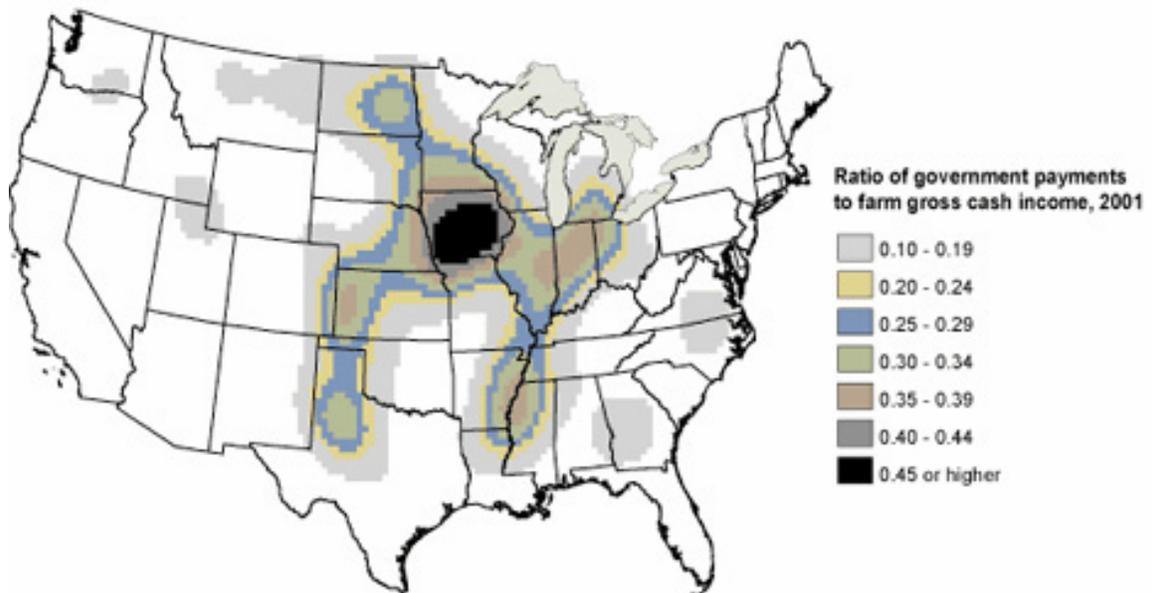


Table 1. Annual External Costs of US Agricultural Production

<u>Damage</u>	<u>Million [Dollars]</u>
Water	419
Soil	2,243 - 13,395
Air	450
Wildlife and Ecosystem	1,145 - 1,174
Human Health-Pathogens	416
Human Health-Pesticides	1,009
Total	\$5.7 - \$16.9 billion
Associated Agency costs	\$3.7 billion

Source: Tegtmeier and Duffy, 2004

Figure 4. Ratio of Government Payments to Farm Gross Cash Income, 2001



Source: "Amber Waves," USDA-ERS, September 2003

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