

MATT LIEBMAN

Sustainable Agriculture

Balancing agricultural production with resource conservation, environmental quality, & compassion



Photo by Lynn Betts, USDA Natural Resources Conservation Service

On October 4, 1979, Pope John Paul II addressed a crowd of several hundred thousand assembled at Living History Farms about the interrelated issues of farming, environment, and community. In his words, the Pope called for gratitude to God for the gift of working with the land, stewardship to protect the soil, water, and air for future generations, and generosity toward the hungry, the poor and the disadvantaged in sharing the bounty of the land. In a term that is more common today than 30 years ago, the Pope called for a sustainable agricultural system.

The Holy Father came to the right place to deliver his message. Iowa exemplifies where land and communities

are inextricably linked through farming. Iowa is almost unique as a place where fertile soil, favorable climate, mechanical innovation, advanced genetics, and skilled farmers all converge. The results of this convergence are huge yields of crops and livestock and a massive agricultural economy. In 2008, Iowa led the nation in the production of corn, soybeans, eggs, and hogs, and ranked fourth in beef. Sales of billions of bushels of grain, billion of cartons of eggs, and millions of pounds of pork and beef generated nearly \$25 billion in farm revenue within the state in 2008. From the standpoint of production and revenue generation, Iowa farmers (and American farmers in general) have established a remarkable record of achievement.

RON & MARIA ROSMANN

Conserve and Restore the Land

"You who live in the heartland of America have been entrusted with some of the earth's best land. ... Therefore conserve the land well." This was a key part of Pope John Paul II message to all of us when he visited Iowa 30 years ago. We also need to remember what else grew out of the papal visit. That is the document *Strangers and Guests* (May 1980) which was the regional Catholic Bishops statement on land issues. It is important that its guiding principles be restated again:

1. **The land is God's.**
2. **People are God's stewards on the land.**
3. **The land's benefits are for everyone.**
4. **The land should be distributed equitably.**
5. **The land should be conserved and restored.**
6. **Land use planning must consider social and environmental impact.**
7. **Land use should be appropriate to land quality.**
8. **The land should provide a moderate livelihood.**
9. **The land's workers should be able to become the land's owners.**
10. **The land's mineral wealth should be shared.**

In many ways, Iowa serves as a window on modern, industrial agriculture in its full expression. So 30 years after the Pope's visit, how has Iowa agriculture fared relative to the benchmarks he set for reverence, environmental stewardship, generosity, and compassion?

MUCH REMAINS TO BE DONE

Land management practices have a strong influence on water quality, and with 85% of Iowa's land area in farms, farming and water quality in the state are closely related. As noted by the US Geological Survey, nutrients emitted from farm fields pollute Iowa's streams and rivers and contribute to the hypoxic 'Dead Zone' in the Gulf and Mexico. Nutrient run-off and leaching from agricultural land also force the Des Moines Water Works to operate the largest nitrate removal facility in the world so as to be able to deliver safe drinking water. Pathogens from livestock operations and pesticides applied to cropland are detected regularly in Iowa's streams, rivers and lakes, and soil particles eroded from farm fields and stream banks stressed by water flow increased by run-off and drainage tiles add to the damage.

In a survey released in 2008, the Iowa Department of Natural Resources classified 44% of the state's streams and rivers and 47% of its lakes as "impaired" by excessive levels of nutrients, sediments, and bacteria. In layman's terms, impaired water may be unsafe to swim in, uninhabitable by fish and other aquatic life, and unsuitable for drinking without intensive treatment.

In his homily that day in 1979, the Pope said "you who are farmers ... have the potential to provide food for the millions who have nothing to eat and thus help rid

the world of famine." Within Iowa it is common to hear that: "Iowa farmers help to feed the world." Calorie and protein production within the state certainly dwarfs local consumption and leads to the export of massive quantities of food outside the state's borders.

But does Iowa's agricultural bounty reduce hunger? Answers to this question may be surprising. For example, in 1999, Mark Muller and Richard Levins, farm policy



The track record in achieving those principles has not been very good over these past 30 years. Family farms and rural communities have declined significantly. The farms have become much bigger, and young people have left the farm and rural areas. Our environmental and human health has all too often been compromised. Competition has decreased in all sectors of the farm economy with only a few corporations controlling most of the food we eat.

Agriculture has become industrialized like most other segments of our society. Perhaps this is inevitable. But what is not inevitable is the resulting shape and form of food

and agriculture. Federal farm policy has played a huge role in shaping the kind of agriculture we have today. Farm programs have historically rewarded the production of just a few commodities such as corn, wheat, cotton, and soybeans. The principle of God's creation implies diversity of life. Our current system of agriculture depends heavily on mono-cropping and decreases diversity in order to maintain control of crop and livestock pests.

Our family farm has been entrusted with a small part of God's creation for over 120 years. We have attempted to look at our 600-acre farm as an integrated system

where each part is equally important. Diversified crops and livestock with multiple crop rotations are the foundation of our farming system. We raise beef cattle (90 mother cows), hogs (40 mother sows), and some broiler chickens. We grow numerous crops with the most important ones being corn, soybeans, oats, barley, popcorn, mixed grass and alfalfa hay, and rotationally-grazed pastures.

In 1983, we decided to no longer use pesticides. This has resulted in 26 years of on-farm research and experimentation in order to find out if we could be successful. We think the answer has been a resounding yes!

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analysts with the Institute for Agriculture and Trade Policy, assessed the use and destination of Midwest grains, especially corn and soybean that are transported down the Mississippi River and exported overseas. When they compared exports to 28 wealthy countries within the Organization for Economic Cooperation and Development (OECD) with exports to the 25 countries that are the world's hungriest and most malnourished nations, they found that 63% of corn exports went to OECD countries, whereas less than 0.6% of corn exports went to the 25 hungriest countries.

Similarly, the wealthier OECD countries received 70% of Midwestern soybean exports, whereas the 25 hungriest nations received less than 0.027% of soybean exports. Recent data from the USDA Economic Research Service show this pattern has changed somewhat (China, for example, is now a major consumer of U.S. soybeans), but Muller and Levin's broad conclusion still stands: Midwestern corn and soybean crops are sent to those who can best afford them, not to those most in need.

As these two brief examples highlight, natural resource conservation, environmental protection and food security are major challenges facing agriculture in the 21st century. We now live a world in which scarcity of the basic necessities of life, including food and water, is an unavoidable reality for billions of people. Adding to the challenge are (1) changes in global climate, which in the Upper Midwest are likely to result in an increase in the intensity and frequency of floods and droughts, and (2) reductions in fossil fuel availability, which are likely to make conventional farming practices more expensive. Flooding in eastern Iowa in 2008 and recent spikes in fertilizer prices, which are linked to energy prices, may signal what the future holds for the Corn Belt.

THREE COMPONENTS FOR SUSTAINABILITY

Given this set of challenges, how might Iowa agriculture serve as an example of how to proceed here in the U.S. and in other countries? I believe there are three key components for moving toward an agriculture that is at once productive, wise and careful in its use of natural resources, and generous in its intent and actions.

The **first component** of a productive, careful, and compassionate agriculture is the recognition that there are limits to how much we can take from the land without doing serious damage to its long-term productivity. Conservation measures like stream-bank buffers, grassed waterways, protected and restored wetlands, grassland set-asides, and other practices employing continuous year-round cover are how we take that insight and put it into practice. The results can be startling. In our research at Iowa State University, soil loss was 95% lower from experimental watersheds with 10% of the area in conservation strips interwoven with crops compared with watersheds containing only crops. The watersheds that contained conservation strips also had less water and nutrient run-off, and more native plants and bird species of conservation concern. These results led us to the conclusion that strategically placing small amounts of perennial cover into cropland can have disproportionately large conservation benefits. It is clear that some balance between production and conservation must be struck if we are to protect soil resources over the long term.

Conserve and Restore the Land *(Continued from p.13)*

In 1994, our farm became certified organic. Even though we had been successful in eliminating pesticides and greatly reducing fertilizer usage, the products we were producing were not bringing a premium in the marketplace. It was a natural step to become certified organic to add value to our crops and livestock. One measurement for scoring success of our food production system would be crop yields.

In 2008, we grew our first field of 200 bushel-per-acre corn and this was done with reliance only on our six year rotation of corn, soybeans, corn, oats or barley and then two years of hay. We just finished

harvesting our soybeans this fall. Our whole farm yield is over 60 bushels per acre. These yields are far above our county average.

There is a lot of criticism that "organic agriculture" cannot begin to meet the food needs of a growing world population. I am not so sure about that statement. If organic agriculture is based on sound science and integrated whole systems management, then I think organic agriculture can contribute far more than it is being given credit for.

Organic agriculture is less than two percent of total U.S. food production. If we could increase that percentage to 5% or even

10%, look at how many more farmers we could have in our rural communities. Local food systems, water quality, and our environment would all be winners, too. Providing more choice, diversity and improving the quality of life for communities would make winners of us all.



Ron and Maria Rosmann run a 600-acre organic grain and livestock farm near Harlan, Iowa. In 2007, their family farm received the Spencer Award for Sustainable Agriculture, given by the Leopold Center for Sustainable Agriculture at Iowa State University.

The **second component** involves the reintroduction and, in some cases, the new development of cropping systems that mix annual crops, like corn and soybean, with perennial crops, like forage grasses and legumes that are consumed by beef and dairy cattle and sheep. In a large-scale, long-term field experiment, my colleagues and I have found that adding perennial forage crops (alfalfa and red clover) to the standard corn and soybean sequence has maintained or increased crop yields and profits, while strongly reducing requirements for synthetic fertilizers, herbicides, and fossil fuels. Adding perennial forage crops to the conventional corn-soybean rotation has also increased soil organic carbon levels and reduced nitrate leaching. Placing forage crops at critical positions in the landscape provides many of the benefits offered by conservation strips, while also providing livestock farmers with a valuable product.

New developments in bioenergy technologies may provide farmers with opportunities to produce perennial crops for sale to biorefineries, as well as conservation benefits. Perennial biomass crops such as switchgrass can increase carbon storage in the soil, reduce greenhouse gas emissions to the atmosphere, limit nitrate leaching to water courses, and provide habitat for birds and other wildlife. A coordinated set of energy, agriculture, and conservation policies could help farmers shift toward new biofuel cropping systems that are integrated with conventional corn and soybean production.

The **third component** of a productive, careful, and compassionate agriculture involves addressing hunger and poverty in developing countries by improving local capacity to use natural resources sustainably. There are clearly situations emanating from war and natural disasters where the delivery of food aid is critical to survival. However, using food exports as a lifeline over the longer term creates dependency and vulnerability, and destabilizes the economies of developing countries by removing the impetus to become self-reliant. In a review of 286 case studies in 57 developing countries covering more than 12 million farms and 91 million acres, agricultural analyst Jules Pretty found that fostering environmentally sound crop and livestock production systems using local resources can raise food security and quality of life more sustainably.

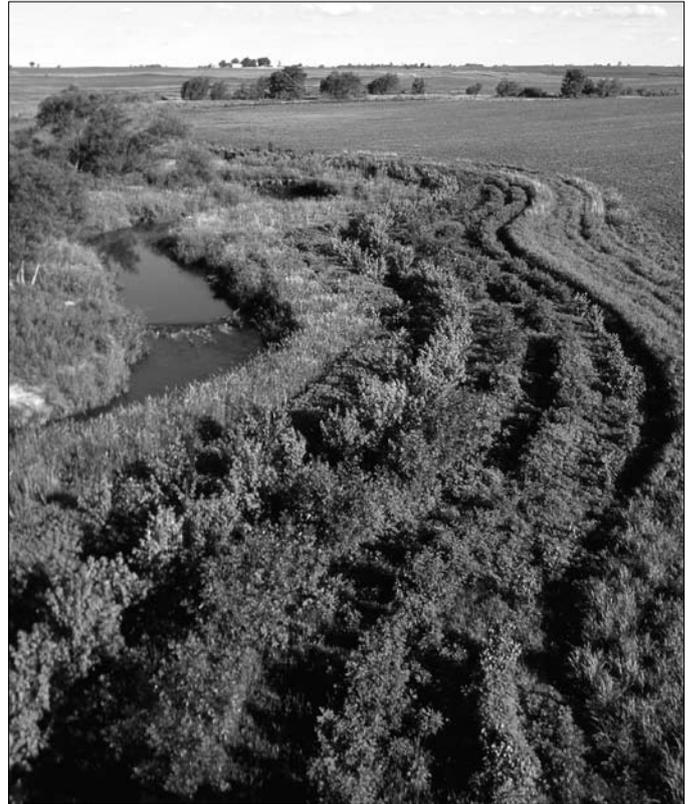


Photo by Lynn Betts, USDA Natural Resources Conservation Service

Thus, sharing the bounty of land in Iowa and other well endowed agricultural regions might be best expressed by helping farmers in developing countries with knowledge and examples, supplemented with disaster aid in exceptional circumstances. I know many Iowa farmers who have given generously of their labor, experience, and knowledge in assisting farmers in poor countries and in hosting visitors from poor countries. This type of exchange is critical for understanding where strategic investments can be made to increase food security and economic development over the long term, and should be supported and expanded.

I am sure that Pope John Paul II was impressed by the accomplishments of Iowa's agricultural community. But he was clear in calling for continued improvements in agriculture's impacts on the environment, communities, future generations, and the less fortunate. We have the opportunity to act on that calling every day. ■



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