**VALUING SUSTAINABLE AGRICULTURE PRACTICES**

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**Abstract**

Planning the succession of a farm from one generation to the next is often a time-consuming, sometimes stressful, process, yet it is also an opportunity for everyone concerned to reflect on their vision for that land far into the future. It’s a chance to explore strategies for fostering sustainable agriculture practices and conservation on the land once the next generation takes over. The purpose of this publication is to help landowners, whether retiring farmers themselves, non-farming owners of agricultural property, or their heirs, examine the costs and benefits of implementing a variety of sustainable practices and evaluate whether the benefits warrant adjusting expectations for sale, rent, or lease price on their land.

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**Introduction**

The term “sustainable agriculture” has been around for many years. But what, exactly, is it? You’re likely to get as many detailed definitions of “sustainable agriculture” as the number of experts you ask. But, basically, sustainable agriculture is about growing crops and managing livestock in ways that meet three objectives at the same time:

* Environmental conservation of natural resources
* Improved quality of life for the producers and their communities
* Profit for the producer

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For a more detailed description of sustainable agriculture, see the ATTRA publications *Applying the Principles of Sustainable Farming*, and *Sustainable Agriculture: An Introduction*. They are available at the National Center for Appropriate Technology’s ATTRA website [www.attra.ncat.org](http://www.attra.ncat.org).

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If you share these core values of sustainable agriculture, you might be wondering how to include them as you plan the transition of your farming operation to a new generation, a new landowner, or a new farm operator (if you’re not currently farming). How can you establish your legacy on your land, and ensure that legacy is carried forward far into the future?

Of course, there are as many unique circumstances of land ownership, farm operation, family decision-making, and inheritance as there are farms. Even so, every piece of agricultural land has the potential for sustainable practices — *if* the land’s owners and operators make the choices that allow those practices to happen on the land.

Choices that will foster sustainable agriculture practices might be different from the choices that have been made over the past several years, or several decades. Making those new choices could mean considering practices that have never before been done on that land. In other cases, the choices might have to do with a family planning its finances and estate in a way that will allow existing sustainable practices to continue.

It can be a stressful time when a farmer retires or a landowner transfers land to her heirs, but it also can be an opportunity for everyone concerned to think about their hopes for the future and the legacy they want to leave on the land.

What could sustainable agriculture look like for the next generation of farmers taking care of your property? Here are just a few examples:

* A new person taking over a cattle ranch might divide pastures into smaller paddocks within a rotational grazing system. These rotational grazing systems are good ways to manage water resources and soil fertility.
* A new farmer taking over a successful corn and soybean operation might shift to a three-year crop rotation and include cover crops such as alfalfa and rye for weed suppression and soil fertility. This would reduce the need for purchased fertilizer and pesticides.
* A large acreage might have a couple of smaller, 5- to 10-acre parcels split out for specialty-crop production, such as market-vegetable or fruit production.
* The new farmers taking over the land could establish windbreak plantings in strategic locations, such as along fence lines or around the farmstead buildings. The trees and shrubs in the windbreak could include fruit and nut-producing varieties that would provide a cash crop in future years.
* A new farmer on your land might pursue certification for organic production. This is a three-year process that, once complete, would make the farm’s products eligible for price premiums in the marketplace.

In some cases, the sustainable farming practices we will discuss result directly in a crop that can be sold. The profits from that salable crop may be competitive with cash grain (corn and soybean) sales, or the profit potential may be lower than that of cash grains; or in the case of some specialty crops the profit potential per acre may be much higher than cash grain production.You should also look at the other, long-term financial or nonmonetary benefits from that practice. Is the practice something you want to foster through your financial and estate-planning decisions and through your expectations for the sale, rental, or lease price of your land?

In other cases, the sustainable farming practices discussed below do not directly result in a cash crop. Some of the practices may have an indirect monetary benefit in terms of lowering the cost of purchased inputs or in terms of improving overall soil quality, which could improve crop yields or lower the risk of reduced yields from poor soils in the future. Some of the practices increase the diversity of crops on the farm, which can also lower the risk of losses from crop price fluctuations or adverse weather. Some of the practices may not have either a direct or an indirect monetary benefit, but they have an aesthetic benefit or benefits to society in terms of pollinator habitat, wildlife habitat, and water quality. There are state, Federal, and private programs available to help finance some of these practices that return environmental, rather than monetary, benefits.

Farmers and landowners have a great deal of power in their hands to choose sustainable practices for their land. The information that follows will provide you with the background you need on the costs and potential benefits of a variety of sustainable practices. With that background, you can start to make the financial plans and farm transition decisions that will enable the farmers on your property in the future to implement the practices you want to foster and encourage.

We will take a look at 10 possible strategies and provide some examples of how to evaluate their costs and benefits as well as consider their implications for your future plans:

* Crop rotation
* Soil-fertility management
* Cover crops
* Trees (agroforestry)
* Water-quality management
* Alternative crops
* Perennial forages/grazing
* Pollinator/beneficial insect habitats
* Wildlife-habitat management
* Organic certification

It’s important to note that, as we will see, many of these practices naturally overlap. For example, a purposeful system of crop rotations will almost always involve using cover crops. Similarly, soil-fertility management and water-quality management almost always go hand in hand.

Nevertheless, we will discuss each of the practices in order and discuss how to start evaluating whether they fit your vision for the future. And once you determine which practices could be both useful and valuable, you will be in the position to start researching how to set up financing and take other steps to encourage the new generation of farmers to adopt the practices.

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Cash Grain Profitability Calculations

It’s important to be able to estimate the potential loss of net income from a cash grain crop when you are considering alternative uses for certain acres. Farmers often have developed specific knowledge of their operations that they can offer as they and the next generation make their choices; they may have in-depth knowledge, for example, of which acreages are the most productive. In many cases, it makes the most sense to plan conservation practices with non-monetary benefits on the least productive acres.

There are tools available to help estimate what cash crop losses might be. The Extension Service in your state is a good place to start. For example, Iowa State University Extension offers an online tool called the Ag Decision Maker on its website. It contains a Crops Page with average yields, prices, and costs for corn and soybeans in the state over the past 30 to 40 years.

In 2012, the average yield of 168 bushels and the average prices received of $6.67 per bushel would bring a total gross revenue estimate of $1,121 per acre.

168 bushels/acre x $6.67/bushel = $1,121 gross return/acre

The total cost estimate of $831 per acre (a corn crop following a corn crops) leaves an estimated return of $290 per acre.

$1,121 gross return/acre - $831 expenses/acre = $290 net return/acre

Similar gross and net return calculations can be done for soybeans.

Of course, the grain prices and average yields change each year, so use the most up-to-date numbers that you can find. Links to swebsites with yield and price information for other Midwestern states can be found in Appendix 1 below.

Reference:
Iowa Ag Decision Maker, [www.extension.iastate.edu/agdm/](http://www.extension.iastate.edu/agdm/)

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**Crop Rotation**

Crop rotation is simply a matter of planting a predetermined sequence of crops in a given field. We’re starting with this practice because it is well known in the Midwest: it is standard practice for most growers to practice crop rotation by alternating corn and soybeans in a given field each year.

In order to make this practice more valuable for soil and water conservation purposes, it is necessary to go to a crop-rotation sequence that is longer than two years.

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Comparison of 2-year, 3-year, and 4-year crop rotations

Recent research done at the Marsden Research Farm by Iowa State Extension specialists compared two-, three-, and four-year rotations in the following order: corn/soybeans; corn/soybeans/oats; and corn/soybeans/oats/alfalfa. It looked at how much energy was used and the economic returns to the producer under each rotation sequence.

The results? The two-year rotation used more than twice as much energy in the form of fossil fuel annually as the three- and four-year rotations. In terms of economic returns per acre, the three-year crop rotation produced the highest returns because of increased yields and lower inputs.

Specifically, the return was $188 per acre for the two-year rotation; $194 for the three-year rotation; and $171 for the four-year rotation.

Reference:

**Energy and Economic Returns by Crop Rotation:** Iowa State Extension [www.extension.iastate.edu/agdm/crops/html/a1-90.html](http://www.extension.iastate.edu/agdm/crops/html/a1-90.html)

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In spite of the fact that 3-year rotations can be more profitable than 2-year rotations, the vast majority of agricultural acres in the Midwest are in a 2-year rotation. Part of the reason is that in 2-year rotations, fossil fuel inputs substitute for the higher labor inputs required for the 3- and 4-year rotations (1). Lots of farmers choose the 2-year rotation and accept the relatively small reduction in per-acre profitability in order to operate many more acres with less labor. It’s also important to realize that the Marsden study described in the text box and most other academic studies do not take into account government payments to producers. Producers do get direct payments every year for growing corn and soybeans. That means a producer who adopted a three- or four-year rotation would not get those payments for one or two years respectively for the acres with no corn or soybeans during the rotation.

These considerations tend to prompt most producers to opt out of the longer rotations that could help reduce soil erosion on their farms. That is a shame, because saving one ton of soil is worth about $2.10 per year in fertilizer costs alone, plus an estimated $4.93 in benefits to water quality (2,3)

In addition to saving soil, crop rotations can provide some other tangible benefits to a farm. Multi-year rotations break up insect breeding cycles and certain disease cycles, thus reducing the damage these cause to crops. Including legumes in the crop rotation scheme can create the conditions that lead to improved soil structure and fertility, which over the long term leads to increased crop yields with fewer purchased inputs. Having a more diverse array of crops growing spreads out financial risk, because a single crop failure will not be so disastrous.

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Value of Saving Soil

In the Midwest, there is an average of five tons of soil lost due to erosion per acre per year. The loss rate on your land may be lower or higher, depending on how steep the slopes of the fields are, the cropping system, and various other factors. If you’re curious about the expected rate of soil erosion on your land, contact your local Natural Resources Conservation Service (NRCS) office to ask them for an estimate.

Find your local NRCS office: http://www.nrcs.usda.gov

The value of the plant nutrients nitrogen (N), phosphorus (P), and potassium (K) provided by one ton of soil is equal to about $2.10 of purchased fertilizers.

5 tons/acre/year of lost soil x $2.10/ton = $10.50/acre/year lost plant nutrients.

However, this is a cumulative loss over years because those tons of soil would have provided those nutrients *every* year. As minerals and organic matter in the soil gradually break down, the nutrients contained in them become available to plants.

So, over several years of losing 5 tons of soil every year, the dollar losses in terms of plant nutrients run thus:

1st year: $10.50/acre from 5 tons lost this year

2nd year: $21/acre from 5 tons lost this year and previous year

3rd year: $31.50/acre from 5 tons lost this year and in each of two previous years

4th year: $42/acre from 5 tons lost this year and in each of three previous years

**Reference:**

 **Value of Soil Erosion to the Land Owner.** August, 2012. Mike Duffy, Iowa State University Extension

[www.extension.iastate.edu/agdm/crops/html/a1-75.html](http://www.extension.iastate.edu/agdm/crops/html/a1-75.html) (accessed 6/11/13)

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| **Crop Rotation**  |
| **Qualitative** **Benefits** | **Cost of Implementation of the Practice** | **Monetary Benefits Per Acre** | **Your Judgment: Value Per Acre of This Practice on Your Land**  |
| Lowers risk of disease, insect, and weed problemsImproves soil structure and fertilityLessens soil erosionSpreads out workloadSpreads out financial risk | Equipment(Different planting & harvesting equipment may be needed for crops other than corn & soybean. Custom hire may be available.)Management efforts of $60 per acre per year (4)Loss of income from cash crop approximately $300/acre/year. Refer to the Cash Grain Profitability Calculation text box on **page 4** | $6/acre/year greater net return than traditional 2-year rotation of corn/soybeans (1)$12/acre/year saved by halving herbicide usage (1)$10.50/acre/year fertilizer value of soil saved by eliminating 5 tons/acre/year of soil erosion; cumulative over years; see Value of Saving Soil text box on page 6 (2,3)$24.65/acre/year water quality value of soil saved by eliminating 5 tons/acre/year of soil erosion (2,3). This is a benefit to society, not directly to the landowner. |  |

References:

**(1) Energy and Economic Returns by Crop Rotation:** Iowa State Extension [www.extension.iastate.edu/agdm/crops/html/a1-90.html](http://www.extension.iastate.edu/agdm/crops/html/a1-90.html)

*This study focuses on the energy use and economic returns of three different crop rotations. The choice of rotation depends on many factors. When considering profitability and energy consumption, including a third or fourth crop may be a viable option for some operations. Other benefits might include an outlet for excess manure, reduced erosion, increased soil health, and improved pest management*(2)Value of Soil Erosion to the Land Owner. August, 2012. Mike Duffy, Iowa State University Extension. [www.extension.iastate.edu/agdm/crops/html/a1-75.html](http://www.extension.iastate.edu/agdm/crops/html/a1-75.html) (accessed 6/11/13)

*Erosion represents costs to the farmers. These costs include lost fertilizer and soil carbon. Erosion also produces costs to society borne by taxpayers. These costs are “external“ to the decisions made by the farmer. This paper estimates the costs of erosion to the land owner.*

 **(3) Economic Measures of Soil Conservation Benefits: Regional Values for Policy Assessment. September 2008. LeRoy Hansen and Marc Ribaudo. Economic Research Service (USDA-ERS).**[www.ers.usda.gov/media/196118/tb1922.pdf](http://www.ers.usda.gov/media/196118/tb1922.pdf)

*This report describes data and methodologies that the Economic Research Service uses to apply monetary values to changes in soil erosion. Values and methodology are clearly described so that analysts can apply the data to specific soil conservation projects.*

**(4) Management Estimate Per Acre**: Iowa State Extension Service

*Personal communication, Ann Johanns, Iowa State University Extension, May 2013.*

**Further Resources:**

**Organic Risk Management: Rotation:** University of Minnesota

 [www.organicriskmanagement.umn.edu/rotation2.html](http://www.organicriskmanagement.umn.edu/rotation2.html)

*This online manual is intended as a guide for organic and transitioning producers in the Upper Midwest. This manual covers a wide range of production topics that are relevant to organic farmers.*

**Soil Fertility Management**

Adding livestock manure, either from animals on the farm or purchased nearby, is a common practice on fields in the Midwest. It helps increase the soil organic matter (SOM) content of the soil. That’s an important consideration because maintaining good SOM levels is key to growing healthy plants and high-yielding crops that are good at tolerating drought and resisting insects and diseases.

Healthy SOM levels also allow less use of purchased fertilizer and other purchased soil amendments. Use of manure as a fertilizer is one way to add organic material, which over time becomes SOM. One reason this is important is that organic matter absorbs up to six times its weight in water. Increasing SOM helps the soil retain and hold water that can be used by crops.

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Your Living Soil

Healthy soil includes:

**Minerals** – bits of sand (coarse), silt (finer), and clay (finest)

**Organic matter** – carbon-based materials that come from the breakdown of plant, animal, and microbial matter.

**Humus** – Organic matter that has been thoroughly broken down and changed by passing through microbes or by chemical reactions in the soil. Humus is how soils store carbon.

**Roots** – The healthiest soils are those that have living plants on them all the time. (Including winter! Dormant plants are still alive!) Living roots wind through spaces between soil particles and larger soil clumps called “aggregates,” and help bind those clumps together.

**Living organisms** – Healthy soil is home to an entire unseen network of:

* Bacteria
* Fungi
* Protozoa (microscopic animals)
* Earthworms and other worms called nematodes
* Arthropods: millipedes, mites, beetles, spiders, ants

The sheer number of organisms in soil is hard to imagine: healthy soil contains 100 million to 1 billion bacteria per teaspoon. The living things in the soil feed on dead plant and animal material, living plant roots, and each other. In the process, they release nutrients that can be taken up by plants.

More information about this underground ecosystem – living soil – can be found in the Soil Biology Primer from the Natural Resources Conservation Service:

**Reference:**
Soil Biology Primer [online]. Available: soils.usda.gov/sqi/concepts/soil\_biology/biology.html [accessed 5/21/13]

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It does make a difference whether manure or synthetic fertilizers are used to manage soil fertility. As stated by the Leopold Center for Sustainable Agriculture at Iowa State University, “Manure is a biologically active substance; synthetic fertilizers are not. Since soil is a living system itself, with millions of living organisms in each spoonful, it will react better to manure than to synthetic fertilizers.”(1) Synthetic fertilizers are produced using fossil fuels, so if reducing fossil fuel use is an important part of the vision for the future of your farm, then encouraging use of manure for fertility is an important option to consider. Manure produced by large confined animal feeding operations (CAFOs) can become a problem and a pollutant unless it is spread on land as a fertilizer, using good management techniques. Encouraging use of manure as fertilizer is a way to turn a potential pollution problem into a good resource for crop production.

Manure application is something that many cash grain farmers choose not to do because it takes different equipment and requires more labor and management than use of purchased synthetic fertilizer. Synthetic fertilizer has specific, known amounts of each nutrient in it. Manure is more variable, so farmers who use it need to get it tested to learn the nutrient levels and then need to make calculations of the amount of manure needed. Sometimes synthetic fertilizer may be needed in addition to the manure, to balance the levels of each nutrient needed by the crop that will be grown. That means the farmer may need to run two different sets of equipment across the fields, to apply the manure and the synthetic fertilizer.

Encouraging manure use in a farm transition plan means recognizing that there will be costs associated with that choice: equipment and labor costs, manure testing costs, and consultant costs or the farmer’s own time to make calculations of amount of manure to use, based on the manure tests and crop needs. If you want to specify that manure will be used as fertilizer – a good choice for soil health and environmental reasons – you should adjust the rental, lease, or sale price to take into account those costs that the farmer will have in order to use manure.

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Value of Soil Organic Matter

Increasing the SOM in a typical acre by 1% can increase its worth by hundreds of dollars, due to the nutrients stored in that organic matter. Soil organic matter releases nitrogen, phosphorus, potassium, sulfur, and carbon as it gradually breaks down, so every year the SOM is a source of nutrients that are available to plants. It does take time to increase SOM. A typical soil, down to six inches, weighs about 2 million pounds per acre. That means that an increase of 1% SOM amounts to about 20,000 pounds. It takes about 10 pounds of added organic material to eventually become one pound of soil organic matter: 200,000 pounds of organic material would be necessary for this typical acre of soil to eventually get another 20,000 pounds of organic matter, raising the SOM by 1% (1). If manure were the only organic material added to this soil, and 10 tons were added each year (20,000 pounds), it would take 10 years to raise the SOM from 1% to 2%. This increase could happen faster if the crop residues were incorporated back into the soil, but even then, it would require a number of years.

Calculating the value:

Soil organic matter decomposes and releases nutrients at different rates depending on the texture of the soil, temperature, moisture, tillage, and other factors. Using an estimate from Minnesota of 3% SOM in the soil and a 2% annual decomposition rate (1), along with SOM nutrient level estimates from The Ohio State University Extension (2), the following table shows nutrients contained in the SOM and nutrients that become available to plants each year from the SOM.

|  |  |  |
| --- | --- | --- |
| Nutrient | Total amount per acre contained in 3% SOM\* | Total amount available per acre per year with 2% annual decomposition of SOM |
| Nitrogen (N) | 3,000 lbs. | 60 lbs. |
| Phosphorus (P) | 300 lbs. | 6 lbs. |
| Potassium (K) | 300 lbs. | 6 lbs. |
| Sulfur (S) | 300 lbs. | 6 lbs. |
| \*An acre of soil, 6 inches deep, weighs an average of 2,000,000 lbs. At 3%, the total SOM would be 60,000 lbs. This is assumed to be 50% carbon, and SOM typically has a 10:1 ratio of carbon to nitrogen, so nitrogen would be 5% of the total SOM. (1,2) |

Using fertilizer prices from 2012 (3,4), the SOM-supplied nutrients would have the following value per acre per year:

|  |  |  |  |
| --- | --- | --- | --- |
| Nutrient | Lbs. supplied by SOM, per acre per year | Value/lb. (2012) | Total value from SOM per acre per year |
| Nitrogen (N) | 60 | $0.60 (applied as urea) | $36 |
| Phosphorus (P) | 6 | $0.72 | $4.32 |
| Potassium (K) | 6 | $0.54 | $3.24 |
| Sulfur (S) | 6 | $0.59 | $3.54 |
|  |  |
| TOTAL value of plant nutrients from 3% SOM, per acre per year: | $47.10 |

The SOM releases approximately these levels of nutrients every year, so over a ten-year period the value of 3% SOM is about $470 per acre.

Increasing SOM percentage in the soil will increase the amount of nutrients available from SOM. Based on the numbers in the tables above, a 1% increase in SOM would deliver:

$47.10/acre/year for 3% SOM, divided by 3 = $15.70/acre/year for each 1% SOM

**References:Fertilizer rates sota in rom the spring of 2013, the SOM-supplied nutrients would have the following value for one year: availa**

1. Organic Matter Management. In The Soil Management Series. Revised 2008. Ann Lewandowski. <http://www.extension.umn.edu/distribution/cropsystems/components/7402_02.html> (accessed 6/11/13).
2. Understanding Soil Microbes and Nutrient Recycling. 2010. James J. Hoover and Rafiq Islam. The Ohio State University Extension. [www.northcentralsare.org/Educational-Resources/Project-Products/Understanding-Soil-Microbes-and-Nutrient-Recycling](http://www.northcentralsare.org/Educational-Resources/Project-Products/Understanding-Soil-Microbes-and-Nutrient-Recycling) (accessed 6/11/13)
3. Fertilizer Use and Price. Reports from the Economic Research Service, USDA. <http://www.ers.usda.gov/data-products/fertilizer-use-and-price.aspx#26727>. (accessed 6/11/13)
4. 2012 Sulfur Fertilizer Price Comparison for Alfalfa. April 2012. Carrie Labowski, University of Wisconsin. <http://ipcm.wisc.edu/blog/2012/04/2012-sulfur-fertilizer-price-comparison-for-alfalfa/>. (accessed 6/11/13)

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| **Manure Management & Application** |
| **Qualitative** **Benefits** | **Cost of Implementation of the Practice** | **Monetary Benefits Per Acre** | **Your Judgment: Value Per Acre of This Practice on Your Land**  |
| Provides needed nutrients to cash crop while simultaneously encouraging soil biological activity. Reduces purchased fertilizer inputs  | Management efforts of $60 per acre per year (4)Possible equipment costs (manure spreaders can cost $15,000-$75,000) $40-$50/acre/year application costs (5) | $15.70/acre/year of nitrogen, phosphorus, potassium, and sulfur for each 1% in soil organic matter (2,3; also see Value of Soil Organic Matter textbox)$10.50/acre/year fertilizer value of soil saved by eliminating 5 tons/acre/year of soil erosion; cumulative over years; see Value of Saving Soil text box on page 6 (6,7)$24.65/acre/year water quality value of soil saved by eliminating 5 tons/acre/year of soil erosion (6,7). This is a benefit to society, not directly to the landowner. |  |

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1. **Frequently Asked Questions about Cropping System Diversity and Profitability.** [online] Leopold Center for Sustainable Agriculture, Iowa State University. <http://www.leopold.iastate.edu/faq-cropping-system-diversity-profitability>. Accessed 6/10/13.
2. **Organic Matter Management**. In The Soil Management Series. Revised 2008. Ann Lewandowski. <http://www.extension.umn.edu/distribution/cropsystems/components/7402_02.html> (accessed 6/11/13).

**(3) Understanding Soil Microbes and Nutrient Recycling:** North Central SARE [www.northcentralsare.org/Educational-Resources/Project-Products/Understanding-Soil-Microbes-and-Nutrient-Recycling](http://www.northcentralsare.org/Educational-Resources/Project-Products/Understanding-Soil-Microbes-and-Nutrient-Recycling)

*This fact sheet, produced by North Central Region-SARE, provides information about soil microbes, nutrient recycling, and microbial soil organic matter decomposition. It was produced in conjunction with the Midwest Cover Crops Council (MCCC).*

**(4) Management Estimate Per Acre.** Iowa State Extension Service. Personal communication, Ann Johanns, Iowa State University Extension, May 2013.

**(5) Ag Decision Maker, Whole Farm Decision Tools:** Iowa State Extension

[www.extension.iastate.edu/agdm/decisionaids.html](http://www.extension.iastate.edu/agdm/decisionaids.html)

*This online toolbox created by Iowa State Extension helps farmers answer hundreds of “what if” questions about their operations and about possible new enterprises. Worksheets are available to evaluate production decisions, marketing decisions, machinery questions, etc.*

**Further Resources:**

**Sustainable Soil Management:** ATTRA

<https://attra.ncat.org/attra-pub/summaries/summary.php?pub=183>

*This publication covers basic soil properties and management steps toward building and maintaining healthy soils. It contains answers to why soil organisms and organic matter are important.*

**Drought Resistant Soil:** ATTRA

 <https://attra.ncat.org/attra-pub/summaries/summary.php?pub=118>

*To minimize the impact of drought, soil needs to capture the rainwater that falls on it, store as much of that water as possible, and allow for plant roots to penetrate and proliferate. These conditions can be achieved through management of organic matter.*

**Soil Health, Organic Risk Management:** University of Minnesota [www.organicriskmanagement.umn.edu/soil\_health.pdf](http://www.organicriskmanagement.umn.edu/soil_health.pdf)

*This online manual is intended as a guide for organic and transitioning producers in the Upper Midwest. This manual covers a wide range of production topics that are relevant to organic farmers.*

**Soil Fertility, Organic Risk Management:** University of Minnesota [www.organicriskmanagement.umn.edu/soil\_fertility.pdf](http://www.organicriskmanagement.umn.edu/soil_fertility.pdf)

*This online manual is intended as a guide for organic and transitioning producers in the Upper Midwest. This manual covers a wide range of production topics that are relevant to organic farmers.*

**The Cost of Soil Erosion: Iowa Learning Farms** [www.extension.iastate.edu/ilf/sites/www.extension.iastate.edu/files/ilf/Cost\_of\_Eroded\_Soil.pdf](http://www.extension.iastate.edu/ilf/sites/www.extension.iastate.edu/files/ilf/Cost_of_Eroded_Soil.pdf)

*Erosion costs the landowner because of lost farmland productivity and potentially decreased land sales price. This study is done by the Iowa Learning Farms, which is a joint project by many of the agricultural organizations in Iowa, including Iowa State University, the Leopold Center, and the Iowa Department of Agriculture.*

**Cover Crops**

Ninety percent of grain growers use crop rotations, according to the USDA Economic Research Service (most of those are 2-year rotations), but fewer than 7% use cover crops in their rotations.

Most cover crops planted by Midwest farmers are not harvested and sold. Rather, they are planted and then chopped, mowed, or plowed down. This practice returns the nutrients and organic matter held in the crop to the soil and helps the grower reduce fertilizer costs, reduce the need for herbicides and pesticides, improve soil health, prevent soil erosion, and protect water quality. Eventually, those benefits will improve the yields of the grower’s cash crops.

Different cover crops provide different benefits; no single cover crop can provide them all. Growers, whether they have decades of experience or are the new generation on the land, must pick the benefits they most need and then choose the appropriate cover crops. The eventual improvement in cash-crop yield happens over time as the cover crops help the soils avoid erosion and build SOM.

Cover crops help build SOM by scavenging nitrogen left in the soil and converting it into food for the billions of tiny critters that live in the soil. These critters then break down the unharvested parts – stems and roots – from the previous cash crop, converting those “residues” into food for the *next* cash crop.

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As mentioned before, the soils on your farm are alive. There are more living organisms in a shovelful of soil than there are people on the Earth! These living organisms include bacteria, fungi, nematodes, earthworms and small insects. They often feed on each other, but they also work together to help build the SOM of the soil by breaking down dead plant and animal material, recycling nutrients, and producing excretions that stick soil particles together and help build soil structure. The activity levels of these organisms constantly change with changes in temperature, acidity, moisture and other factors. Ideally these microbes will collect and hold on to nitrogen and other plant nutrients in the root zone when the plants are not growing and then release the nutrients when the plants are growing. The creatures in your soil are the most important livestock you could ever have on your farm!

[END OF TEXT BOX]

The biological, chemical, and physical properties of the soil under the cover crop all improve at the same time. Cover crops are a long-term investment similar to putting money in a mutual fund. Dramatic effects may not happen in a year or two, but over time, they will.

If cover cropping is a practice that you want to encourage in your farm transition plan, then it is important to recognize the long-term investment nature of cover cropping in the way that you structure a rental, lease, or sale agreement. There are costs to planting and then plowing down a cover crop, and the benefits to the following cash crop might not be seen for a couple of years. Converting all or part of a farm operation to cover cropping is a situation in which it might make sense to use a “stepped rent” together with a long-term lease, with payments lower in the first few years than in subsequent years. If the land will be sold, structuring the payments to be lower in the first few years would help encourage cover cropping. See the Conservation Financing document for more information about options for rent or lease terms.

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| **Cover Crops** |
| **Qualitative** **Benefits** | **Cost of Implementation of the Practice** | **Monetary Benefits Per Acre** | **Your Judgment: Value Per Acre of This Practice on Your Land**  |
| Conserves soil moistureProtects water qualityImproves yields from enhanced soil qualityMay improve wildlife habitatHelps reduce weeds by discouraging germinationAdds valuable nutrients to the soil | Management efforts, $60/acre/year (1)Costs of planting ($100/acre/year) and termination ($50/acre/year) (2)Possible increased risk of disease Possible loss of income from cash crop, up to approximately $300/acre/year, depending on the cover crop system chosen (often cover crops are grown after and before a cash crop in the same season, so you still get a cash crop)Refer to Cash Grain Profitability Calculation text box on **page 4** | $38/acre/year saved by halving nitrogen fertilizer usage (3)$12/acre/year saved by halving herbicide usage (3)$10.50/acre/year fertilizer value of soil saved by eliminating 5 tons/acre/year of soil erosion; cumulative over years; see Value of Saving Soil text box on page 6 (4,5)$24.65/acre/year water quality value of soil saved by eliminating 5 tons/acre/year of soil erosion (4,5). This is a benefit to society, not directly to the landowner. |  |

**References:**

1. **Management Estimate Per Acre**: Iowa State Extension Service

Personal communication, Ann Johanns, Iowa State University Extension, May 2013.

1. **Ag Decision Maker, Whole Farm Decision Tools:** Iowa State Extension

[www.extension.iastate.edu/agdm/decisionaids.html](http://www.extension.iastate.edu/agdm/decisionaids.html)

*This online toolbox created by Iowa State Extension helps farmers answer hundreds of “what if” questions about their operations and about possible new enterprises. Worksheets are available to evaluate production decisions, marketing decisions, machinery questions, etc.*

**(3) Energy and Economic Returns by Crop Rotation:** Iowa State Extension [www.extension.iastate.edu/agdm/crops/html/a1-90.html](http://www.extension.iastate.edu/agdm/crops/html/a1-90.html)

*This study focuses on the energy use and economic returns of three different crop rotations. The choice of rotation depends on many factors. When considering profitability and energy consumption, including a third or fourth crop may be a viable option for some operations. Other benefits might include an outlet for excess manure, reduced erosion, increased soil health, and improved pest management.*

(4)**Value of Soil Erosion to the Land Owner**. August, 2012. Mike Duffy, Iowa State University Extension. [www.extension.iastate.edu/agdm/crops/html/a1-75.html](http://www.extension.iastate.edu/agdm/crops/html/a1-75.html) (accessed 6/11/13)

*Erosion represents costs to the farmers. These costs include lost fertilizer and soil carbon. Erosion also produces costs to society borne by taxpayers. These costs are “external“ to the decisions made by the farmer. This paper estimates the costs of erosion to the land owner.*

 **(5) Economic Measures of Soil Conservation Benefits: Regional Values for Policy Assessment. September 2008. LeRoy Hansen and Marc Ribaudo. Economic Research Service (USDA-ERS).**[www.ers.usda.gov/media/196118/tb1922.pdf](http://www.ers.usda.gov/media/196118/tb1922.pdf)

*This report describes data and methodologies that the Economic Research Service uses to apply monetary values to changes in soil erosion. Values and methodology are clearly described so that analysts can apply the data to specific soil conservation projects.*

**Further Resources:

Cover Crop Chart. Northern Great Plains Research Laboratory, Mandan, ND. USDA-ARS.** <http://www.ars.usda.gov/Services/docs.htm?docid=20323> (accessed 6/11/13).
*Requires sign-in to download document. Chart includes photos and descriptions of many types of cover crops used for various purposes.*

**Cover Crop Decision Tools**: Midwest Cover Crops Council

 <http://www.mccc.msu.edu/selectorINTRO.html>

*This online resource has cover crops information specific to seven states and the province of Ontario.*

**Managing Cover Crops Profitably:** North Central SARE

 [www.northcentralsare.org/Educational-Resources/Books/Managing-Cover-Crops-Profitably-3rd-Edition](http://www.northcentralsare.org/Educational-Resources/Books/Managing-Cover-Crops-Profitably-3rd-Edition)

*This publication explores how and why cover crops work and provides all the information needed to build cover crops into any farming operation.*

**Using Cover Crops to Improve Soil and Water Quality:** Ohio State Extension

<http://mercer.osu.edu/topics/agriculture-and-natural-resources/Using%20Cover%20crops%20SAG%2008%2009.pdf>

*The four-page publication summarizes of all the ways cover crops help farmers improve their soil and water quality with cover crops. It presents advantages and disadvantages of cover crops and lists the different effects of cover cropping on soil and water quality.*

**Soil Fertility, Organic Risk Management:** University of Minnesota

 [www.organicriskmanagement.umn.edu/soil\_fertility.pdf](http://www.organicriskmanagement.umn.edu/soil_fertility.pdf)

*This online manual is intended as a guide for organic and transitioning producers in the Upper Midwest. This manual covers a wide range of production topics that are relevant to organic farmers*.

**Soil Health**. Burleigh County, South Dakota Soil and Water Conservation District. <http://www.bcscd.com/?id=23> (accessed 6/11/13)

*This county-based program offers a number of useful resources on soil management and cover crops*.

**While Crop Rotations are Common, Cover Crops Remain Rare:** USDA/ERS

[www.ers.usda.gov/amber-waves/2013-march/while-crop-rotations-are-common,-cover-crops-remain-rare.aspx](http://www.ers.usda.gov/amber-waves/2013-march/while-crop-rotations-are-common%2C-cover-crops-remain-rare.aspx)

*This article from “Amber Waves,” the monthly newsletter of the USDA/ERS, presents reasons why cover cropping is somewhat rare in the Midwest and gives some suggestions about how and why to increase the use of cover crops.*

**Trees (Agroforestry)**

The kinds of trees we are going to talk about are called “working trees” by the NRCS, which defines them as “trees intentionally established in a given landscape to achieve specific functions.” These functions can include helping farmers maintain air, water, and soil quality; diversify income sources; conserve energy; improve wildlife habitats; and improve productivity.

The technical term for using trees in these ways is *agroforestry*, which is a type of production that is both forestry and agriculture at the same time. There are several ways to use these practices in a farming operation:

● Silvopasture: Picture an orchard of high-value trees where the understory — the small trees, shrubs, and other plants that grow under the tall trees — is specifically managed to produce forage that supports livestock grazing. The trees might be Christmas trees or hazelnut trees or even fruit trees, as well as trees grown for the value of their wood.

● Alley cropping: An agricultural crop that produces annual income grown in the alleys between widely space rows of trees, while the trees themselves are an investment that will produce revenue from such products as lumber and firewood as well as nuts, fruits and other crops.

● Windbreaks: Using rows of trees strategically to block wind can help reduce environmental stress on livestock and bring a farm household energy savings of $100 to $250 a year.

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| **Agroforestry** |
| **Qualitative** **Benefits** | **Cost of Implementation of the Practice** | **Monetary Benefits Per Acre** | **Your Judgment: Value Per Acre of This Practice on Your Land**  |
| Helps landowner diversify income sources through sales of nuts, wood, fruit, biofuels, etc.Windbreak trees can enhance the productivity of crops and livestock by providing shade during summer and protection from harsh winds in the winter (4)Enhances wildlife habitatCan help protect water quality and air quality by absorbing CO2 and releasing oxygenCan help water quality by trapping sediment before it reaches a water source | Management efforts, $60/acre/year (1) One-time land preparation costs can be $150 per acre (2)One-time planting costs can vary from $1,000/acre to $6,000/acre (3)Loss of income from cash crop approximately $300/acre/year.Refer to Cash Grain Profitability Calculation text box on **page 4** | Silvopasture operations can have net incomes of $150-$500 per acre per year (4)Alley cropping operations can have net incomes of $100-$2,000 per acre per year (3)Windbreaks can improve yields of protected crops by 14% as compared to unprotected crops (5)  |  |

**References:**

(1) **Management Estimate Per Acre**: Iowa State Extension Service

Personal communication, Ann Johanns, Iowa State University Extension, May 2013.

**(2) Ag Decision Maker, Whole Farm Decision Tools:** Iowa State Extension

[www.extension.iastate.edu/agdm/decisionaids.html](http://www.extension.iastate.edu/agdm/decisionaids.html)

*This online toolbox created by Iowa State Extension helps farmers answer hundreds of “what if” questions about their operations and about possible new enterprises. Worksheets are available to evaluate production decisions, marketing decisions, machinery questions, etc.*

**(3) USDA National Agroforestry Center**

<http://nac.unl.edu/Working_Trees/index.htm>

*The National Agroforestry Center's popular series of* ”Working Tree” *brochures serves as an introduction to agroforestry. These color publications each illustrate various agroforestry practices that landowners can apply to help meet their production and conservation objectives.*

**(4)Profitable Farms and Woodlands:** USDA National Agroforestry Center and Tennessee State University, 2012.

*One hundred and eight page manual to help landowners develop best management technologies in managing agroforestry projects. Natural Resources Conservation Service, US Forest Service, and six other state land grant universities also were involved in developing this manual.*

**(5) Windbreak Economics:** Presentation by Larry Godsey at Great Plains Windbreak Innovation Conference, July 2012.

**Further Resources:**

**Agroforestry: An Overview:** ATTRA

<https://attra.ncat.org/attra-pub/summaries/summary.php?pub=62>

*Integrating trees and shrubs with other enterprises on a farm can create additional sources of income, spread farm labor throughout the year, and increase the productivity of those other enterprises — all while protecting soil, water, and wildlife. This publication presents an overview of common agroforestry practices, evaluating and planning considerations, marketing opportunities, several case studies, and an extensive list of further resources.*

**Mid-American Agroforestry Working Group (MAAWG)**

<http://midamericanagroforestry.net/>

*The purpose of the Mid-American Agroforestry Working Group (MAAWG) is to provide an organization for advancing the science, practice, and adoption of agroforestry by landowners and natural resource managers in the Midwest region of the U.S. Its goals are to identify core issues for advancing the adoption of agroforestry as a cornerstone of productive land use in the Midwest and then to initiate and coordinate actions to address and resolve the core issues.*

**Working Trees: Silvopasture**: USDA National Agroforestry Center

<http://nac.unl.edu/documents/workingtrees/brochures/wts.pdf>

*A discussion of silvopasture, including components, planning, design, and management.*

**Tree as a Crop: Rodale Center**

 <http://rodaleinstitute.org/our-work/tree-as-a-crop/tree-as-a-crop-how-it-works/>

*A major project of this well-known research center, “Tree as a Crop” offers a way to put trees to work to improve ecosystems while helping to create a healthy prosperity for farmers and small forest landowners. “Tree as a Crop” shows farmers and other landowners how to maximize the potential of trees to improve biodiversity on forested and agricultural land, to capture carbon and to provide a diversified income stream for landowners.*

**Water-Quality Management**

There are sustainable agriculture practices that will go a long way toward guaranteeing that clean water is available for farm families, their livestock, and their communities.

In fact, practices we discuss in other contexts in this publication are key to maintaining or improving a farm’s water quality.

● Crop rotations can help cut down nitrogen fertilizer applications, which reduces nitrogen leaching into groundwater or runoff into streams and rivers .

● Cover crops help hold nutrients, pesticides, and soil particles in place. They do so by cushioning the impact of raindrops and slowing down water runoff. It’s hard to overestimate how important that runoff can be. If the amount of water discharge from an area increases by a third, that water’s capacity for carrying off sediment and nutrients goes up by a factor of 9 to 27 (1)*.*



**Wetland Restoration**

Developing “targeted wetland restoration” projects is another idea to consider. They typically are put in place on areas of a farm that are not very good for growing corn or soybeans — acres that are producing yields of half or less of the farm’s average yields — and can reduce nitrate losses from the farm into surface waters (streams and rivers) by 40% to 70%.

If such wetlands are correctly positioned and designed, they can actually serve as water-quality buffers for more than one farm. In fact, the Natural Resources Conservation Service has estimated that such wetland restoration projects can save $42 per acre in “societal costs” as they eliminate soil erosion. That can make them a good way for neighbors to work together.

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| **Wetland Restoration** |
| **Qualitative** **Benefits** | **Cost of Implementation of the Practice** | **Monetary Benefits Per Acre** | **Your Judgment: Value Per Acre of This Practice on Your Land**  |
| Lessens nitrogen in surface runoffLessens sediment runoffMay improve wildlife habitat | Management efforts Loss of income from cash crop approximately $300/acre/year, less loss if using marginal cropland.Refer to Cash Grain Profitability Calculation text box on **page 4**    | Savings of $42/acre in water quality improvement costs with EQIP practices. These are benefits to society, not direct benefits to the landowner. (2)  |  |

**References:**

(1) **Chapter 18: Surface Water Pollution**. 2006. *In* Environment & Pollution Science. Walker, D., D. Baumgartner, K. Fitzsimmons, and C.P. Gerber. Eds. I.L. Pepper, C.P. Gerber, and M.L. Brusseau. p. 283.

**(2) Economic Measures of Soil Conservation Benefits: Regional Values for Policy Assessments,** USDA/ERS

[www.ers.usda.gov/media/196118/tb1922.pdf](http://www.ers.usda.gov/media/196118/tb1922.pdf)

*This report describes data and methodologies that the Economic Research Service uses to apply monetary values to changes in soil erosion. Values and methodology are clearly described so that analysts can apply the data to specific soil conservation projects.*

**Further Resources:**

**Ag Decision Maker, Whole Farm Decision Tools:** Iowa State Extension

[www.extension.iastate.edu/agdm/decisionaids.html](http://www.extension.iastate.edu/agdm/decisionaids.html)

*This online toolbox created by Iowa State Extension helps farmers answer hundreds of “what if” questions about their operations and about possible new enterprises. Worksheets are available to evaluate production decisions, marketing decisions, machinery questions, etc.*

**Practices to Improve Water Quality:** Leopold Center for Sustainable Agriculture

[www.leopold.iastate.edu/sites/default/files/pubs-and-papers/2012-06-practices-improve-water-quality.pdf](http://www.leopold.iastate.edu/sites/default/files/pubs-and-papers/2012-06-practices-improve-water-quality.pdf)

*This publication presents a brief introduction to nine practices that farmers and ranchers can use to help maintain or improve the water quality on their property. A discussion of the mechanisms of each practice is also included in this online publication.*

**Agricultural Nitrogen Management for Water Quality Protection in the Midwest:** Heartland Regional Water Coordination Initiative

[www.ksre.ksu.edu/waterquality/nitrogen%20pub.pdf](http://www.ksre.ksu.edu/waterquality/nitrogen%20pub.pdf)

*This publication provides an overview of factors influencing nitrogen loss to ground and surface waters in the four-state Heartland region of Iowa, Kansas, Missouri, and Nebraska. The Initiative is a joint project of the land grant college in each of those four states in conjunction with USDA Cooperative State Research, Education and Extension Service (now NIFA).*

**Information and video presentations of Practical Farmers of Iowa annual conference:** <http://practicalfarmers.org/events/annual-conference.html>

**Managed Grazing in Riparian Areas:** ATTRA

<https://attra.ncat.org/attra-pub/summaries/summary.php?pub=116>

*This publication is designed to help farmers and ranchers identify and use locally appropriate grazing practices to protect riparian resources. Methods include keeping livestock from stream banks, properly resting pastures to restore degraded land, and determining the proper duration and season for grazing pastures.*

**The Cost of Soil Erosion:** Iowa Learning Farms

[www.extension.iastate.edu/ilf/sites/www.extension.iastate.edu/files/ilf/Cost\_of\_Eroded\_Soil.pdf](http://www.extension.iastate.edu/ilf/sites/www.extension.iastate.edu/files/ilf/Cost_of_Eroded_Soil.pdf)

*This online document provides an overview of estimated costs of soil erosion.*

**Protecting Riparian Areas, Farmland Management Strategies:** ATTRA

<https://attra.ncat.org/attra-pub/summaries/summary.php?pub=115>

*This publication is designed to help farmers, watershed managers, and environmentalists understand what healthy riparian areas look like, how they operate, and why they are important for the environment and society. It also provides information on the costs and benefits of riparian management.*

**Protecting Water Quality on Organic Farms:** ATTRA

<https://attra.ncat.org/attra-pub/summaries/summary.php?pub=114>

*This publication deals with environmental concerns related to organic farming in the areas of the transition period from conventional to organic, nutrient management planning practices, and improper storage of manure or compost materials. It discusses strategies for preventing water pollution by addressing those concerns.*

**Alternative Crops**

For growers in the Midwest, anything other than corn and soybeans could be considered an alternative crop. Alternative crops such as hay, small grains, and forage crops can be grown as part of a crop rotation on large acreages. Legume crops such as alfalfa and field peas can help build soil by hosting bacteria on their roots that “fix” atmospheric nitrogen into the soil. Alternative crops in the rotation can help reduce disease and insect problems, as well as diversify a farming operation to spread income out more evenly during the year.

“Specialty” crops like fruits, vegetables, and nuts; and even more unusual specialty enterprises like agritourism and aquaculture (fish farming) can be quite profitable enterprises. Growing specialty fresh fruits and vegetables can return $2,000 in income per acre, or sometimes even significantly more, if done correctly. These operations do not require much acreage; 100 acres would be considered a large vegetable farm in the Midwest. A vegetable or fruit operation in which the farmers sell directly to the public typically involves fewer than 30 acres. This presents an opportunity for a larger-acreage farm to split off smaller parcels that could support one or several new specialty crop farmers.

If alternative crops are something that you want to encourage as part of a crop rotation; or if you want to foster a beginning specialty crop farm on your land; then your background work for your farm transition plan should include some enterprise budgeting to determine likely cash flows of the future farm(s) and the farmers’ ability to pay the rental, lease, or sale price that you want for your property. Note that proximity to large urban markets generally improves the viability of direct-marketing farm operations, so your farm’s distance from potential markets should be a consideration in deciding whether this is a reasonable option to pursue for your property.

It is also important to understand that specialty crops are generally a riskier option than cash grain crops. Partly that is because, while some Federal crop insurance options are available for specialty crops, the insurance options are much better established and easier to use for cash grains. Partly this is because the amount of investment that a farmer has to make in order to produce a specialty crop is often very high per acre or per unit of product produced. Therefore, your farm transition plan should include recognition of this risk as a potential cost and barrier to a new farmer starting up an enterprise. Rent, lease, or sale terms should be adjusted accordingly.

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| **Alternative Crops** |
| **Qualitative** **Benefits** | **Cost of Implementation of the Practice** | **Monetary Benefits Per Acre** | **Your Judgment: Value Per Acre of This Practice on Your Land**  |
| May reduce pesticide useImproves soil and water qualityEnhances wildlife habitat and diversity | Capital Investment in equipmentManagement effortsHired laborWorking capital requirementsRisk of under-insured loss | Specialty fruits and vegetables have widely varying net income potential, but $2,000/acre/year is a reasonable average for direct-marketed mixed vegetable production.(1,2)Dry peas and beans have net income up to $300/acre/year (1)Sunflowers, millet, amaranth and other specialty grains have net incomes up to $300/acre/year (1) |  |

**References:**

**(1) Ag Decision Maker, Iowa Fruit and Vegetable Production Budgets:** Iowa State University Extension

 [www.extension.iastate.edu/agdm/crops/html/a1-17.html](http://www.extension.iastate.edu/agdm/crops/html/a1-17.html)

*This online toolbox created by Iowa State Extension helps farmers answer hundreds of “what if” questions about their operations and about possible new enterprises. Worksheets are available to evaluate production decisions, marketing decisions, machinery questions, etc.*

**(2) Minnesota Specialty Crops, An Analysis of Profitability and Performance:** Minnesota Department of Agriculture

[www.mda.state.mn.us/~/media/Files/food/organicgrowing/specialtycrop2012.ashx](http://www.mda.state.mn.us/~/media/Files/food/organicgrowing/specialtycrop2012.ashx)

*This study was done for the Minnesota Department of Agriculture and contains the financial summaries from 47 Minnesota farms. It is intended to give growers (and potential growers) some of the hard data they need to help decide which fruits and vegetables might fit their operations. Existing growers can also use this data to compare their returns to the averages generated by the growers in the study.*

**Further Resources:**

**Crop Insurance Options for Specialty, Diversified and Organic Farmers:** ATTRA

<https://attra.ncat.org/attra-pub/summaries/summary.php?pub=413>

*This publication reviews federally subsidized crop insurance, with special attention to options available to specialty, diversified, and organic farmers. It gives special attention to understanding whole-farm revenue insurance options, which may be of particular interest to growers of diverse specialty and organic crops and livestock.*

**Alternative Agronomic Crops:** ATTRA

<https://attra.ncat.org/attra-pub/summaries/summary.php?pub=84>

*This publication provides an overview of the considerations involved in selecting, cultivating, and marketing alternative agronomic crops. Many additional resources for alternative crop information are referenced in this publication.*

**Horticulture Crops as Alternative Crops:** ATTRA

<https://attra.ncat.org/horticultural.html>

*This series of six publications offers detailed information on production of specific horticultural crops, focusing on sustainable and organic production methods for traditional produce and also introducing a range of alternative crops and enterprises. It includes information on strategies for more sustainable greenhouse and field production of everything from lettuce to trees.*

**Organic Risk Management:** University of Minnesota

[www.organicriskmanagement.umn.edu/alternative\_crops.pdf](http://www.organicriskmanagement.umn.edu/alternative_crops.pdf)

*This online manual is intended as a guide for organic and transitioning producers in the Upper Midwest. This manual covers a wide range of production topics that are relevant to organic farmers.*

**Perennial Forages/Grazing**

Perennial forage plantings are excellent practices for soil and water improvement. An established perennial forage stand is like a sponge, soaking up both water and nutrients and allowing very little of either to escape into groundwater or surface water. Land in a perennial forage crop is not tilled, which is very beneficial for soil health. Tillage – plowing, disking, or similar operations – destroys both soil structure and soil organic matter; so the more years in a rotation that the soil is in a perennial crop and not tilled, the better for the soil (1). Legume forage crops are very useful in crop rotations as a way to add nitrogen to the soil (see text box, below); but longer-term perennial forage is also a reasonable choice to consider on your land’s most productive acres. Hay production can be financially competitive with cash grain production. Perennial forage also has potential to generate income and environmental benefits on the more marginal land.

[START TEXT BOX]

Perennial Pastures & Hayfields: What’s in them?

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| **Grasses** | **Legumes** | **Forbs** |
| Grasses are plants that have long, thin leaves – “blades” of grass. Perennial grasses form dense mats of fibrous roots that hold soil in place. A field of perennial grasses can soak up lots of water and dissolved nutrients, preventing them from running off into rivers and streams. Grasses for pasture and hay are generally divided into “cool-season” grasses, which have their main growth in the spring and fall; and “warm-season” grasses, which grow well in the heat of summer. In northern states, cool-season grasses are what you most commonly see in pastures and hayfields.  | Legumes are plants related to beans and peas. They have a close relationship with a particular group of bacteria that live in the soil, called *Rhizobia*. *Rhizobia* bacteria species “infect” legume roots where they collect nitrogen that the plants take in from the atmosphere, which is about 70% nitrogen gas. The bacteria break down and transform this atmospheric nitrogen into a form useable by plants. Well-managed legume crops can reduce the need for purchased synthetic nitrogen fertilizer, which is produced using fossil fuels. | Forbs are broad-leaved plants that are neither grasses nor legumes. Most of the plants that you recognize as weeds in your garden are forbs. Perennial forbs can also become weeds in perennial pastures, and may be harmful to livestock. Some forbs are planted intentionally in pastures to provide variety in the livestock diet. Certain types of forbs have other beneficial effects such as long and fleshy roots that can loosen compacted soil and “scavenge” water and nutrients from deep in the soil.  |
| **Common types of cool-season hay & pasture grasses:** | **Most common hay & pasture legumes:** | **Common planted forbs for pasture:** |
| Timothy | Alfalfa  | Turnip |
| Smooth bromegrass | Red clover | Chicory |
| Orchardgrass | White clover |  |
| Quackgrass (often considered a weed) | Birdsfoot trefoil | **Common pasture weeds that are forbs:** |
| Fescues | **Less common hay & pasture legumes:** | Canada thistle |
| Ryegrasses | Kura clover | Goldenrod |
|  | Sainfoin | Curly dock |
| **Common types of warm-season grasses in the Midwest:** | Crownvetch | Wild carrot |
| Switchgrass | Alsike clover |  |
| Big bluestem |  |  |
| Indiangrass |  |  |
|  |  |  |

**Reference:**

Evaluating Land Suitability for Grazing Cattle, Green Lands Blue Waters , <http://greenlandsbluewaters.net/Perennial_Forage/CG_Evaluating%20Land_final_0313.pdf>

[END TEXT BOX]

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There are a number of programs administered by the Natural Resources Conservation Service that offer incentives for conservation practices such as perennial pastures. Some examples include the Conservation Reserve Enhancement Program (CREP), the Conservation Reserve Program (CRP), the Conservation Stewardship Program (CSP) and the Grassland Reserve Program (GRP). The Conservation Stewardship Program is a “working lands” program that provides payments for whole farm plans in which acres in perennials can be harvested, either by machine or by grazing livestock. The other programs are land retirement programs, where cost-share is available for planting, nothing is harvested, and contract payments substitute for crop sales. If having acreage in perennials is something you want for your legacy on the land, then these programs can be part of the total package that makes it financially feasible for you and the future farmers to plant and maintain those acres. Your local NRCS office can explain the details of these programs, the requirements and restrictions associated with them, and the contract payment amounts. Search for your local NRCS office: <http://www.nrcs.usda.gov>.

[START TEXT BOX]

USDA conservation programs are administered by the Farm Service Agency (FSA) and Natural Resources Conservation Service (NRCS) which are accessible throughout the nation in county and regional field offices called USDA Service Centers. Find the USDA Service Center nearest to you at<http://offices.sc.egov.usda.gov/locator/app>

USDA Natural Resource Conservation Service conservation programs:

* + Wetland Reserve Program [www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/wetlands/](http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/wetlands/)
	+ Grasslands Reserve Program [www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/grassland/](http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/grassland/)
	+ Healthy Forests Reserve Program[www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/forests/](http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/forests/)
	+ Farm and Ranch Lands Protection Program[www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/farmranch/](http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/farmranch/)
	+ Environmental Quality Incentive Program [www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/](http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/)
	+ Conservation Stewardship Program[www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/csp/](http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/csp/)

USDA Farm Service Agency conservation programs:

* + Conservation Reserve Program[www.fsa.usda.gov/FSA/webapp?area=home&subject=copr&topic=crp](https://www.fsa.usda.gov/FSA/webapp?area=home&subject=copr&topic=crp)
	+ Transition Incentive program[www.fsa.usda.gov/FSA/webapp?area=home&subject=copr&topic=tipr](http://www.fsa.usda.gov/FSA/webapp?area=home&subject=copr&topic=tipr)

[END TEXT BOX]

Perennial forages combined with contract grazing can be a good entry option for a beginning farmer. If helping a new farmer get started is part of your family’s goal for the land, this is a path to consider. A new farmer can lease or rent acres in perennial forage, get a contract to graze someone else’s cattle on those acres, and only have to invest capital in fencing equipment. Managed grazing can be a profitable, productive, and environmentally beneficial use of land. Even simple contracts for grazing a neighbor’s cattle could generate net income of $100 to $150 per acre per year.

Perennial forage production does take different planting and harvest equipment than cash grain production, and also more labor. These are costs that must be taken into account in a farm transition plan, to make sure that your expectations for sale, rental, or lease price for your land match up with what is affordable for a farming operation that includes or is wholly based on perennial forages.

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| **Perennial Forage** |
| **Qualitative** **Benefits** | **Cost of Implementation of the Practice** | **Monetary Benefits Per Acre** | **Your Judgment: Value Per Acre of This Practice on Your Land**  |
| Increases soil fertility with legumes, which take nitrogen from the air into the soil where it is used by the cash cropEnhances soil quality and fertility because less tillage means better soil structure along with less loss of carbon and nitrogen Reduces weed pressure because less weed seed will germinateEnhances water filtration because of better soil structure and tilthLessens erosion because the roots hold the soil in place | Management effortsLoss of net income from cash crop up to $300/acre/yearRefer to Cash Grain Profitability Calculation text box on **page 4**Up to $ 150/acre for establishment (2) | Grazing land lease of $100-$150 per acre per year (3) (lease only; not counting potential additional income from labor & management of grazing system)Hay production up to $300/acre/year (3)$10.50/acre/year fertilizer value of soil saved by eliminating 5 tons/acre/year of soil erosion; cumulative over years; see Value of Saving Soil text box on page 6 (4,5)$24.65/acre/year water quality value of soil saved by eliminating 5 tons/acre/year of soil erosion (4,5). This is a benefit to society, not directly to the landowner. |  |

**References:**

1. **Organic Matter Management**. In The Soil Management Series. Revised 2008. Ann Lewandowski. <http://www.extension.umn.edu/distribution/cropsystems/components/7402_02.html> (accessed 6/11/13).
2. **(2) Ag Decision Maker, Whole Farm Decision Tools:** Iowa State Extension

[www.extension.iastate.edu/agdm/decisionaids.html](http://www.extension.iastate.edu/agdm/decisionaids.html) *This online toolbox created by Iowa State Extension helps farmers answer hundreds of “what if” questions about their operations and about possible new enterprises. Worksheets are available to evaluate production decisions, marketing decisions, machinery questions, etc.*

**(3) Ag Decision Maker, Crops-Costs and Returns:** Iowa State Extension [www.extension.iastate.edu/agdm/cdcostsreturns.html](http://www.extension.iastate.edu/agdm/cdcostsreturns.html)

*This online toolbox created by Iowa State Extension helps farmers answer hundreds of “what if” questions about their operations and about possible new enterprises. Worksheets are available to evaluate production decisions, marketing decisions, machinery questions, etc.*

(4)**Value of Soil Erosion to the Land Owner**. August, 2012. Mike Duffy, Iowa State University Extension. [www.extension.iastate.edu/agdm/crops/html/a1-75.html](http://www.extension.iastate.edu/agdm/crops/html/a1-75.html) (accessed 6/11/13).
*Erosion represents costs to the farmers. These costs include lost fertilizer and soil carbon. Erosion also produces costs to society borne by taxpayers. These costs are “external“ to the decisions made by the farmer. This paper estimates the costs of erosion to the land owner.*

 **(5) Economic Measures of Soil Conservation Benefits: Regional Values for Policy Assessment. September 2008. LeRoy Hansen and Marc Ribaudo. Economic Research Service (USDA-ERS).**[www.ers.usda.gov/media/196118/tb1922.pdf](http://www.ers.usda.gov/media/196118/tb1922.pdf)

*This report describes data and methodologies that the Economic Research Service uses to apply monetary values to changes in soil erosion. Values and methodology are clearly described so that analysts can apply the data to specific soil conservation projects.*

**Further Resources:

Contract Grazing Fact Sheets.** 2013. Green Lands Blue Waters, Midwest Perennial Forage Working Group. <http://greenlandsbluewaters.net/Perennial_Forage/contract.html> (accessed 6/11/13).
*Series of four fact sheets: Basics of Contract Grazing, Evaluating Land Suitability for Grazing Cattle, Pasture and Rental Lease Agreements, and Rates Charged for Contract Grazing Agreements.*

**Organic Risk Management, Forages:** University of Minnesota [www.organicriskmanagement.umn.edu/forages.pdf](http://www.organicriskmanagement.umn.edu/forages.pdf)

*This online manual is intended as a guide for organic and transitioning producers in the Upper Midwest. This manual covers a wide range of production topics that are relevant to organic farmers.*

**Pasture and Rangeland Management During Drought:** ATTRA <https://attra.ncat.org/downloads/water_quality/drought_mgmt.pdf#search=forages>

*This PowerPoint presentation illustrates some common-sense guidelines on how to manage livestock during a drought. It also talks about strategies that can be implemented before a drought starts that could make life easier for a rancher when the eventual drought conditions do begin.*

**Pollinator/Beneficial Insect Habitats**

One of the biggest stories in the agricultural press during the last several years has been the decline of domesticated honey bee populations all over the United States. There are some disagreements about the reasons for these declines, but there is no disagreement that they are happening. One of the strategies to counter such declines is to increase the populations of wild bees. One way to do so is to plant and maintain habitats that promote and protect wild bees by providing nectar and pollen.

These habitats can be created by using marginal or poor cropland, so the loss of income from corn or soybeans will not cost much in comparison to the benefits. The habitats will attract and promote not only wild bees; they will do the same for other beneficial insect species. These beneficial species include many different wasps, beetles, lacewings, predatory mites, flies, and just plain bugs. These types of beneficial insects prey upon the kinds of insects that damage crops, so keeping them around can help reduce pesticide applications.

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| **Pollinator/Beneficial Insect Habitat** |
| **Qualitative** **Benefits** | **Cost of Implementation of the Practice** | **Monetary Benefits Per Acre** | **Your Judgment: Value Per Acre of This Practice on Your Land**  |
| Pollinators are critical to productivity of many fruit, vegetable, seed, and nut cropsBeneficial insects provide pollination and prey on other harmful insectsBeneficial insect habitat can improve productivity of nearby crops and reduce problems from insect pests | Loss of income from cash crop approximately $300/acre/year, possibly less loss if using marginal cropland Refer to Cash Grain Profitability Calculation text box on **page 4**One-time costs of establishing habitat up to $150/acre (1) | Reduced costs of insecticide applications up to $50/acre/year (1) $29/acre/year benefit from pollination services. This is not a monetary value that accrues to the landowner. Instead it is a societal benefit, estimated from pollinator services from all farms in the US. (2)  |  |

**References:**

**(1) Ag Decision Maker, Whole Farm Decision Tools:** Iowa State Extension

[www.extension.iastate.edu/agdm/decisionaids.html](http://www.extension.iastate.edu/agdm/decisionaids.html)

*This online toolbox created by Iowa State Extension helps farmers answer hundreds of “what if” questions about their operations and about possible new enterprises. Worksheets are available to evaluate production decisions, marketing decisions, machinery questions, etc.*

**(2) Insect Pollinated Crops, Insect Pollinators and US Agriculture: Trend Analysis of Aggregrate Data for the Period 1992-2009:** Public Library of Science (PLOS), May, 2012.

*This study was funded by the National Honey Board and gives an in-depth analysis of the directly pollinated and indirectly pollinated crops in the U.S., with detailed financial estimates of both.*

**Further Resources:**

**Alternative Pollinators: Native Bees**: ATTRA

<https://attra.ncat.org/attra-pub/summaries/summary.php?pub=75>

*This publication provides information and resources on how to plan for, protect and create habitat for native bees in agricultural settings.*

**Using Farm Bill Programs for Pollinator Conservation, Technical Note No. 78:** The Xerces Society

[www.xerces.org/wp-content/uploads/2009/04/using-farmbill-programs-for-pollinator-conservation.pdf](http://www.xerces.org/wp-content/uploads/2009/04/using-farmbill-programs-for-pollinator-conservation.pdf)

*More than 30 percent of our food relies on insect pollination, which is overwhelmingly provided by bees.*

*Native bees have declined due to habitat loss and the careless use of pesticides, and managed colonies of European honey bees have suffered a 50 percent decline in recent decades. This publication offers ideas for farmers about using NRCS programs to help abate this staggering loss of bees.*

**Wildlife Habitat Management**

Many of the principles for managing habitats for beneficial insects and for perennial forages also apply to this sustainable agriculture practice. Establishing and maintaining habitat can be purely for aesthetic and conservation purposes, or it can be done with an eye toward encouraging the presence of game species. Fee hunting or hunting leases can be a significant source of farm income if the wildlife acreage is large enough and productive enough.

If having wildlife habitat is part of your vision for the future of your land, and you have some time to accomplish the farm transition gradually, then establishing habitat areas might be something you as the landowner want to do even before turning the land over to the new generation. On the other hand, doing the establishment work might be part of the “sweat equity” that a new farmer provides, and you can adjust your sale, rent, or lease pricing to compensate that person for the work that they do on the wildlife habitat.

An example of habitat planting is native grasslands to provide water, cover, food, and space for whatever wildlife species you want to encourage, for example, quail, pheasants, grouse, ducks, geese, or deer. Another is planting certain trees in specific areas to encourage bird migration – not only game birds – to your place.

Your local NRCS office can be really helpful in this process by providing maps of your farm that will help in deciding which acres to convert and how to convert them; as well as information about funding sources. As with other practices that involve perennial plantings, there are some programs that will cost-share the establishment costs or that offer contract payments for the years that the planting is maintained. These program funds can be part of the total package that makes the habitat development feasible as part of a farm transition plan.

 If such habitat is part of the legacy you would like to leave as a good steward of the land who is concerned with benefitting the local community, starting the process can set the stage for the new owners or operators to have the options of leasing land for hunting, or bird watching or eco-tourism as new sources of income.

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| **Wildlife Habitat** |
| **Qualitative** **Benefits** | **Cost of Implementation of the Practice** | **Monetary Benefits Per Acre** | **Your Judgment: Value Per Acre of This Practice on Your Land**  |
| Can help reduce erosionCan help reduce nitrogen and phosphorus runoff, which will help water qualityProvides habitat for pollinator insectsCan increase land’s economic potential as site for hunting and bird watching | Up to $100/acre for prairie seed mix, one-time cost(1)Up to $50/acre for disking and planting (2)$32-$50/acre/year in maintenance costs (2)Loss of income from cash crop approximately $300/acre/year, possibly less loss if using marginal cropland  Refer to Cash Grain Profitability Calculation text box on **page 4** | Hunting lease income of $100/acre/year if enough acres are available (3)$10.50/acre/year fertilizer value of soil saved by eliminating 5 tons/acre/year of soil erosion; cumulative over years; see Value of Saving Soil text box on page 6 (4,5)$24.65/acre/year water quality value of soil saved by eliminating 5 tons/acre/year of soil erosion (4,5). This is a benefit to society, not directly to the landowner. |  |

References:

**(1) Using Farm Bill Programs for Pollinator Conservation, Technical Note No. 78:** The Xerces Society

[www.xerces.org/wp-content/uploads/2009/04/using-farmbill-programs-for-pollinator-conservation.pdf](http://www.xerces.org/wp-content/uploads/2009/04/using-farmbill-programs-for-pollinator-conservation.pdf)

*More than 30 percent of our food relies on insect pollination, which is overwhelmingly provided by bees.*

*Native bees have declined due to habitat loss and the careless use of pesticides, and managed colonies of European honey bees have suffered a 50 percent decline in recent decades. This publication offers ideas for farmers about using NRCS programs to help abate this staggering loss of bees.*

**(2) Ag Decision Maker, Whole Farm Decision Tools:** Iowa State Extension

[www.extension.iastate.edu/agdm/decisionaids.html](http://www.extension.iastate.edu/agdm/decisionaids.html)

*This online toolbox created by Iowa State Extension helps farmers answer hundreds of “what if” questions about their operations and about possible new enterprises. Worksheets are available to evaluate production decisions, marketing decisions, machinery questions, etc.*

**(3) Integrating Hunting and Grazing:** Leopold Center for Sustainable Agriculture [www.leopold.iastate.edu/grants/2003-e6](http://www.leopold.iastate.edu/grants/2003-e6)

*Land resources in Iowa are limited, yet there is increased interest in both improved wildlife habitat and hunter access to these lands. The study looks at ways to achieve these goals without shortchanging area farmers.*

(4)**Value of Soil Erosion to the Land Owner**. August, 2012. Mike Duffy, Iowa State University Extension. [www.extension.iastate.edu/agdm/crops/html/a1-75.html](http://www.extension.iastate.edu/agdm/crops/html/a1-75.html) (accessed 6/11/13).
*Erosion represents costs to the farmers. These costs include lost fertilizer and soil carbon. Erosion also produces costs to society borne by taxpayers. These costs are “external“ to the decisions made by the farmer. This paper estimates the costs of erosion to the land owner.*

 **(5) Economic Measures of Soil Conservation Benefits: Regional Values for Policy Assessment. September 2008. LeRoy Hansen and Marc Ribaudo. Economic Research Service (USDA-ERS).**[www.ers.usda.gov/media/196118/tb1922.pdf](http://www.ers.usda.gov/media/196118/tb1922.pdf)

*This report describes data and methodologies that the Economic Research Service uses to apply monetary values to changes in soil erosion. Values and methodology are clearly described so that analysts can apply the data to specific soil conservation projects.*

**Further Resources:**

**A Landowner’s Guide to Prairie Conservation Strips:** Leopold Center for Sustainable Agriculture [www.leopold.iastate.edu/sites/default/files/pubs-and-papers/2012-08-landowners-guide-prairie-conservation-strips.pdf](http://www.leopold.iastate.edu/sites/default/files/pubs-and-papers/2012-08-landowners-guide-prairie-conservation-strips.pdf)

*Prairie conservation strips are a tool for improving the function and integrity of row-cropped farms. Strategically planting small patches and strips of native prairie in farmland provides multifunctional benefits disproportional to the amount of land converted. In other words, small patches make a big difference.*

**Farmlands and Wildlife:** Penn State College of Agricultural Sciences <http://pubs.cas.psu.edu/FreePubs/pdfs/agrs104.pdf>

*This manual is written to emphasize the importance of agriculture in maintaining habitat for wildlife. It is also meant as a guide to farmland wildlife, habitat management methods and their benefits, methods of wildlife damage control, sources of financial assistance for habitat projects, and additional educational resources.*

**Organic Certification**

Any – or all – of the practices in this publication can be part of an organic farm operation. The important aspects of crop rotations, soil-fertility management, cover crops, and water-quality management are all mandatory for an organic farmer.

What makes a farm organic – and allows the farmer to receive price premiums (sometimes substantial) for farm products in the marketplace – is the use of production practices specified by the requirements of the USDA’s National Organic Program. By following these regulations and undergoing an annual inspection by a certified inspector, farmers can achieve organic certification.

A new farmer may be excited about the possibility of creating a certified organic operation, but certification brings costs in the form of investments and complying with regulations, as well as rewards.

One of the most daunting costs is the three-year transition period usually required before the land can be certified. The transition period is probably the most difficult time for a producer to be profitable because she or he has to spend a lot time creating a land-use plan and interacting with the certifying agency. Converting cropland to an organic management system can cause unexpected challenges in the form of disease, insect, and weed pressure if chemical methods of controlling those are suddenly withdrawn. Eventually the system re-balances and those problems diminish, but that’s why there is a three-year transition period: it takes some time to work out the system. An organic farmer can’t access the organic price premiums during that transition period, so for that period there are the higher production costs but not the higher returns.

If part of the legacy that you want for your land is to have it farmed organically, then it is important that your farm transition plan recognizes the particular challenges of organic agriculture. It is very difficult for an organic farmer to deal with an annual cash rent situation or a short-term lease, because of the large investment of money, labor, and management they need to make to transition acres to certified organic production. Organic farmers typically need a lease term even longer than the five years required by some conservation programs. They also would greatly benefit from a “stepped rent” arrangement with lower payments in the first few years. In a sale arrangement, lower payments in the first few years would be beneficial for giving the farmer the “breathing room” needed to complete the three-year organic transition period and become profitable. Many farms have successfully made the organic transition – almost 18,000 farming operations in the United States are currently certified organic. Wisconsin is home to more than 1,000 certified organic producers. Minnesota, Iowa, and Ohio each have nearly as many. It can be done.

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| **Organic Certification** |
| **Qualitative** **Benefits** | **Cost of Implementation of the Practice** | **Monetary Benefits Per Acre** | **Your Judgment: Value Per Acre of This Practice on Your Land**  |
| Reduces pesticide and herbicide use (1)Improves water and soil quality (1)Reduces soil erosion (1)Reduces nitrogen and phosphorus runoff (1)Improves wildlife habitats (1) | Management effortsOrganic certification costs of $750-$2,000 per year, depending on certifying agency (2)Costs for certified seeds and fertilizers can be double those of conventional products (2)Plowdowns of cover crops can cost $ 50 per acre per year (3)Loss of income from cash crop approximately $300/acre/year, possibly less depending on profit from organic crop. Refer to the text box on **page ?** | Price premiums for all crops sold vary between 20% and 100% (2)Avoided costs of synthetic fertilizers and pesticides up to $140 per acre per year (4)$10.50/acre/year fertilizer value of soil saved by eliminating 5 tons/acre/year of soil erosion; cumulative over years; see Value of Saving Soil text box on page 6 (5,6)$24.65/acre/year water quality value of soil saved by eliminating 5 tons/acre/year of soil erosion (5,6). This is a benefit to society, not directly to the landowner. |  |

References:

**(1) Organic Risk Management: Rotation:** University of Minnesota

 [www.organicriskmanagement.umn.edu/rotation2.html](http://www.organicriskmanagement.umn.edu/rotation2.html)

*This online manual is intended as a guide for organic and transitioning producers in the Upper Midwest. This manual covers a wide range of production topics that are relevant to organic farmers.*

**(2) Guide for Organic Crop Producers: ATTRA and USDA NOP**

<https://attra.ncat.org/attra-pub/summaries/summary.php?pub=67>

*New farmers, as well as farmers experienced in conventional agriculture, often find that obtaining organic certification for their crops is quite challenging. This guide is intended to help lead farmers through the organic certification process.*

**(3) Ag Decision Maker, Whole Farm Decision Tools:** Iowa State Extension

[www.extension.iastate.edu/agdm/decisionaids.html](http://www.extension.iastate.edu/agdm/decisionaids.html)

*This online toolbox created by Iowa State Extension helps farmers answer hundreds of “what if” questions about their operations and about possible new enterprises. Worksheets are available to evaluate production decisions, marketing decisions, machinery questions, etc.*

**(4) Energy and Economic Returns by Crop Rotation:** Iowa State Extension [www.extension.iastate.edu/agdm/crops/html/a1-90.html](http://www.extension.iastate.edu/agdm/crops/html/a1-90.html)

*This study focuses on the energy use and economic returns of three different crop rotations. The choice of rotation depends on many factors. When considering profitability and energy consumption, including a third or fourth crop may be a viable option for some operations. Other benefits might include an outlet for excess manure, reduced erosion, increased soil health, and improved pest management.*

(4)**Value of Soil Erosion to the Land Owner**. August, 2012. Mike Duffy, Iowa State University Extension. [www.extension.iastate.edu/agdm/crops/html/a1-75.html](http://www.extension.iastate.edu/agdm/crops/html/a1-75.html) (accessed 6/11/13).
*Erosion represents costs to the farmers. These costs include lost fertilizer and soil carbon. Erosion also produces costs to society borne by taxpayers. These costs are “external“ to the decisions made by the farmer. This paper estimates the costs of erosion to the land owner.*

 **(5) Economic Measures of Soil Conservation Benefits: Regional Values for Policy Assessment. September 2008. LeRoy Hansen and Marc Ribaudo. Economic Research Service (USDA-ERS).**[www.ers.usda.gov/media/196118/tb1922.pdf](http://www.ers.usda.gov/media/196118/tb1922.pdf)

*This report describes data and methodologies that the Economic Research Service uses to apply monetary values to changes in soil erosion. Values and methodology are clearly described so that analysts can apply the data to specific soil conservation projects.*

**Further Resources:**

**Guide for Organic Livestock Producers**

<https://attra.ncat.org/attra-pub/summaries/summary.php?pub=154>

*This guide is an overview of the process of becoming certified organic. It is designed to explain the USDA organic regulations as they apply to livestock producers.*

**Organic System Plan Template for Crops and Livestock:** ATTRA

<https://attra.ncat.org/attra-pub/summaries/summary.php?pub=359>

*The forms in this package are provided as tools that farmers can use for documenting practices, inputs, and activities to demonstrate compliance with regulations or to assist in other aspects of farm record keeping.*

**Organic Crop Production Overview:** ATTRA

 <https://attra.ncat.org/attra-pub/summaries/summary.php?pub=66>

*This guide provides an overview of the key concepts and practices of certified organic crop production. It also presents perspectives on many of the notions, myths, and issues that have become associated with organic agriculture over time. A guide to useful ATTRA resources and to several non-ATTRA publications is provided.*

**Nutrient Management in Organic Small Grains:** ATTRA

 <https://attra.ncat.org/attra-pub/summaries/summary.php?pub=384>

*This publication provides information on sources of fertility for organic small grains that are acceptable according to the National Organic Program standards.*

**Soil Management: National Organic Program Regulations:** ATTRA

<https://attra.ncat.org/attra-pub/summaries/summary.php?pub=180>

*The National Organic Program Rule, §205.203, Soil Fertility and Crop Nutrient Management Practice Standard, does not define specific land practices that producers must use. But it does identify general soil management and environmental protection objectives. This publication provides management guidelines for meeting, and measurable parameters for monitoring, these objectives.*

**USDA National Organics Program**

[www.ams.usda.gov/AMSv1.0/NOPNationalOrganicProgramHome](http://www.ams.usda.gov/AMSv1.0/NOPNationalOrganicProgramHome)

*The internal pages of the National Organics Program website give detailed descriptions of every aspect of the Program. Most sections have a FAQ sheet and there are numerous Fact Sheets that address specific topics about the NOP.*

**Conclusion**

All these sustainable practices overlap and can become parts of one overall farm-management philosophy. These practices come together to help optimize the health of soils, water resources, crops, animals, farm families, and communities. And this includes the *economic* health of farm families and their communities.

Even though you may no longer be farming in the near future, you can help guarantee that the new operators will be successful financially while incorporating sustainable agriculture practices into their operation. You may need to consider creative financing options like variable rent payments to allow for reduced incomes in the first years of transition to the new operators.

You may want to investigate some of the options mentioned in this publication’s companion piece “Conservation Financing,” such as deed restrictions and covenants, agricultural conservation easements and irrevocable trusts. But if you are truly interested in promoting sustainable agriculture and land conservation as your operation changes hands, you probably need to talk to other landowners and legal advisors about finance. There are many ways to leave your legacy of being a great steward of your land to the next generation, whether the new owners are part of your family or not. You can do this.

**APPENDIX 1: Sources of Enterprise Budgets for Midwestern States**

Illinois

<http://web.extension.illinois.edu/iidea/resource/financing.htm>

Indiana

<https://ag.purdue.edu/agecon/Pages/default.aspx>

Iowa

[www.extension.iastate.edu/agdm/cdfirst.html](http://www.extension.iastate.edu/agdm/cdfirst.html)

Kansas <http://search.ksre.ksu.edu/index.htm?qt=CORN+ENTERPRISE+BUDGETS&site=http%3A%2F%2Fwww.ksre.ksu.edu%2Fp.aspx%3Ftabid%3D124>

Michigan

<http://fieldcrop.msu.edu/>

Minnesota

[www1.extension.umn.edu/agriculture/corn/](http://www1.extension.umn.edu/agriculture/corn/)

[www.soybeans.umn.edu/home.htm](http://www.soybeans.umn.edu/home.htm)

Missouri

[www.fapri.missouri.edu/farmers\_corner/budgets/](http://www.fapri.missouri.edu/farmers_corner/budgets/)

Nebraska

<http://www1.unl.edu/search/?q=enterprise+budgets&submit=Go&u=http%3A%2F%2Fwww.extension.unl.edu%2F>

North Dakota

[www.ag.ndsu.edu/ndsuag/gsearch?cx=018281009562415871852%3Ajpqauwrs0sa&cof=FORID%3A10&ie=UTF-8&q=enterprise+budgets&sa=+&siteurl=www.ag.ndsu.edu%2Fndsuag%2Fcrops%2Feconomics&ref=www.ag.ndsu.edu%2Fndsuag%2Fcrops&ss=176j30976j2](http://www.ag.ndsu.edu/ndsuag/gsearch?cx=018281009562415871852%3Ajpqauwrs0sa&cof=FORID%3A10&ie=UTF-8&q=enterprise+budgets&sa=+&siteurl=www.ag.ndsu.edu%2Fndsuag%2Fcrops%2Feconomics&ref=www.ag.ndsu.edu%2Fndsuag%2Fcrops&ss=176j30976j2)

Ohio

<http://aede.osu.edu/research/osu-farm-management/enterprise-budgets>

South Dakota

[http://igrow.org/search/CORN+PROFITABILITY/?q=CORN+PROFITABILITY](http://igrow.org/search/CORN%2BPROFITABILITY/?q=CORN+PROFITABILITY)

Wisconsin

<http://corn.agronomy.wisc.edu/Season/DSS.aspx>

 **Worksheet options:**

**PUTTING IT ALL TOGETHER!**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sustainable Practice** | **Acreage estimated for this practice (refer to map)** | **Annual net benefit or net cost due to this practice, per acre** | **Acres x Net Value (or Cost) from practice** | **Total whole-farm net value (or cost) of implementing the practice** |
| Crop Rotation |  |  |  |  |
| Manure Application |  |  |  |  |
| Cover Crops |  |  |  |  |
| Trees (agroforestry) |  |  |  |  |
| Wetland Restoration |  |  |  |  |
| Alternative Crops |  |  |  |  |
| Perennial forages/grazing |  |  |  |  |
| Pollinator/beneficial insect habitat |  |  |  |  |
| Wildlife habitat mgmt. |  |  |  |  |
| Organic Certification |  |  |  |  |
| TOTALS |  |  |  |  |

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| --- |
| **Sustainable Practice \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| Practice and location on land | Individual Monetary Costs | Total Monetary Costs | Individual Monetary Benefits | Total Monetary Benefits |
|  | Year 1Cost \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Cost \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Cost \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Year 1 | Year 1Benefit \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Benefit \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Benefit \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Year 1 |
|  | Year 2Cost \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Cost \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Cost \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Year 2 | Year 2Benefit \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Benefit \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Benefit \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Year 2 |
|  | Year 5Cost \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Cost \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Cost \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Year 5 | Year 5Benefit \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Benefit \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Benefit \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  | Year 5 |
|  | Year 10Cost \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Cost \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Cost \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Year 10 | Year 10Benefit \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Benefit \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Benefit \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  | Year 10 |
| By subtracting the annual costs from the annual benefits, the operator can track the monetary effect of each sustainable practice.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Anticipated Non-Monetary Benefits to Land and Operation After 10 Years: |

|  |
| --- |
| **Sustainable Agriculture Practice:** |
| Added Income Practice Would Bring  | Added Costs Practice Would Bring |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
| Reduced Costs Practice Would Bring | Reduced Income Practice Would Bring |
|  |  |
|  |  |
|  |  |
|  |  |
| Subtotal | Subtotal |
| Net Change: (Subtract subtotal of right-hand column from subtotal of left-hand column |
| Anticipated Non-Monetary Benefits to Land and Operation After 10 Years: |