

**PROCEEDINGS: Leadership in Midwest Watersheds #7**  
**Economic Drivers in Agriculture and Watershed Management**  
**November 1-2, 2016: Dubuque, Iowa**  
Compiled by American Farmland Trust

**LEADERSHIP FOR MIDWESTERN WATERSHEDS**

Since 2011, Leadership for Midwestern Watersheds (LMW) has brought together watershed project directors and other stakeholders to compare notes and share lessons learned about watershed projects. Sand County Foundation, American Farmland Trust, Iowa Soybean Association and the North Central Region Water Network sponsor the LMW meetings to encourage the exchange of information and improve the performance of watershed projects in the Midwest. Funding for LMW comes from a variety of sources but the organizers would particularly like to recognize The McKnight Foundation as a core funder for these important gatherings.

A longer-term objective of LMW is to develop a “community of practice”—a group of conservation practitioners who know how to improve water quality through projects applied at a watershed scale. LMW meetings focus on specific subjects essential to successful watershed projects, using formal presentations to support the facilitated discussions that form the core of the meetings. Subjects addressed have included farmer engagement, targeting conservation practices for greatest impact, measuring results, project governance and scaling up lessons learned.

**EXECUTIVE SUMMARY**

***Overview:** The seventh Leadership for Midwestern Watersheds meeting focused on why it is important to factor in economics when working in watersheds and practical ways to do this. Following a short course in farm economics, the participants were presented with the persuasive business case in Wisconsin for point sources and nonpoint sources work together to adaptively manage and improve water quality. They then broke into small discussion groups to discuss economic conditions that facilitate or impede progress and how they were reacting to economic conditions in their watersheds. In the afternoon, the participants learned that environmental performance may not necessarily compete with economic performance and then had the opportunity to hear more about five tools that can help landowners and producers make decisions in watersheds (conservation cropping systems calculator, cover crop economics tool, collaborative GeoDesign tool, Profit Zone Manager and the USDA NRCS Resource Stewardship Evaluation Tool). A facilitated discussion about the tools followed. On the second day, the participants were introduced to the idea of incorporating economic efficiency into watershed planning and outlining investment opportunities for funders and farmers—an approach that resonates with the key stakeholders in a watershed. The participants then heard about how economic development can sometimes drive agricultural conservation and open doors to scalable solutions. A facilitated discussion about how economics was being incorporated into planning and implementation and how to better*

*do this in the future followed. Mark Rose, USDA NRCS, presented a short update on Agency activities and the participants were introduced to the on-going work in the Catfish Creek and Bee Branch watersheds in the urban/rural watershed around Dubuque (an optional tour followed). Finally, the participants discussed next steps for the LMW.*

### **Key take-home messages**

**Farmers may need to control their production costs for decades:** Commodity crop markets go through fairly steady 30 to 40 year cycles. The increase in world trade and energy costs in the early 1970s more than doubled the price of corn, soybean and wheat so farmers put more land into production. They were then in a break-even market for about 30 years until the next demand driver emerged (ethanol). The same pattern plays out around the world—as production ramps higher and supplies pile up, prices fall. The livestock industry is experiencing similar swings. To break even, farmers need to control their production costs. Net farm income has gone from record highs in 2011 and 2013 to levels we haven't seen in 12 or so years. Land values are tied to farm income and although there is a lag relationship, they are now declining as well. Although farmers have built up working capital over a number of years, they are now drawing down on that capital. The average working capital on 316 farms in Iowa shows 22 percent are in a vulnerable situation (debt to asset ratio) and 47 percent are cautionary. On leased lands, some tenants will walk away and some landowners will hold out for higher cash rents. For conservation, farm economics may generate more interest in retiring marginal lands and/or in improving soil health to lower input costs and maintain yields.

**There may be ways to merge economic and environmental performance:** Precision agricultural maps that show subfield variations in soils and yields are consistently showing that 5 percent to 20 percent of every field is not profitable. AgSolver considers every acre a unique production facility and uses their web-based Profit Zone Manager to identify the areas where poor business performance and primary environmental resource concerns intersect. This can establish an economic motivation to adopt conservation practices. By taking underperforming land out of production or managing it more carefully, the farmer may produce fewer bushels but achieve a higher return on investment along with improved environmental quality.

**We can use tools to factor economics into discussions:** The *Conservation Cropping Systems calculator* is an excel-based tool that can compare crop rotations (up to 6 years in length). It was developed to use in the Minnesota Chippewa 10 percent project. The *Cover Crop Economics Tool* is also an excel-based tool that captures the costs and benefits that are expected from adding cover crops to the farm operation. The *Collaborative GeoDesign tool* helps stakeholders work through multiple iterations of landscapes designs that could meet future demand for biomass crops in a watershed. The *Profit Zone Manager* is a web-based tool that supports Precision Business Planning for farm fields. It uses available precision agriculture data and streamlined crop budgets to identify zones with different profit potential. The USDA NRCS *Resource Stewardship Evaluation tool* evaluates an operation's current management and conservation

activities by comparing impacts on soil management, water quality, water quantity, air quality and wildlife habitat to the desirable stewardship thresholds. Although not spotlighted in the workshop, participants also mentioned the *Agricultural Conservation Planning Framework* (see <http://northcentralwater.org/acpf/>) that identifies potential sites in watersheds that can use more conservation practices.

**We should think about Incorporating economic efficiency and language into watershed planning:** Watershed plans can be used to create a water quality investment prospectus. This “prospectus” can state the goal (vision about the watershed in 30 years), investment strategy, risks (e.g. weather—we have the science), how we’re going to manage the investment (e.g. handling the 25 percent turn-over rate on watershed managers), how investors buy in (grants, other funding sources), the performance (monitoring, mapping and modeling to track progress over time) and management fees (what it costs to do these projects). If we are expected to manage multi-million (and billion) dollar assets, we should HAVE A PLAN.

**Leadership for Midwestern Watersheds:  
Economic Drivers in Agriculture and Watershed Management  
November 1-2, 2016  
Grand Harbor Resort, Dubuque, Iowa**

**NOVEMBER 1**

- 8:30 a.m. Registration and Continental Breakfast**
- 9:00 a.m. Welcome & Charge** Joseph Britt, Sand County Foundation
- LMW Charge: To advance toward success in improving water quality in the context of a healthy farm economy, through communications among watershed project leaders.
  - Meeting Charge: To learn about 1) economic drivers in agriculture and watershed management and 2) tools and resources for watershed projects to incorporate economic factors into watershed planning and implementation. Goal: At end of second day – have a good understanding of what tools are available and know about 2-3 that they may look into more at home.
- 9:15 a.m. Introductions**
- 9:45 a.m. Farm Economics 101** – Chad Hart, Iowa State University
- 10:30 a.m. The Business Case for the Yahara-WINs Phosphorus Adaptive Management Project** - Dave Taylor, Madison Metro Sewerage District
- 11:15 a.m. Break**
- 11:30 a.m. Facilitated Discussion**
- Have you incorporated economic factors into your watershed projects? If so, how?
  - Do you incorporate economic factors into your conversations about conservation with farmers? With other watershed stakeholders? If so, how? Has it helped or hindered your watershed projects?
- 12:15 p.m. Lunch**
- 1:15 p.m. Environmental vs. Economic Performance: are they really competing?**  
- Dave Muth, Vice President, AgSolver
- 2:00 p.m. The Resource Stewardship Evaluation Tool** (Marty Adkins, Iowa Assistant State Conservationist, NRCS)
- 2:30 p.m. Break**
- 2:45 p.m. Tools breakout groups**
- Cover crop economics tool (NRCS): Lauren Cartwright, Economist, NRCS-Missouri

- Conservation Cropping Calculator: Rebecca Wasserman-Olin, Land Stewardship Project
- NRCS Resource Stewardship Evaluation: Marty Adkins
- GeoDesign tool for watershed scale planning: Karen Galles, Great River Greening/Nicollet County SWCD
- Profit Zone Manager: David Muth, AgSolver

**3:30 p.m. Tools breakout groups** (repeat, with different people at each tool)

**4:15 p.m. Facilitated Discussion on tools**  
Ease of use.  
What is each tool useful for?  
How would these tools be used in a watershed context?  
Are these tools likely to be widely used by farmers?  
How can they be better? What tools have we not discussed?

**4:45 p.m. Wrap-up and Dinner Logistics**

**6:00 p.m. Optional Group Dinner**, location TBA

## **NOVEMBER 2**

**7:30 a.m. Continental Breakfast**

**7:45 a.m. Welcome** and come to order

**8:00 a.m. Incorporating Economic Efficiency into Watershed Planning** – Adam Kiel, Iowa Soybean Association

**8:45 a.m. Using economic development strategies to improve water quality** – Karen Galles, Great River Greening/Nicollet County SWCD

**9:30 a.m. Facilitated Discussion + Q&A**

**10:00 a.m. Break**

**10:15 a.m. Agency updates**  
Mark Rose, Director of Financial Assistance Programs, NRCS

**10:45 a.m. Next steps for LMW**

**11:15 a.m. City of Dubuque watershed projects**

**12:00 p.m. Lunch and Adjourn**

**1:00 – 3:00 Optional afternoon tour of Bee’s Branch watershed project, Dubuque**

### **WELCOME AND CHARGE (Joe Britt, Sand County Foundation)**

We started Leadership for Midwestern Watersheds (LMW) in 2011 with the objective of advancing water quality through advancing communications between watershed management leaders. Sand County Foundation is devoted to applying a land ethic (as expressed by Aldo Leopold). They want to reduce the impact of downstream agriculture and maintain and improve soil health to make sure productivity stays intact into the future. Farmers need to incorporate conservation into their business plans. This meeting will focus on the economics both at the field and farm scale. We'll see demonstrations of on-farm software and we'll have a presentation on farm economics 101 and a watershed scale demonstration of economics. We'll go further into this tomorrow and at the end we'll be looking at a watershed action plan in action here in Dubuque.

### **Introductions**

Participants shared their names and affiliations. Rebecca reminded everyone that we have talented speakers but everyone will have the opportunity to have their own conversations and share their knowledge with their colleagues.

### **Farm Economics 101: Chad Hart, Iowa State University**

Understanding the farm business and where farmers are coming from: e.g. Iowa's economy: 7 percent of the economy is production agriculture (Illinois is less than 3 percent). Most people think it is a lot larger. But agriculture touches a lot of other industries (e.g. manufacturing, government, etc. so that 20 percent to 25 percent of the Iowa economy is related to agriculture and food).

The supply side of agriculture includes area planted, yield, production, beginning stocks, imports and total supply. The demand side includes feed and residue, ethanol, food, seed and other exports, total use, other, ending stocks and season-average price.

The ag economy has been on a rollercoaster ride the last few years. The long-term pattern is reflecting the change in the use of our crops. The ramp up of the ethanol industry created tremendous demand (2005-2011), creating the incentive for producers to plant corn. In the last three to four years, the demand stabilized but the supply pressure continued to grow so supply started outrunning demand. Agriculture tends to go through cycles. Within the crop markets, we see a fairly steady 40-year cycle and typically it is the demand sector that changes. It was the run in the early 1970s that kicked off the present cycle of corn, soybean and wheat production. It was driven by exports (increase in world trade) and energy costs. This more than doubled prices (1972-1975) so farmers put more land into production. Farmers saw themselves in a break-even world for the next 30 years when the next demand driver emerged (ethanol). The average return on corn is pretty thin and in 2017 will be zero. The long-term profitability in a competitive industry is zero. As more people grow more corn, the

supply grows and the profit margin collapses. Farmers tend to overshoot. Now farmers are trying to get their costs down, there is some consolidation and some farmers are getting out of corn. They can only control their costs and they may have to do this for the next 30 years. In most of the ag markets, we saw the high prices in 2007-2012 expand the acreage (the drought in 2012 did reduce yields) but our production side has now exceeded the demand with prices going from \$6.89/bu in 2012 to \$3.25/bu in 2016. Corn yields hit record highs in the Corn Belt in 2016, especially soybeans. Farmers love to see the productivity and high yields but they drive down prices.

We're also seeing the world over the last three years setting records as far as corn production. We see expansion in Argentina and Brazil. China is the second largest producer of corn (90 million acres) with average size farms of two to three acres (animal plowed, air picked, hand dried) and their yields are about 2/3rds of the United States (224 billion bushels versus 348 billion bushels in the United States). In the Ukraine (the bread basket of the former Soviet Union) producers have switched from wheat to corn and soybean (same pattern in North Dakota). This all plays out in a plunge of prices as production ramps higher and supplies pile up.

The economics of the livestock industry also is experiencing huge swings. Hog margins (return on animal) are fluctuating every month, and some months they aren't even covering the costs of feed let alone all of the other costs of raising livestock. If they can get through the next six months, they may see better prices. It is the same for cattle (crush margin).

Farm production costs peaked in 2014 and are now declining. Farmers are using lower cost feed, lower cost seeds, less fertilizer and letting land that they are renting go. Farmers have to raise crops in order to gain income but crop margins have been mainly negative between 2015-2016 except for a small blip. A lot of farmers are losing money. The only thing that is helping them is extra productivity (producing more bushels out of each acre). Net farm income has gone from record levels in 2011 and 2013 to levels we haven't seen in 12 or so years. Farmers with the record level income bought equipment and land. Many farmers have second homes. In fact, farmers come in second in occupations likely to own second homes.

In Iowa, the working capital for farmers built up over a number of years and now is being drawn down (60 percent reduction). Profit margins have gone to negative numbers. The average working capital on 316 farms in Iowa dropped by \$90,000 during 2016. Now, 22 percent are vulnerable (debt to asset ratio), 47 percent are cautionary and only 41 percent are strong. Farms that flip tenants (most annual leases expire on March 1) are an indication of the financial stress.

Land values have declined as well. The values are tied to farm income but there is a lag relationship. As farm incomes rise, it takes a few years for the land markets to follow. They reached their peak in 2013 and crop prices were already falling. So now the asset

base is becoming less and less as well. Most of the counties in Iowa have decreasing land values except for those experiencing urban pressures. Land values are holding in areas with dairy production, reflecting the income that is still coming in.

As farmers look at how to use their land, we continue to see producers look at different production practices (e.g. cover crops). Along Highway 20 three years ago, there were no cover crops but now we're starting to see them in several fields. Farmers are realizing that economics aren't the only factor. They are now willing to investigate and try new things, particularly younger producers.

### **Q&A**

**Q:** What about the farm subsidies? How's that working?

**A:** Ag policy is a mixture of what happened in the past and the most important thing for ag producers now is crop insurance. Crop insurance is a very unique public-private partnership run by the federal government through private insurance companies. It doesn't take a complete crop failure. Most farmers bring in their production records over the past 10 years and they insure a percentage of that (50 percent to 75 percent). About 85 percent to 90 percent of producers use crop insurance. Producers also have Agriculture Risk Coverage (ACR is a county-wide government payment scheme. If prices drop throughout the county, everyone gets a payment that has worked well in some areas, not in other areas depending on the county average yield). Government payments are helping fill in some of the losses but don't totally offset them.

**Q:** How do farmers value their time? Do they factor it in?

**A:** Farmers tend to undervalue their time and underestimate the amount of time they need. They look at their time as just what they need to do to survive (sweat equity). Through the 1980s, that's how farmers survived.

**Q:** Have you studied what farmers do with extra money? What about their pension for investing in conservation with extra income?

**A:** There is a lot of diversity. Over the last five years, it has probably gone towards the production side (machinery, land). Some went into the family (e.g. boats, campers). But some is going into conservation practices as well (e.g. cover crops). More established farmers are getting ready to transition to the next phase of life. We're trying to figure out what will happen with land transition.

**Q:** Can you explain tenant flipping?

**A:** When you get rising prices, the landowner is happy and the tenant is happy but we're now seeing some tenants willing to walk away from rental land and we are also

seeing some landowners holding out for a higher cash rent. We'll see this play out over the next year or so as they are working the price structure down.

Q: What about the Conservation Reserve Program (CRP)? What happens?

A: CRP started in 1986, reached a peak seven to eight years ago and was capped at 24 million acres by 2017 due to the 2008 Farm Bill. It would have been more stable had we held at 39 million acres for the CRP. A lot of the CRP land came back into production, particularly corn and soybean. CRP could take care of some of the excess land but the problem is the federal budget. Farm groups would probably like to bring the cap up but don't want to take the money from somewhere else.

Q: Isn't there a good opportunity to spread CRP more widely? For example, we could use AgSolver software to take maybe 10 percent of the field out of production.

A: The more targeted we can be with CRP, the better. Some of the land that was in CRP was really not marginal land but it went in because it could. We can now bring more precision to agriculture. We can consider fields and be more prescriptive as to how to manage the farm. We now have more information that can help producers make more informed decisions.

**The Business Case for the Yahara-WINs Phosphorus Adaptive Management Project:  
Dave Taylor, Madison Metro Sewerage District**

Dave is from a wastewater treatment plant. They have a unique project in Dane County, Wisconsin. They have brought nontraditional partners and funding into the watershed to address not just ag runoff but also discharges from treatment plants and stormwater runoff. Adaptive management in Wisconsin has a unique meaning. The Madison Metro Sewerage District (MMSD) is a regional facility that covers 142 jurisdictions (182 square miles). It can handle up to 50 million gallons/day. They only deal with the sanitary portion, not the municipal stormwater. Most of their service is in one watershed (Yahara) around three big lakes. They have two discharge locations—the first is in the Yahara watershed (80 percent of flow), the other in the Sugar watershed.

Wisconsin has set stringent P surface water criterion (streams are 75 ug/l; rivers are 100 ug/l and lakes are 15 to 40 ug/l.). They also have basin and multi-basin TMDLs (Rock River, Wisconsin River, Wolf and Green Bay area). It is an uneven regulatory framework and there are high compliance costs for point sources. This drives wastewater treatment plants to look for innovative solutions. The three major buckets of P discharges are treatment plants (WPDES permits), urban runoff (MS4's and others—also WPDES permits) and agriculture (no WPDES permits). Treatment plants have a nine-year compliance schedule while urban sources are open-ended.

They are located in the Rock River Basin in the Yahara watershed (540 square miles) with 25 MS4s facing P reduction requirements, seven point sources (including a fish

hatchery) and lots of agriculture. The watershed objective requires a 106,000 lb/year reduction of P.

Traditional compliance consists of independent actions and discharge-focused solutions. These can be expensive, have differing timelines and are unlikely to meet water quality objectives. P treatment is very expensive. The wastewater treatment plant has already installed the more inexpensive treatment options and is looking at a \$140 million investment over the next 30 years (\$224 million accounting for inflation over the same period). These would be very resource intensive and complex technologies and the P reduction benefits accrue to a limited portion of the watershed because of where their discharge outlets are.

Adaptive management is *“an alternative and codified regulatory compliance strategy. Point and nonpoint sources work together and fund the least cost mix of P reduction practices.”* This allows for creative and flexible strategies. This means lower cost regulatory compliance for all participants. There is a 10-fold difference in cost between adaptive management and the traditional approaches.

They now have traditional treatment or control, including water quality trading (WQT applies a trade ratio because it has different end point than adaptive management because it is just an offset) and adaptive management (has specific end point of better water quality). They developed a pilot project in the Yahara watershed. MMSD took the lead over four years at \$3 million with 30+ partners. The portion they are working in has lots of dairy operations and is a major source of P. They used a MOU to bring together the partners who agreed to contribute financially in relation to the amount of P they were contributing (cities, villages, towns, and others including USGS, WDNR, Sand County, Clean Wisconsin, Yahara Pride Farm Group, etc.). They warned participants that there was so much P in the system that they wouldn't see improvements within the four years. The cities of Madison and Storm Prairie did not participate.

Most of the wastewater MMSD costs were passed on to customer communities. There were also stormwater costs for MS4's (two cost centers). They were able to calculate the annual savings based on adaptive management versus traditional treatment costs and make the business case to most of the potential partners. They also calculated the potential stormwater savings in adaptive management.

On the farm side, they explained that this was a locally led conservation effort, that practices would be resource driven, not program driven, that they could focus on soil health and profitability and that they could demonstrate that they were doing their fair share. They looked at a lot of evaluation criteria during the pilot project. They invested in strip tillage, harvestable buffers cover crops, low disturbance manure injection, etc. On the urban side, they invested in construction site inspection, conversion of farmland, stormwater management and leaf collection.

They used four USGS gaging stations that helped determine baseline and they funded volunteer citizen water collection efforts. They also looked at nitrogen and soil sediment. They also built capacity for a full project. The pilot project ended in 2015. They decided to move forward with a full scale adaptive management project over the entire watershed to achieve TMDL compliance of P from all sources (\$104 million over 20 years) distributed over all participants.

2016 is a transition year and the full-scale project starts in 2017. They have moved from a MOU to a more formal inter-government agreement with an adaptive management plan. The intergovernmental agreement is a 20-year agreement with off ramps for participants every five years and the IGA also allows for partial “buy-in” (e.g. city of Madison). A couple of towns signed separate MOUs because they had already met their TMLD obligations but decided to still contribute financially to the project. Sand County Foundation contributed \$250,000 over four years to get the water quality monitoring framework up and running. Also, the Clean Lakes Alliance (businesses in the areas) is contributing dollars for education and outreach. They have a long-term service agreement with the Dane County Conservation District. They provide implementation assistance. This is a pay for performance agreement (2/3’s are fixed costs, 1/3 are payments for meeting targets). They are also eying other potential service agreements with other entities. The adaptive management project brings all the players together, minimizes finger pointing, focuses on least cost mix approach and is likely the only way they will ever meet water quality goals at scale.

#### **Q&A**

Q: Are you just buying the low hanging fruit? Do you have any guarantee that this will get you what you need?

A: They did look at what would happen if they went 10 years and then found out it wouldn’t work. People get fixated on cost/lb. But these are just average costs. If they are going to be successful, they have to invest across the spectrum. They have cover crops (\$40/yr). They are also harvesting P and exporting about 100,000 lbs/year (not low cost).

Q: So you think you can meet the watershed needs without building expensive treatment?

A: Yes, but we still have chloride, pharmaceuticals, etc. that we have to treat. Our other watershed does not have a TMDL so we may do something different for this watershed.

Q: Under urban practices, you had purchase of agricultural lands. That doesn’t make sense.

A: This was farmland that was purchased and converted to prairie. We are also working with producers to put harvestable buffers along streams.

Q: How are you sure that what you are buying is going to be there long term?

A: Harvestable buffers are a good example. We started out with a five-year agreement and then added a 10-year agreement and a 15-year agreement. They do have a shelf life so we will have to track. We'll have to maintain a checkbook and when practices come out, we'll have to bring in new practices to meet that reduction. We are also trying to remove legacy sediment from streams.

Q: What model are you using to estimate P reductions achieved?

A: The Phosphorus index.

Q: What is the size of the pilot sub-basin and how soon do you expect instream changes at the USGS monitoring station?

A: We measured instream improvements after the three years of conservation implementation.

### **Discussion**

What are economic conditions that facilitate or impede progress?

What are you doing related to these economic conditions in your watersheds?

Note: From our table conversation with NRCS): we're seeing a mix of conservation practices changes with price of corn/soybeans—the higher priced treatment technologies are less popular, soil health practices may become more attractive. Farmers really want consistent prices and right now they aren't sure where things are going so they are being really conservative making decisions about what they should invest in. Farmers are now connecting to farmers who are further away (not competitors) on the Internet—particularly around economics. Farmers are also getting overwhelmed by information, both spatial information tied to soils (yields) and their own paper files. They used to meet in coffee shops and put pressure on each other (you are making me look bad) but now not so much. Risk sharing, recognition, equitable accountability are all important in watershed projects. You also need a key driver (like a point source).

### **Report out:**

Economic Conditions that facilitate farmer participation in watershed projects

- Cost-share opportunities (both private and public)
- Low prices might encourage farmer participation. Poor prices seem to create more openness to conservation. With really good prices, greed takes over
- Putting a value on sustainable production systems

- More conversation about conservation, more interest in marginal areas
- Technical assistance and information are very important
- Access to information about new practices, technologies especially from peers
- Need for consistent markets, being able to predict what is coming

Economic conditions that impede farmer participation in watershed projects

- Profit margins
- Expense and risk of trying something new and expense of new equipment
- Exposure of business plan to project area
- Mismatch between costs and benefits (downstream benefits)
- Farmers are price takers, can't internalize costs
- Thin profit margins (yields versus return on investments)
- Lack of land tenure
- Some structural watershed investments only occur when times are good

Economic conditions that facilitate progress towards watershed goals

- Community value on water resources (need to value water resources)
- Leveraging—put together everyone's resources
- Health of local or state government—but could also be an impediment
- System to quantify ecosystem benefits
- More information about costs/benefits
- Fear of regulation is a strong motivator
- Dollars to put into innovation

Economic conditions that impede progress towards watershed goals

- Retailer motivation (need to benefit)
- Commodity demand effects
- Age of infrastructure and lack of records for it

Activities that you are engaged in to influence economic conditions in the watersheds you work in

- Promoting healthy soil, lower input costs
- Helping inform farmers throughout the watershed
- Watershed planning process, getting money in and more boots on the ground
- Rotational grazing
- Tools like Agsolver
- Modeling N loss economics
- Supporting organic farmers
- Owner and tenant land agreements that promote conservation
- Doing acre-to-acre comparisons—whether practices are working or not
- Putting technical assistance and financial assistance into the watershed

## **Environmental versus Economic Performance: Are they really competing?**

**Dave Muth, AgSolver**

Problems agriculture faces:

- Cash flow problems: the basis for identifying long term asset value (e.g. 5 percent return on investment against a \$250/yr rent but this based on a five-year commodity price (\$5.33/bu corn. Against \$3.35/bu corn, the farmer is losing \$212.45/acre). If you look at lower prices, the vast majority of leased ground in Iowa alone (15 million acres) will lose money this year.
- Environmental performance issues: Des Moines waterworks, Iowa nutrient reduction strategy—over \$4 billion to implement.

Solutions: Precision business planning (some solutions in data, but also thinking about how they deploy their resources). Emerging ag information services are chaotic. The services being built right now focus on the agronomic compartment but the information they have can impact more than just that.

Precision ag maps show the subfield variation (yield, soils, etc.). They can also show business performance or profits. About 5 percent to 20 percent of every field is consistently not profitable. Farmers need to maximize the output per unit of input. Places where they are ineffective have higher loss factors. There are three kinds of zones in each field: 1) revenue zone—about 75 percent to 95 percent—makes sense to maximize yield and revenue; 2) no cost zone—won't generate enough revenue (doesn't make sense to keep spending funds here and farmer should look at alternative business plans); and, 3) expense-limited zones which tend to lead to higher losses (farmer needs to manage resources accordingly). Every acre is a unique production facility. If they can't make changes to make it profitable, they need to shut it down.

AgSolver delivers the information through a precision business planning workflow. It includes intelligence gathering, a business performance review, opportunity ratio analysis, negative return assessment, opportunity ratio business planning and in-season plan adjustments. This creates a working capital allocation plan. Farmers sometimes spend money to protect bushels without understanding the full costs. To do this they need precision ag information, information about cash flows. They can rank fields by profit or by return on investment (ROI). The areas that are losing profits can be enrolled in cost-share programs.

Opportunity ratios: farmers think about bushels and revenue but they need to look at production efficiency instead (which almost always improves environmental performance). For example, take a field where 23 percent of the field is not making money (= misallocated working capital). They can look at what is causing the problems (agronomic issues, land improvement issues—e.g. water) and working capital allocation issue (setting up the business). Solutions are in four categories (agronomic decisions; land improvement; precision management (cost containment) and alternative low cost revenue (includes cost-share).

The field example is 145 acres. They listed fields ranked by return on investment. Historically, the farmer had a 6 percent ROI. The 15 acres that are on a ridge aren't producing and will be taken out (equivalent of dry land farming in Kansas but they are in Iowa). He will produce fewer bushels from the field but will be more efficient overall (gaining \$6,000 while spending \$7,000 less). This will boost his ROI to 12 percent. He will produce fewer bushels but achieve both higher financial and environmental quality. They can also apply an environmental screen that usually shows that these negative producing acres also have a higher environmental impact (more leaching, soil erosion, loss of soil carbon, more carbon dioxide). They can show the positive environmental impacts of taking this land out of production (e.g. 10-20 ton dump trucks of top soil versus 3.5 dump trucks; soil carbon change is like taking 3.5 cars off the road). They can overlay profit and nitrate leaching. The increase in nitrate leaching is a symptom. With two to three million acres annually at an expected loss, over \$1 billion is misallocated working capital just in Iowa alone. In the Iowa lawsuit counties, the unprofitable acres were generating millions of pounds of nitrate per year.

#### **Q&A**

Q: Couldn't you argue right now that all acres are unprofitable?

A: Land that is owned and paid for is making money. Even on leased acres we can find areas that are profitable. We like to base these plans on five years of data.

Q: Have you worked with landowners who don't farm?

A: We have some farm managers who are using this process to meet their fiduciary responsibility to their customers (land owners). We find that it usually builds a stronger relationship. The landowners more quickly conceptualize how they can enhance their revenue by taking some of their land out of production (e.g. in South Dakota, the lessee and landowner agreed to take 35 acres out of production, put it in the CRP and the lessee agreed to pay more for the remaining land).

Q: What about phosphorus?

A: Same process. We look at resource concerns and how you deal with them. The "make more money" conversation gives them more traction for that conversation.

Q: How many landowners and farmers are thinking like this? How do we get more involved? Is there a policy angle?

A: Probably about less than 5 percent right now. In presentations, they lead with the financial information. We need to understand the diversity of production facilities and how we manage them. The women non-operating landowners are interesting. We call this active asset management. We think about soil health and long-term financial

management. They don't know how to take advantage of this but they think it holds promise.

Q: Where do you work? How can we evolve from yields to efficiency of production?

A: We work coast-to-coast but we work best where we have the best information (probably row crops). Most of their work is within the core Corn Belt region. They are getting some traction on the Delmarva Peninsula, Delta region, Southeast and Pacific Northwest. The profitability conversation works. Yield always wins but only if you can achieve it at the right cost structure. Their best sales right now come from bank loan officers who tell their customers they should go through the AgSolver analysis.

**The Resource Stewardship Evaluation Tool (RSET):**

**Marty Adkins, Iowa Assistant State Conservationist, NRCS**

This is a service (RSET) provided to producers that supports and enhances the conservation planning process. It uses geospatial data and the data that producers give them. It supports seven of the nine steps of NRCS conservation planning except for "Make decisions" (although it does help) and "Implement the Plan."

It identifies opportunities and helps landowners determine their objectives. It is an accounting tool. It takes stock of the particular environmental risks on a particular unit of land (climate, soils, land use around the area, etc.). Then it looks at the existing practices and whether they are mitigating those risks. It displays the summary information in a way that customers can understand it. They are trying to improve communication, recognize stewardship, empower producers, maximize conservation investments, encourage conservation improvements and encourage comprehensive planning. RSET can look at resource issues and resource criteria all at one time and recognize performance. The tool is intended to be conservative.

They've been piloting the tool. In one case the tenant farmer used RSET to address landowners' resource concerns so he could stay farming. The landowner (a canal district) agreed to a five-year lease so the lessee put in a hay crop. 2016 was the second year of pilot work with RSET. In 2015, they tested different parts of the tool in 15 states and the formatting display. They redid pasture during 2016 and 37 states participated in 2016. In 2017, they will be bringing in pasture, rangeland and forestry evaluation and extending it to all 50 states.

RSET is a web-based tool. It pulls information from the conservation planning database (conservation toolkit), inventories basic resource information and also uses information from the client. Within each of the resource concerns, it calculates a stewardship threshold that varies based on local site conditions. The thresholds can be modified if they are in an area with particular environmental sensitivities (e.g. next to a cold water trout stream). They always have the option of doing a more detailed analysis if need be.

They are trying to find the sweet spot between spending too much time or not putting enough time into it. The idea is to set thresholds, build cropping systems, inventory management and practices, analyze data and report results. They used a series of models to do the analysis including a metamodel based on APEX (= STEP).

#### **Q&A**

Q: Do the thresholds have actual numbers?

A: Yes—and we can lower the numbers

Q: Is NRCS piloting this in specific areas of states?

A: In 2016, we tested the tool in National Water Quality Incentive watersheds in 37 states.

**Tools Breakout** (participants could participate in two consecutive sessions)

**Facilitated Discussion on tools** (see Appendix for description of tools)

#### **Cover Crop Economic tool**

*Intended user:* farmer

*How easy:* Shows increase over time based on real data. Shows long-term benefit and it is quantified, not just feel good.

Farmers want to enter their management structure and then learn what they can expect. Need to continue to build the real data.

One of the first questions we get from farmers is how much it will cost me so this was a useful tool. The yield bumps were based on case studies with farmers who have been using cover crops for five years or so (and weren't challenged by the researcher).

However, yield bumps depend on a lot of variables—where you are, weed pressures, etc.

Long-term, there are some benefits that will kick in and that is helpful to consider if we are going to incentivize practices. We can maybe provide help for the first two to three years of adoption of cover crops and then expect the benefits will kick in.

The case studies are available on their website and Lauren is trying to collect more case studies. She hopes the tool is simplistic enough that farmers can use it easily.

#### **Conservation Cropping Calculator**

*Intended user:* farmer; technical service provider

*How easy:* Good place to start the conversation with the producer. Default values were useful; would need to understand more about the tool to critique it. A technical service advisor could tweak it to address the realities in his or her watershed.

*Improvements:* As a farmer, the problem behind the tool is the lack of replicated science behind what you should expect from changing practices. They want to see real

science. We appreciate that they are refining it (this is very new, only a few months old). Normally, farmers pick their own values.

### **NRCS Resource Stewardship Evaluation**

*Intended user:* landowners, farmers

Most farmers have a stewardship ethic and this tool begins to quantify that in a way that is tailored to an individual farmer. It could be important for behavioral changes. It also allows you to see a norm and where you are in relationship to that norm—that allows you to be pro-active rather than reactive and it also acknowledges what you are doing really, where you are really succeeding.

Champaign County (Illinois) is doing a 5 star award for stewardship just to get conservation cropping systems into the conversation. It is similar.

Likes the benchmark categories and option to run different scenarios and give some feedback to producers.

Good visual way to holistically think about conservation planning.

USDA NRCS is hoping it will help fill out the environmental evaluation in the conservation planning process. Helps reinforce the holistic nature of conservation.

### **GeoDesign tool for watershed scale planning**

*Intended user:* stakeholders in watersheds

Provided hard data, science and good numbers to make decisions. Could see how it could be used as an activity/visioning process to think about the science and what they would like to see their watershed look like.

We haven't commoditized ecosystem service so this was a way for people to collaboratively decide on an ecosystem service. Running the tool opened up thinking about a carbon payment, or a processing facility for perennial crops.

A potential limitation is that it requires fancy technology (touch screen). They do have a web based version. The big format allows multiple people to stand around it.

### **Profit Zone Manager (AgSolver)**

*Intended users:* farmers and landowners

Using it for several projects in Iowa but only have one year of data. Doing a project with Pheasants Forever, NRCS following up with conservation planning.

Also using it with Soil Health partnership—in early stages. Farmers seem really interested. You don't have to enter information by field. That helps with the large acreage farmers (they have spatial software and now this can integrate that data with their economic data and they really like that).

The utility is really high. The only down side is you have to go to every single farm and landowner but it is very effective. Might want to incorporate with other tools in larger watersheds.

It turns the focus from yield to profit and changing that focus on a wide scale level would be significant.

## **Summary Discussion**

The tools help with discussions on values and emotions to help guide decisions. One of the challenges with the tools is they need localized data to drive them. You have to trust the information that is in them. As we're trying to increase adoption, we'll encounter the skeptics who want to see the data. You have to have really good data and lots of security with that data (the wait and see crowd).

We would like to see compatibility between the tools (easier uploading of information and data) and the ability to overlay one tool over another. We would also like the ability to expand on the tools, adding multiple layers of information.

Another tool that we could include is the Agricultural Conservation Planning Framework (see <http://northcentralwater.org/acpf/>). The ACPF identifies potential sites in watersheds that could use more conservation practices.

The tools provide lots of information but that is also a challenge. Who can use them? Which tool? What is it going to take to move the needle?

The farm economic model (FEM) —Tarleton State University—is also a good tool that can estimate the lbs of N, P and soil that can be reduced with a dollar value attached. Any tool that is based on a field-by-field analysis will take time and lots of data.

## **DAY TWO: Economic development strategies and the Agency Update**

### **Incorporating Economic Efficiency into Watershed Planning:**

#### **Adam Kiel, Iowa Soybean Association**

We need more economists at our meetings.

The total value of Iowa cropland: \$200 billion in 2015. The cost estimates of implementing the Iowa Nutrient Reduction Strategy include point sources at \$1.5 billion plus \$114 million annually and Nonpoint sources at \$1.2 - \$4 billion plus \$77 million to \$1.2 billion annually.

We are managing huge investments of public and private dollars in these watersheds but do we talk about the return that taxpayers are getting for these investments? We need to start talking about assets, expense ratio, investment strategy, risks, performance, purchase information, management fees, etc. We can use watershed plans to outline the investment opportunities for funders and farmers (Cedar Creek Watershed Plan: a water quality investment prospectus. Cedar Creek is in the Raccoon River Watershed and is a 33,000 acre watershed, 90 percent agriculture).

1. Investment goals: In 2016, 5 percent N reduction with goal to reduce N loss by 41 percent and P by 30 percent.

2. Investment Performance and Risk: Graphing performance and risk of practices that can be used (percent N reduction)—look at this graphically and demonstrate performance (from literature). Also graph the risk (showing error bars—standard deviation around science assessments). Pasture, land retirement and perennial energy crops end up on top but Iowa Soybean Association (ISA) wants to keep the land working. With nutrient management practices (4R's), there is a 10 percent reduction or less. With cover crops, performance of investment increases. With edge-of-field treatment or drainage systems, the performance goes up. So the ISA best return on investment is edge-of-field treatment and cover crops and not so much focus on the 4R's.
3. Investment strategy: 33,000 acres in Cedar Creek = drainage ditch from top to bottom with very productive soils. They used the Agricultural Conservation Planning Framework that shows a menu of conservation practices to use in the watershed. There are lots of opportunities in the watershed. The investment strategy is a series of options with dials so you are trying to set them to meet a certain goal with farmers. They need soil health practices everywhere (reduced tillage and nutrient management). In 15 locations, they need 30 N removal wetlands (\$250,000 to \$300,000 each) and 25 saturated buffers (\$3,000 each), 30 bioreactors (placed at tile outlets where most effective), 300 acres of drainage water management, cover crops on 17,500 acres—all placed where they have the maximum benefit. These are all based on an investment strategy, placing practices where they are needed and not where other practices are doing the job. This just one of 1,600 HUC12s (33,000 acre watersheds) in Iowa.
4. Return on investment: Cost per pound N reduction (e.g. N removal wetlands are \$0.52, cover crops are \$5.38, drainage water management is \$6.46, bioreactors are \$1.20 and N inhibitor is \$4.44). They have a plan out to 2036 and show what funders can buy in to (goals established in five year increments with return on investment). The management costs are \$1.2 million/year and the infrastructure costs are \$4.6 million/year. They show project (practices), total goal, unit (acres or structures), cost per unit and total cost.

The Water Quality Investment Prospectus is really a water quality plan but we report it differently. We state the goal (vision about the watershed in 30 years), investment strategy, risks (weather—we have the science), how we're going to manage the investment (25 percent turn-over of watershed managers), how you buy in (grants, other funding sources), what's the performance (monitoring, mapping, modeling—what's happening in the watershed, track progress over time), management fees (what it costs to do these projects—it isn't cheap, be up front about this). If we are expected to manage multi-million (and billion) dollar assets, we should HAVE A PLAN.

#### **Q&A**

Q: I like the tracking, monitoring and idea of having a prospectus but current returns are not a predictor of future performance, are they?

A: Our scenario isn't the one that will ultimately be implemented. We use subsequent five-year plans for adjustments.

Q: As an investor, what's the guarantee that this is going to be here five to 30 years from now? I want to invest in the most permanent practices you have.

A: You want a good return, e.g. I'm going to build wetlands with your funds (100 year life span).

Q: What about land tenure changes, policy changes. We don't have permanency, we're on a treadmill that keeps going.

A: We talk about improvements in soil health with cover crops over 10 years. We pay for them a year at a time so policy wise, we need to think longer term.

Q: As an investor, I would like to see the multiple benefits for the money I'm investing (resiliency, pollinator habitat, all of the ecosystem benefits). Chris Johnson (2016) did a paper that talks about the ecosystem services of CRP in one watershed in Iowa to show the value.

Q: I wonder if we don't have an opportunity here. We have better tools and we might be able to generate something better. This group might be able to do that.

Q: I like this idea because you are changing the terminology so our audiences understand this better. If you talk about absentee landowners, they can appreciate this language and be more willing to make the investment.

Q: If I'm investing in farmland in Iowa, we are looking at production values over time (e.g. Corn Suitability Rating (CSR) values). What are the opportunities for improving soil health even if there are water quality benefits and incorporating this into the evaluation of the land? This could also be incorporated into rental rates.

A: I would guess if we improve the soil health, we can justify that the value should be calculated differently than it is now (CSR).

Q: Have you started communicating this approach with farmers? Is the water quality goal buried in the lead? (No—the farmers set the goal).

A: The way we do watershed planning is with the stakeholders and we consider every possible goal (improving organic matter, wildlife habitat, water quality, profitability, productivity) and then everyone ranks them. Some of the work doesn't make financial sense so we need to figure that out. We try to get farmers to focus on practices that are most efficient. Some of the practices (e.g. 4Rs) have benefits but maybe not such big returns.

Q: It is really exceptional to have the kinds of plans that ISA has in Iowa. There seems to be an institutional bias against this type of planning. How can we reincorporate this back into NRCS (rather than just jumping into implementation)? What's the way to rebuild this back into our approaches?

A: We've worked on 10-11 12HUC watershed plans so far. I don't have the answer.

C: If you want to move from types of plans and pilot projects you have to look at existing policies now (Clean Water Act, farm bill). You have to think about existing policies at county, state and federal levels and how do we do a better job of integrating these policies to achieve our results. There may be some opportunities for this group—policy options, etc.

C: We need some sort of commitment for sustainable funding. We also need to invest in boots on the ground for farmers. We need to get farmers to adopt and can only do that with people on the ground working with these farmers. USDA and NRCS are stretched very thin as are the SWCDs.

Q: We're talking about return on investment. Usually this is understood on purely monetary terms. We're comfortable with conservation return on investment. Some conservation investments don't offer a direct monetary return while others may eventually offer returns or different returns like more ducks. Have you encountered some confusion among stakeholders on conservation return on investment versus economic returns?

A: Yes, we try to talk about other benefits but they want to talk about dollars and cents. Even farmer needs to think more about return on investment on a different scale, maybe acre by acre that shows getting rid of potholes doesn't make good economic sense.

**Agricultural Conservation through Economic Development: Open doors to scalable solutions by embracing new partnerships and focusing on economics: Karen Galles, Great River Greening/Nicollet County SWCD and Marcus Grubbs, Future IQ**

To infuse conservation into a more traditional economic process, we need to expand the conservation toolbox. We have started doing this based on work that has been done in the 7-mile creek watershed in Minnesota. It has been worked on and studied extensively over the last 20 years (it is in the MN River Basin). It is a heavily drained landscape, both flat and steep. In the last three years they have added 70 structural BMPs, 1,000 acres of cover crops and 300 acres of controlled drainage.

The Need: We're trying to deliver conservation assistance differently and we're having great success, yet it seems simply impossible to scale up our success to an entire basin. Over the last three years, we have gotten lots of practices on the ground. The human capital is the one thing that is absolutely necessary. How can we expand to basin wide

implementation? The farmers want additional crop and market options—be seen as conservation heroes and less dependent on government programs. The stakeholders want to know how they can affect the future of agriculture in a way that improves farm incomes, conservation and community well-being. Our scalable solution (economic development) is:

- Create additional crop and market options for farmers
- Develop markets for crops that generate conservation benefit
- Ensure that solutions add to farm-gate, local and regional economies

Economic development basics:

Economic growth and development includes the quality of jobs, how much they pay, what does the regional economy look like and how we diversify it to create a stable economy. There are lots of public-private partnerships that focus on economic development. To do this work, they focus on quality of place (why someone wants to live here), natural and built assets (infrastructure and protecting natural assets) and workplace development. All of this attracts businesses that bring in more jobs and this helps them (business development). They usually don't think about agriculture and probably don't think about conservation either.

Their toolbox includes assessments (what the economy looks like), coalition building, visioning (what kind of future do we want for our economy and how do we get there) and pursuing opportunities (they chose the opportunities they want to pursue and can attract other resources).

Example: Ammonia fiber expansion (AFEX pellets) (a promising technology for utilizing biomass to make renewable fuels and chemicals as well as animal feed). They treat cellulosic biomass and turn it into something that is useful as a commodity (the biomass is pelletized and can be a ruminant feed to replace corn grain or as a biorefinery sugar feedstock). Farmers bring crop residues to a local depot, the depot upgrades the residues to dense pellets, AFEX pellets are transported to sites of uses and go to cattle feeding operations or biorefineries producing fuels and chemicals.

The challenge: The conservation professionals immediately objected to taking more residue off the land. The response was: if we take more stover, we can also ensure that we use cover crops, other forms of perennial crops in strategic places. "Skate to where the puck is going, not where it has been."

In the 7-mile creek watershed over the past three years, markets, technology and policies have been creating opportunities in Minnesota. Now they call their stakeholders "shareholders."

- Developed collaborative geo-design tool
- Faced deep skepticism about taking stover but, using the collaborative geo-design tool, they were able to bring people around to the idea that this could create conservation benefits

- Brought in a market coordinator for the new Ag Bioeconomy project. They created three phases:
  1. Shared learnings: Over four months they sponsored a series of presentations on biomass, harvest and transport, regenerative grazing, etc. This was critical for the human capital, getting people to work together (taking the “no buts” to “yes, then...”)
  2. Future scenarios (what future of ag in southern MN might look like). They interviewed everyone involved in the process and translated that into what the drivers of future ag might be and what could create the future they want to head towards. They drafted five scenarios (e.g. 20 years from now we have cellulosic EtOH, local cellulosic processing, on-site stover, increased animal ag, winter annuals, early covers and others). They explored these scenarios with the geo-design tool (e.g. with new buffer law in MN, make the buffers harvestable) and
  3. Next steps (e.g. alfalfa siting, farm economics and biomass processing) e.g. biomass processing is partly economics but conservation has something to bring to the table as well

This is risky stuff but they have a community of shareholders now who have bought into this and want to pursue it. This requires a long-term investment. Ag is a large part of many regional and economic economies and conservationists should be at the table. We should be thinking about taking risks on new ideas that allow you to fail-forward. We need to seek out win-wins. To make Economic Development work, you will need mission alignment, project champions, etc. You need to make near-term farm-gate economics work for you, manage expectations and prepare for the long haul. This work inspires participation and generates trust and respect for conservation professionals. Don't let the perfect be the enemy of the good.

**Q&A:**

Q: In your watershed you have a unique situation with a deep pocket entrepreneurial family—were they involved?

A: No—they were not involved in the beginning. They came in once we had momentum to see if they wanted to invest. They immediately said yes.

Q: We have a community foundation in central Illinois that is asking these very same questions—how do we get triple wins for the small rural communities? What we lack is the connection of the various expertise coming together. When you look around for partners to support this, your community foundation might be a perfect investor (e.g. as a convener, support some of the tools you'll need).

A: I agree. What we really needed was patience—it took a long time. We had two coordinators on staff.

## Discussion

Are you specifically involved in a project that is incorporating economics into planning and implementation—and what is that? *[most groups didn't get beyond this question]*

- Have two projects focused on finding markets for perennial crops and pasture on marginal lands
- Illinois project working to see if downstream will pay for upstream practices
- Shifting conversation from TMDL implementation to more positive soil health discussion
- NRCS thoughts about incorporating technical assistance for economics
- Using AgSolver to look at wetlands
- City of Cedar Rapids is looking at how they can update their plan to incorporate economics, have big ag companies in the city so tie to the supply chain
- Notre Dame RCCPP project—three to four years of data from very small watershed, now has 70 percent of watershed in cover crops and have resource economists coming in from Iowa State
- Fishers and Farmers using simple economic calculator with jobs added, will start looking at ecosystem services
- LaCrosse cover crop seed offers services to farmers based on economics and is driving demand for seed by farmers
- Talked about Iowa tax and how to increase the political will to add the tax to the system
- Concept of watershed projects with timeframe that forces you to spend the money quickly—how do we change that?

Based on what you've heard, what is your vision for the future about incorporating economic considerations into watershed planning and implementation?

- Need funding to create a plan, reasonable expectations you can implement the plan
- Need for long term funding and stability for these projects—too much turnover
- Efficiency in cost per pound but also need to value downstream benefits
- Need to get public to accept value of ecosystem services
- Need economists to engage in watershed planning activities. Should also add a social scientist and someone with marketing expertise
- Soil health practices and value returned. Benefits of more streams to fish in, flood control—need to communicate with local businesses (how we can leverage our money better)

What support do you need to better incorporate economics into your watershed/water quality projects?

- Farm bill and other state policies to nudge us towards economic solutions
- Investing in people and job performance that are less siloed
- Alignment between economic folks, university types who can help with the discussion

### **Agency Updates: Mark Rose, NRCS-Washington, DC**

This is his third LMW meeting. Chief Weller is very high on investment opportunities. The State Conservationists need to hear Adam's presentation about converting a water quality plan into a Water Quality Investment Prospectus. This is how they should be operating. The Agency is trying to get back to conservation planning and get it at the forefront before the dollars go to farmers.

The Agency has made 1,000 new hires but there have also been some retirements. They are low on technical assistance in the field but are making some headway in this. They had a good year in 2016 and obligated over \$1 billion in EQIP.

The CIG announcement should be made this week for the 2017 round.

NRCS has reworked the Conservation Stewardship Program in how it is presented to the producers (now 80 million acres). They have put planning first and are looking more closely at resource concerns and tying those to enhancements and practices. The outcomes are tied directly to the practices (e.g. 590) so CSP is looking more like EQIP (payment schedules, evaluation and ranking tool with national, state and local questions).

With the Resource Conservation Partnership Program, NRCS is wrapping up the full proposals with announcement of funding expected in mid-December. They have about 199 projects funded now. They are looking at a January-February timeframe for the next funding announcement. Adam's project would compete well in this.

NRCS changes slowly. They are getting more into urban (mainly high tunnels) which is something that resonates with politicians focused on "food deserts."

### **Q&A**

Q: There are food deserts in rural areas as well, so how can we bring non-traditional approaches to those communities to reignite local food economies, other ecosystem services?

A: Good point. A food desert in rural areas is 10 miles, in urban areas it is one mile.

Q: How much will be available in the CIGs?

A: \$25 million is set aside—the Chief has the ability to increase the amount if there are lots of good applications.

Q: When will the CIGs be due?

A: The due dates will be about the same. Also, we're trying to think about how to present RCPP results to the public (outcomes for a billion dollar investment).

Q: What about a measuring/monitoring strategy for the Agency?

A: A farm bill is coming up so we have an opportunity. You guys will drive what is in the next farm bill. RCPP is a good program but has some challenges. CSP is now the next step beyond EQIP.

Q: Anything else about measuring outcomes?

A: There are discussions but I don't know the details. One of our concerns is what is in it for the producer with edge-of-field monitoring.

Q: CRP is with FSA and not with NRCS—would Congress ever consider moving it back to NRCS?

A: Conservation plans should look at all USDA programs (including CRP). CSP is a working lands program as is EQIP but CRP takes land out of production. It isn't fully benefiting society. Although it helps the environment, it isn't producing food.

Q: But isn't NRCS better equipped to do CRP?

A: We work closely with FSA on CRP and provide the technical assistance while they do the financial management. But there are politics to consider.

C: The inclusion of some acres that weren't marginal into CRP still angers the environmental community.

A: NRCS is working with FSA on the land that is coming out of the CRP to make sure it is treated in an environmentally sound matter (an announcement is forthcoming)

Q: What about the 60-40 rule in EQIP which requires 60 percent goes to livestock practices? Is there some way to figure out a point ranking that would help the fly over states?

A: We're looking at 60 percent nationally. There can be states that obligate only 5 percent to livestock, the rest to crops. We're creative—if the farm is generating silage to support livestock, it can qualify.

C: We appreciate RCPP for its targeting to certain watersheds. Regarding the partnership aspect of RCPP, some of the partners would like to be more involved in signing up producers and implementing practices.

A: Yes. One opportunity is the alternative funding arrangement. Here, the partners are doing the contracting, and do everything except for the eligibility portion. Remember

RCPP is not a grant program. You have to do something to get the money and the producer gets the money. There will be more opportunities to improve RCPP.

Q: The municipalities really appreciate being involved in the RCPP projects. We're still three years out of project completion. We suggest that NRCS allow some time to develop the plan and administrative piece before the project kicks off (this takes nine months or so) so now they are doing a five-year project in four years. Think about when you make the announcement to maximize the work that goes into the front end.

A: The business tool process that NRCS is developing may help somewhat. If you aren't funded, this may tell you what you need to do. The five-year project timeframe is part of the RCPP structure which can be addressed in the farm bill.

Q: We have a sewerage district in the RCPP and the NRCS programs are new to us. What might the farm bill provide for Agricultural Conservation Easement Program-Agricultural Land Easements (ACEP-ALE) funding?

A: It was cut in the 2014 Farm Bill. You have some work ahead of you for the 2018 Farm Bill to restore and increase funding for it.

### **Connecting Watersheds: Economic Resources, Projects and Partnerships: An Overview of the Catfish Creek and Bee Branch Watersheds:**

**Eric Schmechel, Dean Mattoon and Denise Ihrig, City of Dubuque**

The Upper Catfish creek is a cold water class "B" stream, predominantly spring fed, with naturally reproducing brook/brown trout. It represented the first urban/rural watershed project in Dubuque. They eventually expanded to the larger watershed and developed a plan. The larger watershed drains 72 square miles (46,100 acres) and includes five branches. Land use-wise, 47 percent is agriculture, 22 percent is open space and 14 percent is residential.

When they looked at projected land use over the next 30 years, they predicted a 15 percent loss in agriculture and a 13 percent increase in residential. They made recommendations for improvements including seven critical area detention retrofits (usually flood control but can also provide improvements in water quality). They are building bio-retention into water detention. They are restoring stream riparian areas (stabilization of stream banks). The residents asked why they were spending \$100,000 on a ditch? They had to do a lot of outreach to connect the residents with the stream.

They are also developing a green infrastructure network. They categorized parcels, prioritized them and developed a network. They were trying to connect natural areas. They looked at existing agricultural practices (terrace farming, contour cropping, no-till farming, and vegetated swales). They have 43 critical ag management areas. Their map combines all of the targeting, necessary practices.

In Iowa, they have state revolving funds and sponsorship projects. If a city takes a loan out, the sponsorship project allows you to use \$100,000 from every \$1 million loaned. The Bee Branch Stormwater SRF loan (15 million) made \$1.4 million available for implementation projects split between stream restoration and cost-share programs. They have a big push on soil health and soil quality restoration (both agriculture and urban). They work with just about everyone including colleges, museums, county, cities, local producers, schools, churches, builders, contractors, home owners, county conservation board, etc.

The Iowa Nutrient Reduction Strategy also factors in. The City of Dubuque has NPDES nutrient reduction requirements in 2013 (sewer overflows). They had just gone through an upgrade of their facility but then were faced with INRS. The city did a feasibility study to figure out how to achieve a 66 percent reduction in N by 2030 and 75 percent reduction in P by 2024. They secured a 2014 CIG grant (\$75K) and then the University of Iowa IIHR, Kieser & Associates and Troutman Sanders led to 2015 CIG grant with Iowa League of Cities (\$715,000/three years). They have a 1:1 match from the Iowa League of Cities and other partners. This is an integrated strategy, both non-point and point sources to reach the ultimate reduction goals. Initial partners include cities, ISA, IAWA, University of Iowa, K&A and Troutman Sanders. They have a large technical advisory committee. Their goals include creation of voluntary nutrient reduction exchange, development of DNR-approved WQCT framework, Integration of SRF sponsored projects, university-led modeling to target implementation, stackable benefits, ag commodity group participation and expansion of flood modeling capabilities to include nutrients. Next steps include a demand and supply analysis and examining proposed projects.

The Bee Branch Watershed Project is an urban project. It is a series of improvements that will help prevent flash flooding in the city of Dubuque. The watershed is about 6.5 square miles with a steep drop off. Between 1999-2011, the city had six presidential disaster declarations with \$70 million in damages by flooding. Now they are in the process of trying to reduce volume, slow the rate and move the water more slowly. They are converting 240 alleys to green alleys. They use detention basins to slow rates (one uses 12 acres of woodlands; one has 16 acres of prairie). "Daylighting" (redirecting streams which had been previously diverted into a culvert, pipe or drainage system into an above ground channel) is restoring their streams and creeks and they are adding walking trails, native plants and bioretention cells. They are improving the ecosystems. The total project cost is \$219 million with lots of different sources of funding.

#### **Q&A**

**Q:** In Wisconsin, there have been challenges with trading.

**A:** We're already working on a 30-year plan. We have a full understanding that the NPDES permits are controlling the process and that trading program isn't the only tool.

We are looking at the feasibility. Regardless of where we end up, we're looking at where these types of programs and projects fit.

### **Next Steps for LMW: Joe Britt**

Outcome of a previous LMW meeting (Michelle Perez, AFT): After the January 2015 meeting, Michelle carried some of the LMW recommendations forward (LMW drafted a memo on how to help NRCS better quantify the outcomes of RCPP). AFT is now launching an external committee that can help NRCS quantify their outcomes and make tools available to the participants. Michelle has also incorporated projects from LMW into her paper on water quality successes. Michelle thinks we should develop a strategy to find funds to direct towards project management and reduce the turn-over problem with watershed managers.

### Ideas for subsequent meetings:

- What about Ray Archuleta (conservation agronomist at the NRCS East National Technical Center) on soil health? We always need to think about the "why" for producers—what is the farmers' "why"—and we need to learn how to value ecosystem services.
- Maybe a future meeting on the 101 of behavior change—what works, what doesn't
- Next step in economics is how to connect with consumers and the marketplace to drive the programs we want to see, provide funding
- We've seen topics on soil health and economics. It would be nice to see farmers talking about business practices. What are their thoughts on what this all means and how do they talk to other farmers?
- Importance of thinking about attitudes at all different levels—social science, social psychology. We could benefit from hearing about this.
- What about community economic development and resilience and taking this conversation further, i.e. keeping young people in small rural communities and what does this have to do with water?
- We're missing flooding and water supplies. Those are real numbers that can be captured. We can focus on the benefits of resiliency and how to prevent future damage.
- Marketing, advertising is really important. There may be different companies who can assist us in selling conservation in a more persuasive manner.
- Taking stock in progress relative to watershed management—what exhibits good leadership? Are there statistics? Are we getting some traction relative to this issue?
- We've done some farmer panels and have paired them with consultants—these work great.
- There are a number of entities that have watershed academies. Extension has also looked at core competencies for watershed leaders.
- Carrots and sticks: what about property taxes? Can we reward landowners who implement conservation? The farm operator responds to market signals, the

landowner pays the property tax and might respond to improvements on the land that have a positive impact on property taxes.

- If we're talking about getting public buy-in, maybe we should look at improvements in public health. How do N and P affect human health?
- Next farm bill: should we consider a policy-specific agenda?
- What about a "red team" (U.S. military concept)? This involves people whose purpose is to evaluate what an organization does and review its assumptions. It would be great if the conservation community would take a look at its original assumptions. We have some environmental problems that have positive solutions, but not all have that. We promise to fix the hypoxic zone in the Gulf through conservation but we probably can't deliver on that. We need to think less about problems that can be solved and more about problems that can be adaptively managed and measured short-term.

## APPENDIX

### Tools break out groups

1. **Conservation Cropping Systems Calculator** - *Rebecca Wasserman-Olin, Land Stewardship Project*

The CSC is an Excel-based tool that allows the comparison of two crop rotations, each up to six years in length. Default values are built in the CSC for many common crop to west-central Minnesota including corn and soybeans, small grains, and cover crop mixes. It provides average yearly returns as well as a year-by-year breakdown for each rotation. The CSC is relatively unique in that it can compare row-cropping to various grazing management methods and types of cattle on a per-acre basis. It was developed by Wasserman-Olin as part of the Chippewa 10 percent Project, in consultation with various other economic experts, as well as farmers. In this session, participants will see a demonstration of the calculator and have an opportunity to try it out with their own data. Participants are encouraged to bring their own laptops and datasets (but this is not required).

2. **Cover crop economics tool** - *Lauren Cartwright, NRCS-Missouri*

This is an excel based tool designed to help producers, landowners, planners and others make informed decision when considering adding cover crops to their production system. The tool is built as a partial budget analysis tool. A partial budget only captures the costs and benefits that are expected due to a change in the operation. Analysis results are provided both numerically and graphically. Since the analysis is customized with user supplied values, users can adjust the values to run “what if” scenarios based on different potential ranges of inputs. The model will also store and retrieve up to 5 default scenarios. A references and citations page is included with the tool which provides users with additional technical and scientific details utilized to build the tool. In this session, participants will see a demonstration of the tool. Cartwright will share some examples of farmer case studies she’s done with the tool, and future upgrades planned for the tool. Participants are encouraged to bring their own laptops, but this is not required.

3. **Collaborative GeoDesign tool** - *Karen Galles, Great River Greening/Nicollet County SWCD*

Collaborative GeoDesign is a process that allows groups of diverse stakeholders to “try-on” various landscape designs assisted by a geodesign tool. The tool provides quantitative feedback on multiple biophysical and social indicators as stakeholders work through multiple iterations of landscape designs that could meet future demands for biomass crops without sacrificing local- and regional scale concerns (e.g. water quality, farm profitability, maintenance of the tax base). The tool exists both as a self-contained rolling unit with a processor and a large touch screen (like a giant tablet device), and as a web-based interface, which is what participants will be using during this exercise. This

tool is special in that, paired with appropriate stakeholder and community engagement, the impermanent nature of iterative design seems to create openness to different futures, a spirit of collaboration among different stakeholder groups, and a willingness to experiment and “play” with the landscape. In response to a (hypothetical) demand for biomass crops, participants will be given targets for designs (e.g. produce X tons of biomass; improve water quality index by X percent) and asked to produce as many design iterations as time allows. Participants are encouraged to bring their own laptops, however we will be working (collaboratively!) in pairs, so it is not required. Collaborative GeoDesign was developed by an interdisciplinary team at the University of Minnesota including Drs. David Mulla, Nick Jordan and David Pitt.

**4. Profit Zone Manager™ (PZM) - David Muth. AgSolver**

PZM is a web-based ([profit.agsolver.com](http://profit.agsolver.com)) tool that supports a process called Precision Business Planning for farm fields and enterprises. PZM uses available precision agriculture data and streamlined crop budgeting to identify zones demonstrating different profit potential within a field, allowing profit-focused management decisions at a resolution of 3m. PZM identifies areas where poor business performance and primary environmental resource concerns intersect, establishing a business motivation for conservation practice adoption. The session will be held as a live demonstration using preloaded precision agriculture data. Interested participants will be instructed on how to start an account and use public data resources to get started with analysis and planning.

**5. Resource Stewardship Evaluation Tool - Marty Adkins, NRCS-Iowa**

RSET is a new tool and service that evaluates an operation’s current management and conservation activities by comparing stewardship thresholds for five overarching natural resource concerns: soil management, water quality, water quantity, air quality and wildlife habitat. These thresholds are science-based and set by NRCS at levels that maintain the right balance between productive agriculture and healthy natural resources. Adkins will provide an overview of RSET and run through an example with the group. He will also discuss ongoing plans for RSET development and deployment, including plans for RSET to facilitate new ways of working with traditional and non-traditional partners.