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Using a BMP Auction as a Tool for the Implementation of Conservation Practices

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Abstract: Compensating producers through conservation programs for best management practice (BMP) adoption has had notable success to date; however, there are still many producers that choose not to participate in conservation programs and/or decide not to implement BMPs. How can Extension professionals and conservationists better promote and encourage BMP adoption and conservation program participation? This paper offers insight into methods, results, and lessons learned from an innovative watershed approach piloted in an east-central Kansas watershed with a focus on providing guidance to other Extension professionals interested in conducting a similar type of project.

Introduction

In recent decades, there has been increased attention paid to nonpoint sources of pollution. In particular, runoff from agricultural lands has been cited as a primary contributor of sediments, nutrients, and pesticides into our nation's waterbodies (Faeth, 2000). The adoption of agricultural best management practices (BMPs) is critical for restoring and protecting water quality (Smith, Peterson, & Leatherman, 2007). Despite many years of effort and hundreds of millions of dollars spent on BMPs aimed at reducing agricultural nonpoint sources of pollution, many challenges remain. In the state of Kansas, for example, nearly 39% of stream-length miles and 76% of lake acres were deemed impaired for one or more of their designated uses

(Kansas Department of Health and Environment, 2006).

Because of this realization, there are currently many cost-share and incentive programs in place through various government agencies, but many producers and landowners still choose not to participate and/or adopt BMPs (Smith et al., 2007). The question is, how can policy makers, conservationists, and Extension professionals design programs to increase BMP adoption rates? This article offers insight into methods, results, and lessons learned from an innovative watershed approach piloted in an east-central Kansas watershed with a focus on providing guidance to other Extension professionals interested in conducting a similar type of project.

Motivation

According to Smith et al. (2007), the number one reason why producers may choose not to participate in conservation programs is because they are uncomfortable with the idea of government control over their land-use decisions. The authors suggest that programs will attract more participants if they limit the restrictions placed upon enrollees. For example, installing a filter strip on a field with a 15-year commitment coupled with restrictions that limit the use of that strip may not be very attractive to many landowners. Producers may be more likely to convert a piece of land into permanent grass vegetation if they are given the flexibility to continue to utilize it for haying and/or grazing. This management alternative would still result in some level of water quality improvement. The full list of reasons from Smith et al. (2007) for why producers may choose not to participate in conservation programs includes:

- Governmental control and lack of flexibility (36%)
- Paperwork (19%)
- Low payments (15%)
- Complicated programs (13%)
- Hassle (11%)
- Education or necessary information about programs were unavailable (4%)
- High penalties for failing to meet program requirements (2%)

Building on these findings, Kansas State University Cooperative Extension professionals together with a leadership team comprised of local Natural Resources Conservation Service (NRCS), Conservation District, Army Corps of Engineers staff utilized an innovative and highly flexible "BMP auction" approach for addressing erosion and reservoir sedimentation concerns in the Pomona Lake Watershed (Figure 1). In BMP auctions, producers/landowners submit bids for implementing BMPs and the bids are ranked and funded based on cost-effectiveness. The following paper details the steps from start to finish for a BMP auction project using the Pomona Lake BMP auction as an example.

Figure 1.
Pomona Lake Watershed Map

Definition and Logic of a BMP Auction

"Cost-effective" is defined as being economical in terms of tangible benefits produced by money spent. Because available funding, time, and effort for the implementation of BMPs are, and always will be, limited, resources should be directed towards highest impact investments that deliver the biggest "bang for the buck"—or the most environmental benefits produced per dollar spent. While watershed protection and/or restoration may be a fine goal, it is important to consider both the economic and environmental costs and benefits in order to develop economically feasible watershed management plans. BMP auctions are one tool to help accomplish these goals.

In a BMP (reverse) auction, agricultural producers compete by submitting bids to supply the buyer (e.g., watershed group, state agency, etc.) with water quality (WQ) improvements through the implementation of BMPs (Greenhalgh, Guiling, Selman, & St. John, 2007). The bids are ranked by the amount of water quality improvements generated per dollar. Winning bids will come from producers who can provide the most water quality improvement for the least cost. The ranking process is repeated until a predetermined point is reached (e.g., funds are exhausted, bids no longer meet a certain WQ improvement/price ratio target, etc.). The auction allows the buyer to identify and purchase the most cost-effective water quality improvements for a specified budget. The buyer could be a government entity or a private firm that needs to achieve a particular reduction in emissions.

BMP auctions allow bidders to indicate the amount of money they are willing to accept in order to install a BMP. In a competitive market, bidders will likely bid their true costs of BMP implementation (Johansson, 2006). Therefore, competitive bidding processes provide "revealed preference" data on producers' willingness-to-accept values for adopting BMPs (Clark, English, & Garland, 2007). Combining this information with the amount of environmental benefits resulting from the BMP(s), allows auction managers the opportunity to compare and rank bids and select the best applicants. This ensures that taxpayers' money is being spent on practices that achieve the greatest levels of environmental benefits.

Education

Having BMP auction "champions," or watershed stakeholders who support the idea, spread the word and exert influence on others is critical for a project to be successful. The first step in developing these "champions" involves introducing the BMP auction idea to a core group of stakeholders. This group should include those who both know the watershed and know producers and landowners in the watershed. This core stakeholder leadership group should also have definite goals for the watershed. In many watersheds, individuals who likely fit this description would include representatives from organizations and agencies such as county Extension offices and councils, county Conservation Districts, and the NRCS. Gaining the support of this group is crucial for future marketing success among the general watershed stakeholders (producers and landowners).

Initially, there may be resistance from some among the stakeholder leadership group regarding the utilization of a BMP auction. There may be concerns about the level of flexibility implied by the auction approach or the deviation from established standards for BMP implementation. Garnering the support of this group requires effective communication about the logic behind a BMP auction, the framework and mechanics of an auction, and the benefits of an auction. During this introductory process, expect challenging questions about BMP auctions. Not every question has to have a definitive answer. The key is to create a spark of interest (that will keep the group coming back for more), and most of the questions will likely be answered, with the help of the stakeholder leadership team, during the auction design process.

In the case of the Pomona Lake watershed, there was a newly formed watershed stakeholder leadership team willing to entertain new, innovative approaches for implementing BMPs. Once they were shown the logic of BMP auctions and how they had the potential to encourage more producer/landowner participation, BMP implementation with resulting erosion and sedimentation reduction, and higher levels of cost-effectiveness, they were in support of pushing forward with the project, although some had reservations about how producers/landowners may react to this new approach. Throughout this entire process, Kansas State Extension professionals depended heavily on the suggestions and concerns identified by this local leadership team.

BMP Auction Design

During the auction design process and before the auction is opened for bidding, it is important to develop criteria for evaluating the bids. Working through these details can be one of the most challenging activities of the auction. Identifying the targeted pollutant(s) and the unit of measure is the first step. This may be tons of soil erosion reduction or pounds of phosphorus or nitrogen reduction, for example. During this decision process, thought also should be given to the methods or techniques of estimating pollutant loads or reductions. Are the pollutant reductions going to be estimated and evaluated at the edge of the field scale or watershed outlet scale? Having an experienced watershed or field scale modeler on the leadership team is useful for determining which pollutant loads and reductions can be reasonably estimated and which models can be effectively utilized to answer the questions at hand.

Creating a list of potential BMPs is the next step. These BMPs should effectively address (or reduce) the targeted pollutant(s) and be acceptable to potential bidders. Along with the selected BMPs, an estimate of pollutant reduction efficiency for each BMP can be predetermined. Ideas for potential BMPs and estimated pollutant reduction efficiencies can come from Extension publications (Devlin et al., 2003), other watershed management programs (Chesapeake Bay Program, 2008), or various other sources, along with guidance and suggestions from local experts. Providing this information, via a field sign-up sheet, to the producers/landowners will greatly enhance their understanding of how the auction process works and may

increase bidder participation.

With "excessive paperwork" cited as the number two reason and "complicated programs" cited as the number four reason for why producers may not participate in conservation programs (Smith et al., 2007), every effort should be made to keep the sign-up process as simple and straightforward as possible. Table 1 displays an excerpt from the one-page Pomona field sign-up sheet that provided potential bidders the BMP erosion reduction efficiency assumptions. It should be noted that these generalizing assumptions may sacrifice overall accuracy.

Table 1.
Excerpt from Field Sign-Up sheet for Pomona BMP Auction

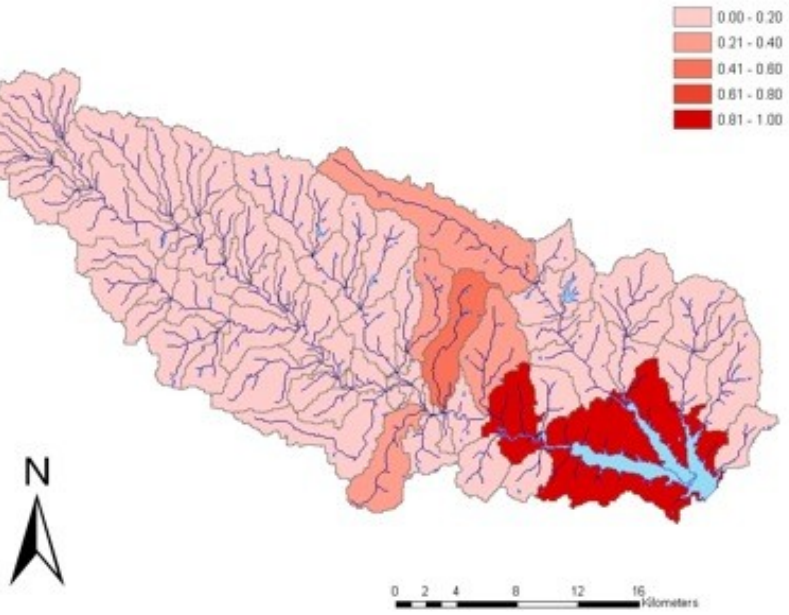
	Best Management Practices	**Erosion Reduction Efficiency**	**Treated Field Acres**	**Total Bid Price (dollars)**
__	Establish riparian vegetative buffer (check width): __ less than 30' wide __ 30' to 60' wide __ greater than 60' wide	 **25%** **50%** **75%**	 _____	 _____
__	No-tillage (check option): __ Option #1: No-till must be used for 3 years with no more than one crop being soybeans __ Option #2: No-till must be used for 3 years with no crop being soybeans	 **40%** **75%**	 _____	 _____
__	Farm on the contour	**35%**	_____	_____
__	Establish contour grass strips	**50%**	_____	_____
__	Re-shape existing terraces	**25%**	_____	_____
__	Establish terraces	**30%**	_____	_____
__	Establish permanent vegetation on entire field	**95%**	_____	_____
__	Establish grassed waterways	**50%**	_____	_____
__	Alter crop rotation away from continuous soybeans	**25%**	_____	_____
__	Other (explain):	**TBD**	_____	_____

Another factor that should be addressed at this point is whether or not to allow "stacking" of bids. Stacking refers to bidders requesting money on top of (or in addition to) funding they will receive through participating in traditional conservation programs (e.g., EQIP). Stacking is a way to help stretch the auction funding further by working with base funding from traditional conservation programs. In a sense, this can be thought of as reaching out to that producer/landowner who may require slightly more funding than what is available through traditional conservation programs. From a research standpoint, stacking also allows producers to reveal their "true" incentive preference. Regardless of whether or not stacking is allowed, it should be made clear that bids for BMPs should only be for new practices—not payments for a practice that is already or has already been implemented.

In the case of the Pomona BMP auction, all bids were to be ranked by the number of tons of sedimentation reduction achieved (at Pomona Lake) per dollar. Using a field sign-up sheet (Table 1), producers had the option of identifying soil erosion reduction BMP(s) they were willing to use on a field. They could choose from the BMPs listed or write in their own BMP proposal to reduce soil erosion either on cropland or pasture/rangeland. Stacking BMP bids on top of traditional conservation program funding was allowed. Next, they indicated the amount of money they would need to install and maintain the BMP(s) selected, understanding that bids would be ranked by cost-effectiveness. The stakeholder leadership team decided that a producer could sign up multiple fields, but the total amount per producer/landowner could not exceed $5,000. Because this was a sealed bid auction, the bidders did not know the status of other bids made during the bidding period.

In order to estimate the amount of sedimentation reduction in Pomona Lake resulting from the adoption of the proposed agricultural BMPs, each bidder was assigned a baseline sediment load (in tons per acre) based on results obtained from the Revised Universal Soil Loss Equation (RUSLE2) model (NRCS, 2004). When a producer submitted a BMP bid, the baseline, field-edge load was multiplied by the overall estimated sedimentation reduction efficiency. The overall estimated sedimentation reduction efficiency was calculated by multiplying the BMP erosion reduction efficiency by the sediment delivery ratio obtained from the Soil & Water Assessment Tool (SWAT) (Neitsch, Arnold, Kiniry, & Williams, 2005) (Figure 2) to calculate the estimated amount (in tons per acre) of sediment reduction achieved.

Figure 2.
Computed Sediment Delivery Ratios for Pomona Lake



Marketing the BMP Auction

One of the major challenges that can either make or break the success of any new idea or approach is that of spreading the word and marketing the idea. This, in itself, can be a challenging endeavor. Having the support and cooperation of local agencies is extremely helpful in the marketing of the auction. To market the Pomona BMP auction to potential bidders, producer meetings were organized throughout the watershed along with farm visits, phone calls, mailings, and radio interviews. At the start of the bidding period, a letter of explanation and field sign-up sheet were mailed to 225 producers/landowners who lived or farmed in the critical areas that were identified by the SWAT model. During the bidding period, radio interviews were conducted on two farm-radio talk shows explaining the auction details and encouraging bids. Approximately 3 weeks before the bidding period was closed, reminder post cards were sent to anyone who had attended one of the producer meetings, called with questions, visited the office, or shown any interest in the auction.

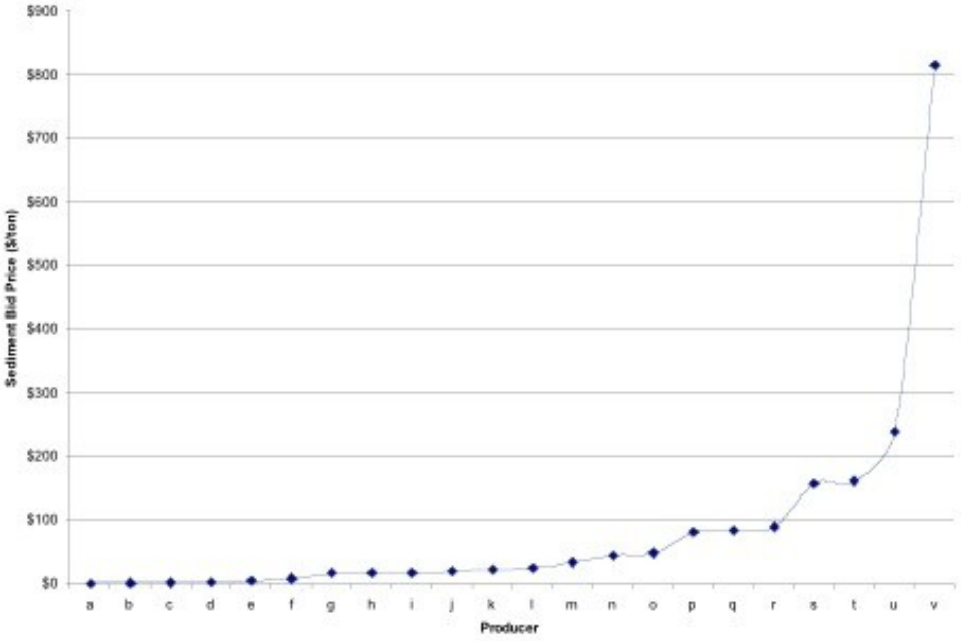
Evaluating and Ranking the Bids

Depending upon the auction design, the bids can either be evaluated during the bidding period or after the bidding period has closed. Either way, the bids must be reported in dollars per unit of pollutant reduction. When all of the bids have been evaluated, the next step is to rank the bids. This can be as simple as ranking the bids from most cost-effective (which is represented by the bid with the lowest cost per unit) to least cost-effective. The auction managers can then decide which bids to fund and which not to fund, based upon the predetermined auction design. This may be starting at the top of the list and funding bids until the funds are exhausted, or cutting off the bids when they fail to meet a certain cost-effectiveness level.

In the Pomona auction, there were 24 bids for practices from 12 different landowners requesting $19,062 in funding. The practices funded through the BMP Auction resulted in 938 tons/year of soil loss reduction at the edge of field with an overall erosion reduction efficiency of 75.4%. The local stakeholder leadership team requested that a 10% weight be placed on the sediment delivery factor to Pomona Lake. So, of the 938 tons, the landowners received credit for 778 tons of sedimentation reduction at the lake. The 778 tons of sedimentation reduction came at a price of $19,062 for an overall cost-effectiveness of $24.50 per ton. In the final analysis, all bids were funded because the total did not exceed the amount of available funding

($20,000). Figure 3 depicts the variation in cost-effectiveness across bids.

Figure 3.
Variation in Pomona Watershed Producer Bid Price (in Terms of "Credited" Sedimentation)



Auction Wrap-Up

After the determination of winning bids is complete, the next step is notifying the winning bidders and having them sign contracts. In the case of the Pomona auction, a bid acceptance letter was sent out to winning bidders congratulating them on their success and summarizing the overall results of the auction. The letter also gave them instructions for how to receive their money. This included filling out and signing the contract, which stated that the BMP must be implemented prior to funds being disbursed. This is also a good opportunity to ask for their cooperation in completing a follow-up survey. The follow-up survey can give auction managers and researchers information on how the auction was received and also provide ideas of how to structure BMP auctions in the future.

Pomona bidders indicated that they appreciated the flexibility of choosing their own BMPs and naming their own price in the auction. Several mentioned that better advertising of the auction would be necessary to increase participation across the watershed. Overall, the bidders were very satisfied with the first ever BMP auction in Kansas.

Conclusion

BMP auctions have the potential to offer producers and landowners more flexibility in BMP adoption while assuring watershed managers that cost-effectiveness is being achieved. There are many potential variations of BMP auctions. While the Pomona auction focused on reducing erosion and sedimentation in the watershed, there is no reason why the BMP auction concept could not be applied to other natural resource and

environmental issues across the country, including BMPs aimed at reducing livestock pollution, homeowner septic-tank and leachfield pollution, and issues of water shortages and quantity. Clark et al. (2007) even used an auction process to increase switchgrass production in Tennessee.

Collaboration and cooperation among local agencies and organizations are crucial for the success of a BMP auction. Bringing everyone to the table early on in the development stage of the auction creates great support and "buy-in" of the auction idea. This is essential for future marketing success among the producers and landowners who live and work in the watershed.

Many dedicated individuals and organizations were responsible for making the Pomona Lake Watershed BMP auction a success. The BMP auction provided an excellent opportunity for stakeholders to actively participate in applying scientific information (watershed modeling and economics) to guide change in the watershed. The project also serves as a good example of how cooperation and collaboration among Extension, NRCS, county conservation districts, Army Corps of Engineers, and local watershed stakeholders can yield positive results.

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