



## Conestoga Reverse Auction Project, Pennsylvania, USA

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**Key Message:** Reverse auctions in the Pennsylvania Conestoga Watershed help farmers to reduce phosphorous content in local waterways.

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### 1. What is the problem?

330 miles of the Conestoga River and its tributaries have been listed as water quality impaired according to the Clean Water Act Section 303(d) list, primarily due to excessive nutrients and sediment. The nutrients of concern in the Conestoga River Watershed are nitrogen and phosphorus. Excess nutrients can cause nuisance algae growth, deplete oxygen levels, and decrease populations of certain aquatic species. The primary sources of nutrients include agricultural and urban runoff, construction activities, wastewater, septic systems, industrial discharges, and soil (streambank) erosion (Hintz, 2008).

### 2. Which approach was taken?

Two reverse auctions were conducted in Pennsylvania's Conestoga Watershed to demonstrate the effectiveness of using reverse auctions to allocate funding for environmental improvement. Unlike standard auctions where multiple buyers compete to buy goods from a single seller, in reverse auctions multiple sellers compete to sell goods to a single buyer. The effect is that in a reverse auction sellers bid prices down while in a standard auction buyers bid prices up. The total budget for the two auctions was \$490,000. The first auction was conducted in June 2005 and the second auction between October 2005 and February 2006. The purpose of these reverse auctions was to pay farmers to implement best management practice (BMPs) that reduced phosphorous (P) losses to local waterways based on how cost-effectively BMPs reduced P losses. The reverse auction project awarded approximately \$486,000 to farmers to implement BMPs that were estimated to result in over 92,000 pounds (lbs) of P reductions (Greenhalgh, et al. 2007).

### 3. What ecosystem services are considered, and how?

The primary ecosystem service considered here is the water purification service measured through water quality. The Conestoga River Watershed encompasses 475 square miles in

Lancaster County, with small portions of the watershed located in Chester, Lebanon, and Berks Counties. The watershed contains a varied landscape including large tracts of forested, urban, and rural land. While the area's population continues to grow, agriculture remains the dominant land use activity at 60 percent (Hintz 2008). Lancaster County's soil is among the most agriculturally productive in the country. The degradation of the water purification service in the watershed has impacted local waterway and also relates to the downstream eutrophication of the Chesapeake Bay (which is impaired by excess nitrogen).

#### **4. What input was required?**

Technicians from the Lancaster County Conservation District worked closely with farmers in the watershed to estimate the P reductions associated with the BMPs the farmers were interested in implementing. Phosphorus reductions were estimated using a version of World Resource Institute's NutrientNet tool (NutrientNet is a suite of web-based tools used to facilitate market-based approaches to improving water quality). In the first auction farmers entered their bids to implement specific BMPs based on U.S. Department of Agriculture Environmental Quality Incentive Program (EQIP) standard BMP costs and cost-share amounts, while in the second auction, farmers bid the price they were willing to accept to implement a BMP (which could exceed the EQIP BMP implementation costs). The bids were then ranked within NutrientNet based on the cost of each P reduction (i.e. \$/lb of P reduced). Based on this ranking, it was possible to determine the cut-off price where the auction budget was exhausted (Greenhalgh, et al. 2007). Any bid lower than the cut-off price was successful and funded. The average bid price for auction 1 and 2 was \$10.32 lb P and \$5.06 lb P respectively. Out of 23 bids in auction 2, only 13 bids were accepted. The range of bids was \$2.36 lb P - \$157.49 lb P. For the second auction, the auction cut-off price was \$54.33/lb P (ibid).

#### **5. What was the policy uptake and what were the conditions for this effort to influence public management?**

Andrew McElwaine, President & CEO of the Pennsylvania Environmental Council said that projects funded would reduce pollution from nutrients in the Conestoga River, Lancaster County, by over 4,300 pounds and sediment by 4,580 tons (McElwaine, 2005). Recognizing the benefits of this approach, in July 2006, the USDA piloted a reverse auction in their Wetlands Reserve Program to reduce the acquisition costs of wetland easements. The enrollment applications were prioritized according to an environmental benefits index determined by dividing the landowner bid by an environmental self-assessment score (Greenhalgh, et al. 2007). The pilot project demonstrated the value of using a reverse auction approach to reduce the cost of reducing P losses from farms compared to more conventional U.S. Department of Agriculture cost-share subsidy approaches such as those in the EQIP program (Selman, et al. 2008).

#### **References**

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