Market-based Incentives to Improve Water Quality:
Trading Program Examples

Mark S. Kieser
Senior Scientist
Kieser & Associates

and

Acting Chair
Environmental Trading Network
Presentation Overview

- Water Quality Trading overview
- State of WQT Markets
- Trading in Michigan
  - Trading infrastructure & tools
  - Calculating/registering credits
  - Emerging market information
- Lake Tahoe
- Streetsboro, Ohio
- Important program considerations
Trading Overview

A market-based tool for water quality improvements...

One pollutant source with high treatment costs pays another to make a voluntary and surplus pollutant reduction for a lower cost.

The Market... Buyers and Sellers of Pollutant Reductions
State of the Market...

- Most “trades” have been Point Source/Point Source
- Most trades focus on nutrients (and temperature)
- Concerted efforts for PS/NPS (a few bilateral trades -- local & small; mostly Ag credit generation)
- Growing interest in urban NPS/NPS trades
- Growing interest in multiple credits—air/water/habitat
- EPA WQT/wetlands – High costs, scale issues, no Wetland Mitigation Banking/WQT overlaps
- Environmental Group participation
- Confusion over trading definitions
- High transaction costs
- Fragmented and thin markets
Watershed Scale Trading Programs
Statewide Trading Programs
Michigan Water Quality Trading

• Rules were effective on November 22, 2002
• Program is Voluntary
• Goals:
  - improve water quality, optimize cost of achieving and maintaining water quality standards
  - create economic incentives for discharge reductions, pollution prevention & restoration programs
  - facilitate TMDLs, stormwater control programs and non-point source management practices
  - provide incentives for development of reliable quantification procedures
  - provide greater flexibility in watershed management
Statewide Rules Trading Rules (Michigan)

- Purpose
- Water Quality Benefit
- Restrictions
- Eligibility
- Closed/Open Trading
- Pollutants Traded
- Baselines
- Credits Generated
- Discount Factors
- Banking
- Notice Requirements
- Registry
- Trading ratios
- Program Evaluations
- Compliance/Enforcement
- Citizen Petitions
Types of Trading

• **Point source/Point source**
  (between permitted WWTPs)

• **Point source/Non-point source**
  (between permitted and non-permitted sources with voluntary credits)

• **Non-point source/Non-point source**
  (between regulated municipal stormwater permittees and unregulated agriculture)
Trading in Michigan
- **Planning:** Producer works with local certification process OR with a TSP/Planner to develop plan (privately or with a Farm Bill program).
- **Payment:** Farmer receives funds to implement plan from a bank OR a private buyer (after posting on NutrientNet).
- **Notice:** If credits formally offered for sale under MI Rules, notice is filed with MDEQ including farmer information.
- **Use:** Credits (and notice info.) get publicly posted on state registry.
Eligible Practices

- Gully Stabilization
- Streambank Stabilization
- Filter Strips
- Prescribed Grazing
- Conservation Tillage
- Conservation Cover
- Conservation Crop Rotation
- Cover Crop & Green Manure
- Critical Area Planting
- Stripcropping, Contour
- Stripcropping, Field
- Terraces
- Feed Lot Waste Management Systems
New Trading Efforts in MI
~ EPA 2004 Targeted Watershed Grant ~

- New trading infrastructure per MI rules
- State registry (credit tracking/use)
- Marketplace tools (connecting buyers & sellers)
- Banking schemes (credit aggregation)
- Brokerage opportunities
NRCS Conservation Planning Process

Standard edge of field sediment load (no nutrient delivery to surface waters)

How do I use this information to get into a trading program?
So if I want to add cover crops:

- What is the phosphorus reduction from my fields with this practice?
- How many credits could I generate for a trading market?

STEP 1: Sign in at [http://kalamazoo.nutrientnet.org](http://kalamazoo.nutrientnet.org) (on-line marketplace)
STEP 2: Working with my NRCS planner, select desired practice from the list of 24 options (for example, “Conservation Cover”).

Estimate Phosphorus Reduction

Instructions: To estimate phosphorus reductions for a proposed BMP, select the BMP from the list below.

Gully Erosion Management Practices
1. Grade Stabilization Structure
2. Grassed Waterway
3. Critical Area Planting in Areas with Gullies
4. Water and Sediment Control Basins

Streambank Channel Erosion Management Practices
5. Animal Trails and Walkways (and other animal stream exclusions)
6. Stream Channel Stabilization
7. Streambank Protection

Field Sheet and Rill Erosion Management Practices
8. Prescribed Grazing (w/ optional filter strips)
9. Residue Management, Mulch Till (w/ optional filter strips)
10. Conservation Crop Rotation (w/ optional filter strips)
11. Conservation Cover (w/ optional filter strips)
12. Cover and Green Manure (w/ optional filter strips)
13. Critical Area Planting (w/ optional filter strips)
14. Stripcropping, Contour (w/ optional filter strips)
15. Stripcropping, Field (w/ optional filter strips)
16. Filter Strip Only

Feedlot Runoff Management Practices
**STEP 3:** Planner or farmer enters data from conservation plan (contributing area, RUSLE2 values for before and after practice implementation, etc.)

<table>
<thead>
<tr>
<th>Estimation Tools</th>
<th>By BMP</th>
<th>My Account</th>
<th>Saved BMPs</th>
<th>View Farmers</th>
<th>Help</th>
<th>FAQ</th>
<th>Contact Support</th>
</tr>
</thead>
</table>

**Estimate Phosphorus Reduction**

Best Management Practice: Conservation Crop Rotation

Saved BMP #: SR-000043

Complete form to estimate Phosphorus reduction. Required fields are indicated in red.

<table>
<thead>
<tr>
<th>Farmer</th>
<th>Details</th>
<th>Location</th>
<th>Reduction</th>
<th>Auto-saved at 7:19 PM on 1/23/2007</th>
</tr>
</thead>
</table>

Enter characteristics of the field

- **Contributing Area (acres):**
  - 190
  - 10.5

- **RUSLE2 - before BMP (tons/acre/year):**
  - Loamy Sand

- **Soil Type:**
  - Loamy Sand

- **Phosphorus Concentration (lb/ton soil):** (leave blank if not known)

- **RUSLE2 - after BMP (tons/acre/year):**
  - 5.7

- **Filter strip:**
  - Yes

- **Will a filter strip be installed?**
  - Yes

- **Is the field directly connected to a waterbody or tile drain?**
  - Yes

- **Total Cost of BMP ($):**
  - 7000.00
STEP 4: Planner and farmer delineate field(s).
STEP 5: View phosphorus reductions and trading credits available. Farmer may wish to consider additional practices with planner for added value.
STEP 6: Register your credits online.

Phosphorus market history: Kalamazoo river basin

Offers to sell credits that have already ended are listed below.

<table>
<thead>
<tr>
<th>Ended with</th>
<th>Credits</th>
<th>Final price</th>
<th>Buy now</th>
<th>Bids</th>
<th>Ended</th>
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<td>$7.25</td>
<td>-</td>
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<td>$50.26</td>
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<td>-</td>
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<td>$10.10</td>
<td>-</td>
<td>2</td>
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<tr>
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<td>$22.63</td>
<td>-</td>
<td>-</td>
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<tr>
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<td>$40.98</td>
<td>-</td>
<td>-</td>
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<td>$32.00</td>
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<td>-</td>
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<tr>
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<td>$2.00</td>
<td>-</td>
<td>-</td>
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<td>-</td>
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<tr>
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<td>14</td>
<td>$96.59</td>
<td>-</td>
<td>-</td>
<td>12/3/04 08:00</td>
</tr>
</tbody>
</table>
Credit Registration Information

Notice of Generation (NPS)
- **General Information**: pollutant, name, address (person or company), location and source type
- **Baseline**: loads per month/yr, load allocation, measurement method
- **BMP implemented**: type, date, load reduction, cost-share funds/program
- **Total credits generated**

Notice of Use (PS)
- **General Information**: pollutant, name, address (person or company), location and source type
- **Discharge and credits per outfalls**: location, discharge limits, credits used (#, date, duration), notice of generation ID
- **Total credits purchased**
Notices of Generation/Use

- **“Notice of Generation” Form**
  - NOG submitted electronically to MDEQ for 30-day review period.

- **Pending Notices**
  - MDEQ determines whether Notices are complete and posts accepted notices to registry.

- **MDEQ Water Quality Trading Registry (database)**
  - Contains full information on Proposed Notices of Use & Generation, Completed Notices of Use & Generation

- **MDEQ Electronic Bulletin Board**
  - Public Access to limited Information on Proposed and Completed NOUs, and Completed NOGs

- **“Notice of Use” Form**
  - NOU submitted electronically to MDEQ for 30-day review period.

- **Board of Trade**
  - Public access to calculation tools, Board of Trade, Notice of Use forms and Notice of Generation forms

**Key:**
- Information accessible to MDEQ only
- Publicly available Information

**“NutrientNet”**
- Proposed NOU posted to Registry AND Electronic Bulletin Board.
Lake Tahoe Water Quality Trading Program Development

Location: CA & NV

Watershed Landuse: Urban, Forested & Recreational

Regulatory Driver: TMDL (Lake Clarity)

Commodities: TP, TN, Fine Sediments

Credit Sources: Urban stormwater, Streambanks

Trade Types: NPS/NPS

Program Highlights: Rigorous models & BMP efficiency data
Issue of Declining Water Clarity

• Stimulation of algae by phosphorus & nitrogen
• Fine sediment (<20 μm) from erosion and dust
• Tahoe TMDL addresses interaction between 3 pollutants as they affect Secchi depth
Lake Tahoe Clarity Model

DLM Hydrodynamic Model

- Land Use
- Atmospheric Deposition
- Tributaries
- Climate, Precipitation
- Abiotic Particles
- Light Scattering & Absorption
  - Secchi Depth
  - Loss
- Algal Growth
  - Loss
- Lake N, P, Si
- Groundwater
Water Quality Trading in a Data-rich Environment

- Existing WQT system applications
- Market design options
- Pollutant suitability
- Legal constraints (MEP, local policy)
- TMDL baselines
- Supply & demand
- Economic attractiveness
- Market structure & infrastructure
- Units of trade (cross-pollutant)
- Trading zones (subwatershed; nearshore/open lake)
- Cross-media trading
- Operational protocols and governance
- Electronic trade/credit tracking system
Housing growth may hurt water quality
Potential Streetsboro development issue highlighted by study

By Deborah Guziak
Record-Courier staff writer

STREETSBORO — Developing land in south Streetsboro will hurt the quality of the ground water recharge and surface water purification provided by identified natural resources in that area of the city, according to a recent study.

The findings were part of a study by Applied Ecological Services Inc. of Wisconsin and performed by Steve Aptelbaum and Andrew Fang of Keiser & Associates of Michigan.

The study covered 1,200 acres of land that included Sahbra Farms, a sand and gravel operation, the property for the proposed Del Webb and the vacant land belonging to the Streetsboro Board of Education, as well as a few smaller parcels.

The study, which was done with a grant from the Great Lakes Protection Fund, measured municipal infrastructure maintenance costs, sediment and contaminant loading estimates and increases in stormwater volume. It showed that improper land use is more costly to communities.

Previous studies by Applied Ecological Service Inc. and the Davey Resource Group mapped, defined and rated important natural resources of the 1,200 acres. The studies were commissioned by the Portage County Regional Planning Department.

The studies stated the south sector of the city is "known to be one of Portage County's highest volume clean potable water supplies, possessing some of the highest producing ground water wells in the county."

The "clean, potable water source, combined with the composition of the substrate provides very efficient ground water recharge resources." It also was identified as "highly vulnerable to ground water contamination."

Currently, the Streetsboro Land Group is seeking to develop a Del Webb community for active adults ages 50 and older on 463 acres of property within the study area. The development is considered a standard subdivision, meaning it is all housing.

People who live in a standard subdivision, which is the most common type

See Study, page A10

- Nutrient TMDLs
- Low assimilative capacity
- Habitat loss (wetlands, forests)
- Stormwater (flows)
- Water supply
- CSOs

Drivers for watershed payments
High Priority Natural Resource Areas

Legend
- Road
- R.R.
- River or Stream
- Municipality of Streetsboro
- Greenway
Natural Resource Inventory: Agricultural Areas

Legend

- Road
- R.R.
- River or Stream
- Municipality of Streetsboro
- Natural Resource Inventory
- NRI Class
  - Agricultural
  - Developed
Natural Resource Areas: Forest and Wetlands

Legend
- Road
- R.R.
- River or Stream
- Municipality of Streetsboro
- Natural Resource Inventory
- NRI Class
- Forested
- Wetland/Water Feature
Public/Private Sector Opportunity

- Land parcels (~ 1,200 acres in total) with high ecological values under development pressure
- *Conservation development strategy* proposed to preserve/enhance natural features
- Cost savings/increased net profit with conservation development vs. standard subdivision development
- Additional incentives with loading reductions, habitat restoration & permanent protection, increased recharge, greenspace, public trailways, baseflow augmentation…(i.e., “payments”)
Conservation Development
Annual Savings

Roadways: $180,000 - $1,080,000
Stormwater volume/quality: $16,800 - $52,600
GW recharge offsets: $400,000 - $2,500,000
Habitat mitigation: $1,000,000 - $1,700,000

Total = $1.6M - 5.3M/year for 1,200 acres
Water Quality Trading Market

Drivers: Nutrient TMDLs

Market size: Load reduction requirements (current loads minus load allocations). For example: phosphorus (lbs/yr)

<table>
<thead>
<tr>
<th>PS</th>
<th>NPS</th>
<th>Septic systems</th>
<th>Growth allowance</th>
<th>CSOs</th>
<th>Lake Rockwell</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>50,581</td>
<td>116,942</td>
<td>11,190</td>
<td>16,965</td>
<td>29,994</td>
<td>6,196</td>
<td>231,868</td>
</tr>
</tbody>
</table>

Market value: $2.3 million annually (assuming 2:1 trading ratio and $5/lb cost of load reduction)
Drivers: urbanization and wetland mitigation requirements

Market size: estimated to be 2,000 acres in the next 10 yrs based on

-- an annual urbanization rate of 1.8%
-- 6% of all land developed is wetland

Market value: $163 million in 10 years, assuming

-- 2:1 mitigation ratio
-- $39,000/acre price for mitigation bank
**Water Quantity Market**

**Drivers:** City of Akron’s water needs from...

1) Demand with growth: 4.8 MGD; and/or
2) Lake Rockwell minimum release requirement: 5MGD

**Market size:** estimated to be 178 MG/yr for flow augmentation based on average 37 days of low flow period annually

**Market value:**

1) **$3.9M** in 10 years with buying and pumping water from quarry lakes; or
2) **$4.9M** in 10 years with building infiltration basins
What to consider...

• Programs vary by local social-political, geographic, and physical conditions
• Don’t force trading if market forces lacking or other alternatives are working
• Proceed when stakeholders realize benefits
• Be prepared for resistance
• Tap into other program designs and adapt
• Use local champions
• Don’t think you that you can forecast every scenario or condition
• Be prepared to spend time and money
• DON’T always believe what you read
Common Trading Elements for Agriculture

- Trading has *buyers, sellers & regulators*
- Brokering to provide separation from permits
- Private contracts
- Standardized calculation approaches
- Defined list of BMPs
- Technical assistance/conservation planning
- Practice verification
- Market infrastructure (communications, tracking)
- Market pricing
- Some information disclosure required
- Voluntary, but failure to follow rules has risks
# Emerging Market Information

<table>
<thead>
<tr>
<th>Trading Program Location</th>
<th>Buyer Treatment Costs ($/lb P)</th>
<th>Ag Credit Price Range ($/lb P)</th>
<th>Average Credit Price ($/lb P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michigan</td>
<td>292</td>
<td>3 – 652</td>
<td>--</td>
</tr>
<tr>
<td>Ohio</td>
<td>23.37</td>
<td>1 – 12</td>
<td>1.50</td>
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<tr>
<td>PA</td>
<td>30 - 3,000</td>
<td>6 – 113</td>
<td>9.27</td>
</tr>
<tr>
<td>Ontario</td>
<td>775</td>
<td>156</td>
<td>--</td>
</tr>
</tbody>
</table>
Future Market Potential (?)

FARM INCOME
Greenhouse Gas Emissions Trading at $5/Ton

- **$3.7B** for N and C credits from N and manure management to offset WWTP N reductions (Short-lived with new WWTP technology)
- **$2.4B** for 80M acres of perennial crops for cellulosic biomass on sensitive lands (greater N reductions)
Critical considerations for future WQT markets

• Greatest potential in overlapping environmental commodities (robust market opportunities)
• Investment scale – local bilateral trades vs. regional (interstate) watershed trading
• Regulatory drivers (enforcement)
• Market certainty (regulatory buy-in/recognition)
• Credit definition/standardized quantification
• Brokering/credit aggregation
• Access to market information (board of trade)