Central Big Sioux River Watershed
Environmental Markets
Environmental Market Programs for Pollutant Reductions

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Project Background

**Who:** Moody County Conservation District

**What:** Evaluated environmental market approaches

**How:**
- Establish a Technical Review Team
- Benchmark salient programs
- Assess pollutant suitability
- Assess financial attractiveness
- Develop market rules and infrastructure
- Test program framework
- Public outreach
Project Area
Environmental Markets Considered

• Water Quality Trading

• Payment for Ecosystem Services (PES)
  PES program -- A buyer pays another entity to provide a new environmental benefit
  - **Municipality Examples:**
    - Reduce nitrates in wellhead protection areas for drinking water supply
    - Reduce stream peak flows and/or increase the base flows
    - Reduce water quality parameter loadings upstream of river reaches flowing through the city

• Basic PES program currently in operation
Pollutant Suitability Assessment

- **Total Suspended Solids**
- *E. coli* bacteria – A pathogen, and used as an indicator of other pathogens
- Are there adequate load reduction drivers?
- Consideration of persistence throughout different flow regimes
- Determination of supply to demand ratios
- Equivalent water quality parameter forms?
Big Sioux River and *E. coli* Persistence

- Diversion Channel

Bacteria Contributions to BS 11 During Exceedances
Suitability Findings

- Cost effective, pennies on the dollar
- Environmental markets alone are not sufficient
- Agricultural/urban sources are not fully comparable regarding forms of pathogens
- *E. coli* bacteria have a limited persistence
- The river diversion structure increases complexity
  - Upper BS-10 and the unnamed tributary to Skunk Creek have limited potential for offsetting local stormwater loading with agricultural generated credits
  - In key reaches, bacteria is not completely flushed away
- Inadequate load reduction driver for total suspended solids
Enhanced Payment for Ecosystem Services Options

- Public transparency
- Third party checks and balances
- Application and/or request for projects windows (e.g., open windows, reverse auctions, etc.)
- Cost-effective site selection

Program transparency and third party oversight strengthens support when requesting longer permit compliance schedules and/or a variance.
Pilot Testing

- Three landowners/livestock producers in the Skunk Creek Watershed have agreed to test the protocols
  - One livestock feeding operation
  - Two livestock grazing operations
Pilot Test Conservation Measures

Seasonal Riparian Area Management (SRAM) (Before) (After)
Pilot Test Conservation Measures

**AFO Heavy Use Lots; Bacteria in Runoff Loads Streams During Large Events (Before)**

**Move Cattle to Remote, Mono-slope Barns Sites; Preventing Runoff (After)**
SRAM Monitoring
SRAM Monitoring

- Water Quality monitoring results

E. Coli

Box Plot of *Escherichia coli* (cfu/100mL) for four sites on Skunk Creek
National Water Quality Initiative

- Beneficial Use: Limited Contact Recreation
- Daily Maximum Standard: 1,178 cfu/100mL
- Geometric Standard based on 5 samples: 630 cfu/100mL

TSS

Box Plot of Total Suspended Solids (mg/L) for four sites on Skunk Creek
National Water Quality Initiative

- Beneficial Use: Warmwater Marginal Fishery
- Daily Max Standard = 263 mg/L
- 30-day Average Standard = 150 mg/L
Thank you!

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