CEAP-ARS Economic Analysis

Team Leaders:

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CEAP Objective 4

Selection and placement of conservation practices to optimize:

1) Profit maximization at the farm level

2) Environmental outcome at the watershed level

3) Program efficiency
Objective: Profit maximization at farm level
Objective: Profit maximization at farm level

Constrained by:

land area
Objective: Profit maximization at farm level

Constrained by:

land area

crop
Objective: Profit maximization at farm level

Constrained by:

- land area
- crop
- yield
Objective: Profit maximization at farm level

Constrained by:

- land area
- crop
- yield
- labor
Objective: Profit maximization at farm level

Constrained by:

- land area
- crop
- yield
- labor
- fertilizer
Objective: Profit maximization at farm level

Constrained by:

- land area
- crop
- yield
- labor
- fertilizer
- pesticides
Objective: Profit maximization at farm level

Constrained by:

- land area
- other costs
- crop
- yield
- labor
- fertilizer
- pesticides
Objective: Profit maximization at farm level

Constrained by:

- land area
- crop
- yield
- labor
- fertilizer
- pesticides
- other costs
- ownership
Conservation practices

Add more constraints

- BMP cost
- change in available land
- change in nonpoint source emissions
- location in watershed
- incentive payments for adoption
Environmental Quality

Environmental performance index

Shows whether conservation practice has improved production of “goods” relative to “bads”

Data from output of physical models
– SWAT, AnnAGNPS

Calculated using DEA, add more constraints
Program/Policy efficiency

**Definition:** cost/ change in nonpoint source agricultural pollution

**Program** - USDA conservation programs

**Policy** - TMDL, command and control

- Permit trading
- Green taxes
- Court orders (e.g., buffer strips)
Efficiency of Green Tax – nutrient runoff reduction
Comparison of Green Tax and Regulatory Reduction

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<th>Percent difference in policy efficiency</th>
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<th>30</th>
<th>60</th>
<th>90</th>
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- No Barley or Wheat

Map showing the comparison of Green Tax and Regulatory Reduction across different regions.
NFSPRC Beowulf Cluster

- 24 Pentium 4 processors (2.4 GHz) processor, 1 GB of RAM,– 12 with hyperthreading technology

- 24 port, 1 Gbit/s (gigabit/second) ethernet switch

- Integrated INTEL 10/100/1000 Mbps NIC

- 24 ports - KVM switches

- Linux, Fedora Core2, kernel version 2.6.5smp
CEAP-ARS Deliverable

Database of Pareto optimal solutions

Nutrient (ppm)

Basin Revenue

Nutrient (ppm)

Basin Profit

Sediment (ppm)

Farm Profit

Program Efficiency

Farm Profit

Sediment (ppm)