V (A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Natural Resources and Environment

2. Brief summary about Planned Program

The Census of Agriculture reports decreasing numbers of mid- and large-sized farms and a significant increase in the number of small farms. Small acreage owners/operators frequently may not possess much agricultural or business knowledge. AES and Extension will address the needs of small acreage producers and work with agricultural industry personnel and governmental agencies to assure that land managers and communities can evaluate a broad range of opportunities to enhance viability while respecting the environment.

AES and Extension programs address the growing competition for finite water, land, and air resources in a state with a growing human population by:

- educating agricultural and resource industry professionals;
- researching technical and economic issues related to improved resource utilization; and
- enhancing international competitiveness.

3. Program existence: Mature (More than five years)

4. Program duration: Long-Term (More than five years)

5. Expending formula funds or state-matching funds: Yes

6. Expending other than formula funds or state-matching funds: Yes
V (B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

<table>
<thead>
<tr>
<th>KA Code</th>
<th>Knowledge Area</th>
<th>%1862 Extension</th>
<th>%1890 Extension</th>
<th>%1862 Research</th>
<th>%1890 Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>Appraisal of Soil Resources</td>
<td>0%</td>
<td>10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>102</td>
<td>Soil, Plant, Water, Nutrient Relationships</td>
<td>30%</td>
<td>10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>103</td>
<td>Management of Saline and Sonic Soils and Salinity</td>
<td>0%</td>
<td>10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>104</td>
<td>Protect Soil from Harmful Effects of Natural Elements</td>
<td>1%</td>
<td>0%</td>
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<td></td>
</tr>
<tr>
<td>111</td>
<td>Conservation and Efficient Use of Water</td>
<td>15%</td>
<td>15%</td>
<td></td>
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</tr>
<tr>
<td>112</td>
<td>Watershed Protection and Management</td>
<td>3%</td>
<td>10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>121</td>
<td>Management of Range Resources</td>
<td>20%</td>
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<tr>
<td>122</td>
<td>Management and Control of Forest and Range Fires</td>
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<td></td>
<td></td>
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<tr>
<td>123</td>
<td>Management and Sustainability of Forest Resources</td>
<td>5%</td>
<td>10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>124</td>
<td>Urban Forestry</td>
<td>5%</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>131</td>
<td>Alternative Uses of Land</td>
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<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>132</td>
<td>Weather and Climate</td>
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<td>10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>134</td>
<td>Outdoor Recreation</td>
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<td>0%</td>
<td></td>
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<tr>
<td>403</td>
<td>Waste Disposal, Recycling, and Reuse</td>
<td>0%</td>
<td>10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>605</td>
<td>Natural Resource and Environmental Economics</td>
<td>5%</td>
<td>5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Development of management practices that are compatible with a high quality environment requires new methods of study that involve entire agro-eco-systems. Quantitative relationships between agriculture, natural resource use, and environmental quality must be defined. This will require a more thorough understanding of basic biological/ecological processes, as well as computer-aided systems management research. Continuing to use natural resources to produce agricultural, range, and forestry products requires new multiple use strategies which are realistic in terms of biological, economic, social and environmental constraints. Transport and fate of pesticides, fertilizers, and other agricultural chemicals, as well as threatened and endangered species, biodiversity, habitat, wetlands, and water are all issues of concern. Knowledge must be developed to understand and evaluate competitive land use impacts and interactions on agricultural, range, and forest lands. This research provides the basis for developing agricultural and forestry management systems that are more compatible with conservation and environmental goals.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V (D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Colorado State is in the ideal geographic position to address irrigated agro-eco-system level issues. Colorado has a wide diversity of water supply/management regimes that include ground water, diverse surface water management in five river systems, and various diversions of West Slope water. Faculty have an international reputation in agro-eco-system modeling and soil carbon dynamics and associations with the NSF Long Term Ecological Research Short-Grass Prairie unit near Ault, the USDS-ARS Great Plains Systems Unit in Akron, a five-university dry-land agriculture research team, the modeling group at the Natural Resources Ecology Laboratory on campus, atmospheric sciences research programs at CU and CSU, the US Geological Survey, USDA-NRCS, USDA-ERS, a strong set of dry land cropping extension agents, and the dry land crops industries. Colorado State has field research laboratories at Walsh, Rocky Ford, Ft. Collins, Cortez, Center, Orchard Mesa, Rogers Mesa, and Fruita capable of experimentation on cropping systems. State and grant funding will continue at current levels to provide facilities and support required to conduct an applied, field based research and outreach program.

2. Ultimate goal(s) of this Program

Programs will sustain and/or improve the quality and quantity of Colorado's natural resources and environment. The following activities will help achieve this goal:

- Conduct natural resources research to develop agricultural and forestry management systems that are compatible with conservation and environmental goals and economically sustainable.
- Study the effects of climate and climate variation on plant, animal and microbial ecosystems to allow an assessment of the impacts of global change on agricultural and natural ecosystems.
- Develop and test technical, institutional, or social solutions to water quality and quantity problems in Colorado.
- Develop technologies for managing agricultural and municipal wastes.
- Provide educational programs for urbanites on horticultural practices and the environment resulting in less pollution and more efficient water use.
- Sustain local agriculture while lessening adverse impacts on the environment.

V (E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

<table>
<thead>
<tr>
<th>Year</th>
<th>Extension</th>
<th></th>
<th></th>
<th>Research</th>
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<tr>
<td>2012</td>
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<td>0.0</td>
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<td>2014</td>
<td>30.0</td>
<td>0.0</td>
<td>11.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>
V (F). Planned Program (Activity)

1. Activity for the Program

- Conduct workshops and educational classes for producers, landowners, and agency personnel.
- Establish demonstration plots and field days to share research and outreach results.
- Consult with individual producers and landowners to address local problems.
- Conduct basic and applied research on environmental and natural resources issues.
- Conduct natural resources research to develop agricultural and forestry management systems that are compatible with conservation and environmental goals and economically sustainable.
- Develop and test technical, institutional, or social solutions to water quality and quantity problems in Colorado.
- Develop technologies for managing agricultural and municipal wastes.
- Provide educational programs for urbanites on horticultural practices and the environment resulting in less pollution and more efficient water use.
- Sustain local agriculture while lessening adverse impacts on the environment.

2. Type(s) of methods to be used to reach direct and indirect contacts

| Extension |
|-----------------|-----------------|
| Direct Methods  | Direct Methods  |
| Education Class | Public Service Announcement |
| Workshop        | Newsletters      |
| Group Discussion| Web sites        |
| One-on-One Intervention | Other 1 (Radio spots) |
| Demonstrations  |                  |
| Other 1 (Field Days) |               |

3. Description of targeted audience

Individual agricultural producers, landowners, commodity groups, regulatory agencies, agribusinesses, and local, state, and federal land management agencies.

V (G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) to be reached through direct and indirect contact

<table>
<thead>
<tr>
<th>Year</th>
<th>Direct Contact Adults</th>
<th>Indirect Contacts Adults</th>
<th>Direct Contacts Youth</th>
<th>Indirect Contacts Youth</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Target</td>
<td>Target</td>
<td>Target</td>
<td>Target</td>
</tr>
<tr>
<td>2011</td>
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<td>2000000</td>
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</tr>
<tr>
<td>Year</td>
<td>Direct Contact Adults</td>
<td>Indirect Contacts Adults</td>
<td>Direct Contacts Youth</td>
<td>Indirect Contacts Youth</td>
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<tr>
<td>------</td>
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</tr>
<tr>
<td>2015</td>
<td>20000</td>
<td>2000000</td>
<td>2500</td>
<td>0</td>
</tr>
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</table>

2. (Standard Research Target) Number of Patent Applications Submitted

<table>
<thead>
<tr>
<th>Year</th>
<th>2011:0</th>
<th>2012:0</th>
<th>2013:0</th>
<th>2014:0</th>
<th>2015:0</th>
</tr>
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</table>

3. Expected Peer Review Publications

<table>
<thead>
<tr>
<th>Year</th>
<th>Research Target</th>
<th>Extension Target</th>
<th>Total</th>
</tr>
</thead>
<tbody>
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<td>2011</td>
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<td>2014</td>
<td>25</td>
<td>45</td>
<td>0</td>
</tr>
<tr>
<td>2015</td>
<td>25</td>
<td>45</td>
<td>0</td>
</tr>
</tbody>
</table>
V (H). State Defined Outputs

1. Output Target

- Number of attendees at workshops/trainings/field days.
  
  2011: 15000  
  2012: 15000  
  2013: 15000  
  2014: 15000  
  2015: 15000

- Amount of grant dollars garnered to support natural resources research and outreach.
  
  2011: 1000000  
  2012: 1000000  
  2013: 1000000  
  2014: 1000000  
  2015: 1000000

- Number of Master Gardener and Wildlife Master volunteer hours
  
  2011: 55000  
  2012: 55000  
  2013: 55000  
  2014: 55000  
  2015: 55000

- Value of volunteer time at $20.25/hr. (nationally recognized value.)
  
  2011: 1000000  
  2012: 1000000  
  2013: 1000000  
  2014: 1000000  
  2015: 1000000

- Number of volunteers supporting this program.
  
  2011: 2000  
  2012: 2000  
  2013: 2000  
  2014: 2000  
  2015: 2000

- Number of partnering agencies supporting this program.
  
  2011: 200  
  2012: 200  
  2013: 200  
  2014: 200  
  2015: 200

- Number of new technologies adopted by producers.
  
  2011: 3  
  2012: 3  
  2013: 3  
  2014: 3  
  2015: 3

- Pounds of food donated to local food banks through Master Gardener efforts.
  
  2011: 30000  
  2012: 30000  
  2013: 30000  
  2014: 30000  
  2015: 30000

- Number of curriculum pieces developed and/or reviewed in support of this planned program.
  
  2011: 5  
  2012: 5  
  2013: 5  
  2014: 5  
  2015: 5

- Number of Small Acreage Workshops Delivered
  
  2011: 6  
  2012: 6  
  2013: 6  
  2014: 6  
  2015: 6
• Number of Demonstration Plots established/maintained to share research and outreach results

• Number of field days conducted to share research and outreach results

• Number of individual producers and/or landowners receiving consultation to address local problems.

• Number of Native Plant Master Volunteer Hours

• Value of Native Plant Masters' volunteer time (at $20.25/hour)

• User fees in dollars, collected through Natural Resources & Environment programming

V (I). State Defined Outcome

<table>
<thead>
<tr>
<th>O. No</th>
<th>Outcome Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Percent of participants in workshops/trainings/field days indicating an increase in knowledge gained about agriculture/horticultural practices and the environment.</td>
</tr>
<tr>
<td>2</td>
<td>Percent of participants indicating change in behavior/best practices adopted.</td>
</tr>
<tr>
<td>3</td>
<td>Economic impact in dollars reported as a result of the change in behavior.</td>
</tr>
<tr>
<td>4</td>
<td>Percent of participants gaining knowledge to change irrigation practices in order to provide a cleaner environment.</td>
</tr>
<tr>
<td>5</td>
<td>Percent of participants indicating they changed behavior in order to have less pollution and more efficient water use.</td>
</tr>
</tbody>
</table>
**Outcome # 1**

1. **Outcome Target**

   Percent of participants in workshops/trainings/field days indicating an increase in knowledge gained about agriculture/horticultural practices and the environment.

2. **Outcome Type** : Change in Knowledge Outcome Measure

<table>
<thead>
<tr>
<th>Year</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>60</td>
</tr>
<tr>
<td>2012</td>
<td>60</td>
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<tr>
<td>2013</td>
<td>60</td>
</tr>
<tr>
<td>2014</td>
<td>60</td>
</tr>
<tr>
<td>2015</td>
<td>60</td>
</tr>
</tbody>
</table>

3. **Associated Knowledge Area(s)**

   - 101 - Appraisal of Soil Resources
   - 102 - Soil, Plant, Water, Nutrient Relationships
   - 103 - Management of Saline and Sodic Soils and Salinity
   - 111 - Conservation and Efficient Use of Water
   - 121 - Management of Range Resources
   - 123 - Management and Sustainability of Forest Resources
   - 124 - Urban Forestry
   - 131 - Alternative Uses of Land
   - 132 - Weather and Climate
   - 403 - Waste Disposal, Recycling, and Reuse
   - 605 - Natural Resource and Environmental Economics

4. **Associated Institute Type(s)**

   - 1862 Extension

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**Outcome # 2**

1. **Outcome Target**

   Percent of participants indicating change in behavior/best practices adopted.

2. **Outcome Type** : Change in Action Outcome Measure

<table>
<thead>
<tr>
<th>Year</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
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<tr>
<td>2012</td>
<td>50</td>
</tr>
<tr>
<td>2013</td>
<td>50</td>
</tr>
<tr>
<td>2014</td>
<td>50</td>
</tr>
<tr>
<td>2015</td>
<td>50</td>
</tr>
</tbody>
</table>

3. **Associated Knowledge Area(s)**

   - 102 - Soil, Plant, Water, Nutrient Relationships
   - 103 - Management of Saline and Sodic Soils and Salinity
   - 111 - Conservation and Efficient Use of Water
   - 121 - Management of Range Resources
   - 123 - Management and Sustainability of Forest Resources
   - 124 - Urban Forestry
   - 131 - Alternative Uses of Land
   - 132 - Weather and Climate
   - 403 - Waste Disposal, Recycling, and Reuse
4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target
Economic impact in dollars reported as a result of the change in behavior.

2. Outcome Type: Change in Condition Outcome Measure


3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 103 - Management of Saline and Sodic Soils and Salinity
- 111 - Conservation and Efficient Use of Water
- 112 - Watershed Protection and Management
- 121 - Management of Range Resources
- 123 - Management and Sustainability of Forest Resources
- 124 - Urban Forestry
- 131 - Alternative Uses of Land
- 403 - Waste Disposal, Recycling, and Reuse
- 605 - Natural Resource and Environmental Economics

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 4

1. Outcome Target
Percent of participants gaining knowledge to change irrigation practices in order to provide a cleaner environment.

2. Outcome Type: Change in Condition Outcome Measure


3. Associated Knowledge Area(s)

- 111 - Conservation and Efficient Use of Water
4. Associated Institute Type(s)
   - 1862 Extension
   - 1862 Research

**Outcome # 5**

1. Outcome Target

Percent of participants indicating they changed behavior in order to have less pollution and more efficient water use.

2. Outcome Type: Change in Knowledge Outcome Measure

<table>
<thead>
<tr>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
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<tbody>
<tr>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>

3. Associated Knowledge Area(s)

   - 101 - Appraisal of Soil Resources
   - 102 - Soil, Plant, Water, Nutrient Relationships
   - 111 - Conservation and Efficient Use of Water
   - 605 - Natural Resource and Environmental Economics

4. Associated Institute Type(s)

   - 1862 Extension

V (J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

   - Natural Disasters (drought, weather extremes, etc.)
   - Economy
   - Appropriations changes
   - Public Policy changes
   - Government Regulations
   - Competing Programmatic Challenges

Description

Local, state, and federal funding changes will impact ability to conduct programs. Significant changes in regulatory environment could dramatically alter the scope and goals of both research and extension programs. This is most notable in Colorado with respect to policies affecting use of public lands and both surface and ground water. Both water quantity and water quality are critical issues to the future of agriculture in the semi-arid west. More and more agricultural producers are operating in a market-oriented, individual-responsibility environment, with less reliance on price supports. Producers are moving toward differentiated, consumer-oriented products.

V (K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned
• After Only (post program)
• Before-After (before and after program)
• During (during program)
• Case Study

**Description**

Regular pre-post evaluations are used. Formative evaluations are often used during programs to adjust focus and direction. Case studies are used to clearly demonstrate impact.

2. **Data Collection Methods**

• Sampling
• Case Study
• Observation
• Tests

**Description**

Pre-post tests and standard survey methods.