2007 The State University Combined Research and Extension Plan of Work

1. Name of the Planned Program.

Natural Resources and the Environment and Agricultural and Biosystems Engineering

2. Program knowledge areas.

- KA 102 Soil, Plant, Water, Nutrient Relationships (15%)
- KA 104 Protect Soil from Harmful Effects of Natural Elements (5%)
- KA 112 Watershed Protection and Management (10%)
- KA 123 Management of Forest Resources (8%)
- KA 131 Alternative Uses of Land (5%)
- KA 133 Pollution Prevention and Mitigation (15%)
- KA 134 Outdoor Recreation (10%)
- KA 141 Air Resource Protection and Management (15%)
- KA 402 Engineering Systems and Equipment (10%)
- KA 405 Drainage and Irrigation Systems and Facilities (7%)

3. Program existence

- Long Term (more than five years)

4. Program duration

- Long Term (more than five years)

5. Brief summary about Planned Program

Management of all natural resources, including water, land, air, and other resources are important for sound environmental stewardship. The focus areas of this plan of work encompass all of these resources. As part of this program area we will conduct programming with the ultimate goal of:

- Improving clients' management of Iowa's natural resources ensuring both economic and resource sustainability,
- Protecting and enhancing Iowa's air, soil, wildlife, and woodland, and water resources in concert with agriculture, recreation, and urban land uses,
- Enhancing energy conservation and production of energy from Iowa's renewable resources.
- Providing leadership in developing a culture of environmental stewardship to protect air, soil, wildlife, woodland, and water quality and to increase adoption of technologies and systems that protect and enhance natural resources.
- Increasing adoption of integrated crop-livestock production systems to improve farm profitability and environmental quality,
- Engaging communities in protecting and enhancing Iowa's natural resources,
- Developing long-term, sustainable, and economically and environmentally sound plant production systems to conserve and enhance Iowa's natural resources.
6. Situation and priorities

Management of all natural resources, including water, land, air, and other resources, within the constraints of farm production systems and communities are prerequisite for sound environmental stewardship. Inappropriate management can lead to potential environmental degradation. To maintain economic viability of agricultural operations there will be an increased need to ensure environmental stewardship.

- Environmental consequences are especially pertinent to nitrogen, phosphorus, carbon, and sulfur, with respect to land, water, and air.
- Soil erosion continues to be the number one pollutant in the state of Iowa. Pollutant loadings, in general, are a primary concern at state and federal levels.
- Uncertainties of health impacts and nuisance related to exposure to agricultural odors and emission of other gases are a prominent concern in rural parts of Iowa. Odor along with nitrogen ($\text{NH}_3$, $\text{NO}_x$, $\text{N}_2\text{O}$), methane, and hydrogen sulfide are most pertinent to air resources.
- Wildlife conservation, energy utilization, and community water issues are part of our natural resources that merit protection.
- Development of strategies to address utilization and preservation of these natural resources and education on the issues surrounding adverse consequences will help Iowans better understand and practice environmental stewardship.

7. Assumptions made for the Program

There is an ever increasing concern about the quality and degradation of our natural resources including air, land, and water resources. For example, in Iowa the number of waters on the EPA Impaired Waters List is greater than 200. In addition, there is a growing concern about air quality around large animal feeding operations. While there is a recognition and understanding that some natural resource concerns are related to urban settings, much of the air and water quality concerns are related to agricultural production. With this, there is a need for programming and development of agricultural best management practices that reduce the environmental impacts of agricultural production. This focus on stewardship of natural resources needs to also encompass wildlife conservation and energy utilization. The stewardship of natural resources is important nationally but particularly important to the economic vitality of Iowa. We believe programming under this plan of work can help maintain and enhance the condition of our natural resources, increase the adoption of practices that will reduce the environmental impacts of agricultural production, and assist with developing strategies for addressing natural resources concerns. Since natural resources concerns involve many stakeholders, participants and targeted audience members for this plan of work include producers, citizens, public health officials, agency personnel, and regulators.

8. Ultimate goal(s) of this Program

Goal: Address air and water quality along with other environmental issues of Iowa through programming targeted at producers, citizens, public health officials, and regulators.

Goal: Increase the adoption of conservation practices that control soil erosion, minimize sediment transport, and reduce nutrient export.

Goal: Increase the adoption of practices that reduce nitrate export from subsurface drainage.

Goal: Increase the understanding of water quality issues and problems associated with poor stewardship practices.
Goal: Increase the use of indices and diagnostic tools along with other performance measures to
document progress toward improved nutrient management.

Goal: Identify site-specific strategies and facilitate the implementation of these strategies to
improve air quality and address related concerns.

Goal: Increase the adoption of practices that reduce impacts to air resources.

Goal: Understand and evaluate the economic impact of management of natural resources.

Goal: Change the attitudes and practices of how Iowans use and protect natural resources
including woodlands, wildlife, energy, and community resources.

Goal: Increase the adoption of energy conservation practices by crop farmers, livestock
producers, and homeowners.

9. Scope of Program

In-State Extension
In-State Research
Multi-state Integrated Research and Extension

Inputs for the Program

10. Expending formula funds or state-matching funds

   • Yes

11. Expending funds other than formula funds or state-matching funds

   • Yes

12. Estimated amount of professional FTEs/SYs to be budgeted for this Program

<table>
<thead>
<tr>
<th>Year</th>
<th>Extension 1862</th>
<th>Extension 1890</th>
<th>Research 1862</th>
<th>Research 1890</th>
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<tr>
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<tr>
<td>2011</td>
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Outputs for the Program

13. Activity (What will be done?)

   • Curriculum for each targeted group, fact sheets, and web-accessible tools for decision
     making.
• Targeted programming to address policy issues as they arise including response to public comment documents, development of hard copy materials and resources for regulators and policymakers.
• Produce, update or revise handbooks, newsletters, and bulletins as appropriate.
• Hold workshops, field days, farm/field visits, and satellite and web-based sessions as appropriate.
• Develop strategies and programs to increase community (citizen) involvement.
• Develop and execute educational programs about the Conservation Security Program (CSP).
• Develop and execute educational programs about indices and diagnostic tools (e.g. P-Index) that can be used to improve nutrient management.
• Develop and execute educational programs on methods to conserve energy.
• Develop educational programs to preserve environmental benefits of the Conservation Reserve Program (CRP) and other conservation programs when the programs change.

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

<table>
<thead>
<tr>
<th>Extension</th>
<th>Direct Methods</th>
<th>Indirect Methods</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>• Conferences</td>
<td>• Curriculum</td>
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<td></td>
<td>• Field meetings</td>
<td>• Publications and fact sheets</td>
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<td>• Workshops</td>
<td>• Web site</td>
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<td>• Farm/field visits</td>
<td>• Decision aids</td>
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<td></td>
<td>• Satellite and web-based sessions</td>
<td>• Handbooks</td>
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<td>• Newsletters</td>
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15. Description of targeted audience.

Crop and livestock producers
Private citizens
Public health officials
State agencies
Conservation planners
Landowners
Homeowners

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

<table>
<thead>
<tr>
<th>Year</th>
<th>Direct Contacts Adults</th>
<th>Indirect Contacts Adults*</th>
<th>Direct Contacts Youth</th>
<th>Indirect Contact Youth</th>
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<tbody>
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<td>87000</td>
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<td>2009</td>
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<td>Target</td>
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<td>2010</td>
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<td>91000</td>
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<tr>
<td>2011</td>
<td>8000</td>
<td>93000</td>
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* Each website hit is assumed to be an indirect contact
17. (Standard Research Target) Number of patents.

<table>
<thead>
<tr>
<th>Year</th>
<th>Target</th>
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<tbody>
<tr>
<td>2007</td>
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<td>2008</td>
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<td>2010</td>
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18. Output measures

Output Text: Number of research projects completed to identify site-specific strategies and application of these strategies in order to improve air quality and address related concerns.

2007 Target: 3
2008 Target: 3
2009 Target: 3
2010 Target: 3
2011 Target: 3

Output Text: Number of research projects completed to identify strategies and application of these strategies in order to improve water quality and address related concerns.

2007 Target: 4
2008 Target: 4
2009 Target: 4
2010 Target: 4
2011 Target: 4

Output Text: Number of research projects completed to understand and evaluate the economic impact of management of natural resources.

2007 Target: 2
2008 Target: 2
2009 Target: 2
2010 Target: 2
2011 Target: 2

Outcomes for the Program

19. Outcome measures

Outcome Text: Number of producers that participate in programming directly focused on increasing the adoption and implementation of conservation practices.

2007 Target: 1000
2008 Target: 1000
2009 Target: 1100
2010 Target: 1100
2011 Target: 1200

Outcome Text: Number of producers that participate in programming directly focused on adoption of practices that reduce nitrate export from subsurface drainage.

2007 Target: 500
2008 Target: 500
2009 Target: 500
2010 Target: 500
2011 Target: 500
Outcome Text: Number of landowners participating in programs to increase their understanding of water quality issues and related adverse consequences following poor stewardship practices.
2007 Target: 1200
2008 Target: 1200
2009 Target: 1200
2010 Target: 1200
2011 Target: 1200

Outcome Text: Number of producers that participate in programming directly focused on utilization of indices and diagnostic tools along with other performance measures to document progress toward improved nutrient management.
2007 Target: 600
2008 Target: 600
2009 Target: 600
2010 Target: 400
2011 Target: 400

Outcome Text: Number of producers that participate in programming directly focused on increasing the number of livestock production sites that adopt practices that reduce impacts to air resources.
2007 Target: 400
2008 Target: 500
2009 Target: 600
2010 Target: 600
2011 Target: 600

Outcome Text: Number of Iowans that participate in programming directly focused on the adoption of practices that protect natural resources including woodlands, wildlife, energy, and community resources.
2007 Target: 1000
2008 Target: 1000
2009 Target: 1000
2010 Target: 1000
2011 Target: 1000

Outcome Text: Number of Iowans that participate in programming directly focused on increasing the adoption of energy conservation practices.
2007 Target: 500
2008 Target: 500
2009 Target: 600
2010 Target: 600
2011 Target: 600

20. External factors which may affect outcomes.

- Iowa DNR and national rules and regulations relative to water quality, air quality, and natural resource management.
- Reauthorization of the Farm Bill.
- Internal resources.


- Implementation of conservation practices such as no-till, buffers, and wetlands will be evaluated by reviewing and surveying conservation implementation information from the Iowa NRCS.
- To evaluate benchmark conditions relative to the use of tillage practices through the survey data developed by the Conservation Technology Information Center (CTIC) will be used to evaluate whether there are changes in the implementation of conservation tillage practices. In addition, specific state surveys through active projects at Iowa State
University such as the Iowa Learning Farm project that document conservation practices will be used to evaluate potential changes on the landscape.

- Implementation of the Iowa Phosphorus Index will be evaluated by surveying the Iowa DNR relative to manure management plans that effectively incorporate the Iowa Phosphorus Index.
- To evaluate implementation of best management practices relative to manure management through the number of manure spills and accidents documented by the Iowa DNR will be reviewed to assess improvement in reducing the number of incidents.
- Increased participation in water quality projects will be evaluated by surveying state agency personnel and documenting the number of local watershed groups active in water quality projects.
- The incorporation of stewardship curricula in classrooms in Iowa will be evaluated by documenting the number of schools (elementary and secondary) that communicate with ISU Extension about incorporating stewardship curricula in their classrooms.
- General awareness in natural resource issues will be evaluated by reviewing overall attendance at Extension sponsored natural resource programming and changes in attitudes will be evaluated through use of program surveys and evaluations.
- Adoption of conservation practices by urban and suburban landowners will be evaluated by documenting the number of Extension programs directly targeted to this audience, the overall attendance at Extension sponsored programming, and changes in attitudes will be evaluated through use of program surveys and evaluations.
- Overall evaluation of all objectives relative to this plan of work will document the overall attendance at Extension sponsored programming, web-site hits and publication distribution and changes in attitudes will be evaluated through use of program surveys and evaluations.

22. Data Collection Methods.

- Sampling
- Whole Population
- Survey
- Mail (surface, electronic)
- Telephone
- On-site
- Interview
- Structured/unstructured
- Case study
- Observation
- Portfolio reviews
- Tests
- Journals
- Other