

CSREES Portfolio Review Expert Panel Report Summary

Portfolio 5.2 Soil, Air, and Water CY 1999 – 2003

REPORT

External Review Completed: February 2005

Portfolio Overview

This portfolio encompasses agency-wide activities because it addresses fundamental natural resource issues necessary to support agricultural productivity and resilient rural and agricultural communities. It is for this reason that the NRE Unit leadership initiated and implemented the Environment and Natural Resources (ENR) working group. This is an agency-wide group that takes into consideration the interconnectedness of all programs, functions, funding resources, and program leaders involved in research, education, and extension activities. ENR is comprised of individuals from each program unit within the agency and is intended to provide a more comprehensive and integrated approach to the programs that comprise this portfolio.

This portfolio was prepared using the agency-wide ENR working group which is also being utilized to plan, develop, and implement natural resource and environment related programs at the agency level. It consists of research, extension, and education programs aligned with 13 Knowledge Areas (KAs) to provide science-based knowledge and education to improve the management of soil, air and water. The KAs addressed are as follows:

- KA 101 Appraisal of soil resources
- KA 102 Soil, plant, water, nutrient relationships
- KA 103 Management of saline and sodic soils and salinity
- KA 104 Protect soil from harmful effects of natural elements
- KA 111 Conservation and efficient use of water
- KA 112 Watershed protection and management
- KA 131 Alternative uses of land
- KA 132 Weather and climate
- KA 133 Pollution prevention and mitigation
- KA 141 Air conservation and management
- KA 403 Waste disposal, recycling, and reuse
- KA 405 Drainage and irrigation systems and facilities
- KA 605 Natural resource and environmental economics

This integrated systems approach takes into account that the ability to sustain production while growing the economy requires more efficient production practices, better management of the resource base, and finding uses and markets for raw materials. There is also a need to restore degraded lands to some level of productivity through reclamation and remediation. Understanding how these natural systems respond to cultivation and introduced species is critical for maintaining environmental quality and conserving the resource. Additionally, science-based knowledge is needed so that these resources can best be protected in order to promote a sense of well-being and security for our citizens. Because of industrialization and land use and the land cover change, our planet is changing. Understanding global change and the effects on climate and production practices are critical to sustainability and our agricultural economy. Better understanding of the role soil, air, and water play in the production and offset of greenhouse gases and their implication to national policy in a global environment is needed. The portfolio encourages interdisciplinary approaches to addressing these issues. Similarly, many of the activities are integrated in nature and encompass research, education, and extension components.

Comments on R&D Criteria & Dimensions

In 2005, a panel comprised of independent experts from the field was convened to assess and score the current state of the Soil, Air, and Water Portfolio. A discussion of specific comments and recommendations related to each of the dimensions of the three Office of Management and Budget (OMB) research and development (R&D) criteria used (relevance, quality, and performance) is provided below.

Relevance

Scope

The variety of projects is exceptional, and the scope is very good in relationship to the available resources. Some areas are exceptional, for example, the air and water aspects of the portfolio. Research is sufficiently described, however, more extension and education examples are needed.

About 50 percent of CSREES funding comes through either formula or earmarks so apparently CSREES has little ability to monitor, let alone direct research, education, and extension efforts for half of its portfolio. More specific targeting of RFAs would demonstrate relevancy, especially to emerging topics.

Focus

The portfolio is focused with KAs that include contemporary and cutting edge technology. There is evidence of curiosity in seeking out what new knowledge needs to be found i.e., air resources, climate, and land use. It seems like CSREES, via competitive, formula, and earmarks, is able to quickly change direction when new critical needs are identified.

How proposal selection balances national need and regional priorities needs to be more clearly articulated. How are "national problems" defined? Are they an aggregate of local and state needs? Clarify that national needs emerge from dialog sessions between national, state and local stakeholders. How long does CSREES stay with a topic and how does it judge that the need has been met?

Emerging Issues

The portfolio shows evidence of identification of emerging issues through stakeholder involvement at the local, state, regional, and national levels, through close working relationships and partnerships with land-grant universities, other appropriate federal agencies, professional societies, advisory groups, and Congress. CSREES often seems to lag in involvement in areas, e.g. global change, air quality. More focused involvement (NPL or RFA) occurs many years after topics are being addressed by many other agencies. CSREES does not always identify new areas and lead initiatives, but rather develops programs on issues identified by others. There is a need to better tie indications of emerging issues to trend analysis. That will be possible when the data exist.

Integration

The panel finds this is the weakest part of relevance and understands this short-coming is due to the lack of data availability. Better integration of research, education, and extension is needed. It seems like an overemphasis on research with a limited number of examples of truly integrated research, education, and extension. Each KA needs a section on integration of CSREES research, education, and extension efforts. This information should be explicitly requested for both formula funds and grants.

Multidisciplinary Balance

The Knowledge Area-ENR working group approach is a good way to promote multi-disciplinary balance. Each KA needs a section on multidisciplinary balance. The agency should explicitly request multidisciplinary balance in formula funds and competitive RFAs. Is agency review of proposals the only means of ensuring multidisciplinary approaches?

While frequent mention is made of importance of economics and other social sciences, it is unclear how successfully they are actually incorporated in projects. Inclusion of social sciences will strengthen the portfolio and greatly assist in developing better performance indicators and measurements.

Quality

Significance

The panel notes that significance is hard to assess. Outputs are not really documented. The outputs and findings cited are far from complete and some appear dated. The time span was covered by the examples is not clear. The emphasis on inputs and outputs makes it harder to assess outcomes and impacts, i.e., significance.

More data are needed on outputs, e.g., publications, patents, and other items noted in the logic model. Better definitions are needed of expected outcomes, impacts, and metrics from the program mapping effort. The panel notes that this information currently is being developed by CSREES.

Stakeholder Input

The panel notes good formal and informal procedures (listening sessions, annual meetings, conference participation, requests for RFA comments, and direct requests from NPLs) are used to obtain stakeholder input. However, as written, stakeholder assessment is largely invisible, notwithstanding that several projects do have stakeholder advisory committees/panels. How is this impact assessed? Where is acknowledgement of CARET, ECOP, ESCOP, NASULGC? The role of CARET and NASULGC and its sub-groups needs to be more transparent in the self-review document. Stakeholder views could include EPA, NRCS, and other federal agencies. The panel recommends one large stakeholder session (input or listening) or many regional sessions with the purpose of crafting a plan for natural resource management and environmental economics.

How is customer satisfaction identified? The panel suggests that perhaps CSREES should attempt to engage non-traditional stakeholder groups to ensure that research conducted, and the education and extension to follow, truly are focused on solving the problems of the ultimate user of such information – farmer, consumer, etc. The panel recommends the agency require a stakeholder advisory panel on all grants over \$250,000. Going beyond typical input, NRE should initiate customer satisfaction/end user surveys throughout its portfolio to more meaningfully inform the assessment process.

Portfolio Alignment

NPLs should stay current on cutting edge science through annual meetings of scientific societies, meetings with land-grant scientists across disciplines, and other agencies. CSREES needs to do a better job explaining its 5-year priorities. Most scientists and administrators at land-grant universities would not know what CSREES priorities were except as explained in year-to-year RFAs.

Alignment seems appropriate assuming peer-review panels are well-selected, and this selection process should be specified. The peer/merit review process employed by CSREES helps ensure alignment with current state of science-based knowledge and previous work. More information is needed on how projects build on previous work. There was more evidence of peer-reviewed publications, patents, etc, from work funded. These data are reported by the partners and should be captured in some way. The next step would be to show alignment with ARS, FS, and NRCS programs.

Appropriate Methodology

The panel notes no documentation of methodologies. NPLs are clearly current with respect to knowing the latest methodologies and tools. The peer review process must be rigorous. Economics expertise should always be included in RFA development.

Performance

Portfolio Productivity

The panel notes no quantitative measures of productivity, and the lack of data precludes intelligent observations. If extension and higher education activities aren't known, then how can productivity be assessed? It is not satisfactory to rely on NPL site visits and word of mouth. Productivity expectations need to be explicitly defined. Impacts are difficult to assess without measures to benchmark performance. Quantitative targets or benchmarks need to be part of all programs and the tracking and promulgation of program accomplishments over time. Require scientists to define the impact of their work or consider their project not completed. Reward those who respond and are timely. The panel would like to see a break out of accomplishments among the types of funding (formula, competitive, earmark) to see which are more productive. Issues of evidence and documentation along with implementation of a better reporting system must be completed before the next review.

How are results showcased and promoted? Results must be shared in specific ways with the public according to various audiences. CSREES should identify their key users of information and document impacts and outcomes for them. The panel suggests three key user groups: scientific community, policy makers, and stakeholders, including agriculture producers and businesses. RFAs should include in project/work plan assessments, the replicability or applicability of results to other situations nationally. Include all agencies who use/apply/rely on the data to show leveraging that IS NOT duplicative – i.e., follow through on the honeycomb. Global impact is missing. Include foreign governments as one of the ways your work is used.

Portfolio Comprehensiveness

While the portfolio is highly diverse, completeness is not explicitly provided. Good “outcomes” are stated for economics, waste disposal, and pollution prevention. The panel recommends more discussion on federal oversight, and makes the point that stakeholders are not the only evaluators.

Portfolio Timeliness

Timeliness is not really documented. Data are needed on how many projects met their objectives on time and how this compares with other agencies (e.g., NSF, NASA, etc.). While there is a procedure in place for assessing timeliness of competitive research grants (beginning/ending dates, etc), there is little evidence of procedures to assess the timeliness of extension and education programs.

Agency Guidance

Portfolio management is superior with the trifecta of RFAs, NPL management and leadership, and plan of work guidance. Suggestions for improvement include the need to emphasize pursuit of “innovative” proposals – specifically refer to earlier research/projects, etc, and the need to explicitly show what CSREES has done to take leadership in guidance.

Portfolio Accountability

Long-term outcomes often are not expressed as actually having happened (i.e., need to identify measures that will be used to determine outcomes), but as projections of if/then clauses. What if a recipient missed a deadline or milestone?

Panel suggestions for improvement include discussion on how an accountability emphasis can stifle creativity if not managed carefully and how competitive grants can erode base programs.

General Comments

We thank CSREES for the opportunity to serve as the review panel for 5.2. This was an invaluable experience, and we are wholeheartedly appreciative of the important work CSREES funds. We have made observations and recommendations, which we think will enhance the agency's efforts.

We are impressed with all the hard work done by NPLs, the writing team leader, the deputy administrator, and the planning and accountability staff. We appreciate the development and nurturing of the ENR network of national program leaders. We find the management guidance of NPLs clearly current with the latest methodologies, and believe they work hard to carry out the agency's mission.

The portfolio review and our discussions with CSREES staff demonstrate how important our partnership is to both CSREES and the land-grant system. Continued interactions with land-grant faculty across multiple disciplines and with other agencies will help CSREES promulgate desired changes. The panel also made recommendations to achieve consistency in the future portfolio review process and to advance the global impact of CSREES program successes.

Comments on Future Directions Presented by CSREES

There are a number of areas where the panel felt sincere and swift efforts need to be made in order to get NRE and perhaps, CSREES as a whole, to a new level of operational excellence. The CSREES Administrator and NPLs can take a leadership role through workshops, meetings, and conferences to demonstrate new and innovative ways of working collaboratively. These include changes in how members of the partnership operate when it comes to responding to Requests for Applications, the use of the logic model framework throughout the partnership (including formula funds), greater coordination with other stakeholders and partners, and the meaningful planning, collection, interpretation, and reporting of data about the successes of CSREES-funded projects.

Data Issues

Development of the new unified data collection system should be accelerated to standardize documentation for research, extension, higher education, and integrated programs, including their outputs, outcomes, and impact. Additionally, better data matrices and criteria of success are needed. Impact assessments and logic models need to be tightly woven into the new reporting system. A feedback loop is needed for scientists about the quality of their work and reports. Institutional partners need to be involved in the development and implementation of the system.

The agency should not just rely passively on CRIS, which does not reflect today's data and reporting needs. A new data system should consolidate, cluster, and renumber KAs in the CRIS system, as appropriate, creating a crosswalk that goes from the old numbers to the new numbers and fully integrating the old CRIS system with the new database system.

Data that can also illustrate what is happening on a state-by-state level across a number of funding lines would help illuminate the magnitude of CSREES's contributions. CSREES should seek to place its goals and measures in context, compared to organizations such as NASA, NSF, NOAA and EPA. This would help CSREES measure the impact of its investments and how it stacks up against those agencies. (This is also the approach that OMB takes.)

Evaluation Issues

Higher education programs are very poorly described, and the document needs to be bolder in trumpeting successes, including the use of portfolio results by others, i.e. other federal agencies, foreign governments, the private sector, and the public. More relevant examples of successes are needed for each KA. Failures could also be included, together with how problems have been addressed. This would demonstrate the self-correcting capacity of the KA. (This also addresses accountability mechanisms, which are addressed in different terms in the financial portion of the PART assessment).

Miscellaneous Evaluation Issues

The portfolio document could be strengthened to show how efforts are impacting the adoption of technology. CSREES needs to find some ways to measure or assess public adoption of the technology and to define outcomes in terms of public benefit.

It would be useful to have a comparative table of the CSREES program areas with ARS program areas. Identify and list the distinguishing features of CSREES research in comparison with ARS research.

Summary of Comments and Recommendations

The panel recommends enhancing multi-disciplinary contributions. CSREES still has barriers to equally valuing research, education, and extension, which real or perceived, need to be removed. NPLs need to be equally informed across all three components so they can provide a more comprehensive package when attending meetings and making site visits.

Better integration of research, education, and extension is a must. To every extent possible, the CSREES calls for proposals and programs should require and award points for applicants who effectively integrate all three components in their proposals. Some consideration should be given to how rapid response and innovation can be infused into CSREES funding.

Coordination with the partnership in all areas, including priority setting, must be accelerated. So much can be gained with NPLs getting out and sharing CSREES goals, logic models, aspirations, and so forth.

The panel encourages CSREES to find ways to encourage multi-disciplinary and integrated efforts with formula funds. Since formula funds are a large part of the CSREES budget, influencing the direction and effective reporting of program activities supported by these funds can create large, beneficial shifts in thinking and behavior.

Particularly important in a new organizational paradigm is the inclusion of economists and other social scientists on proposal writing teams so they can help design the tools to measure and understand human behavior associated with choices that might be required by the development of new technology or a new management protocol. This improved understanding would, in turn, allow for a more realistic assessment of the likely impact (as opposed to the potential impact) of new knowledge, technologies, or practices.

More comprehensive resource management plans and reporting can be created with the help of animal scientists. The role of environmental risk assessment in selecting activities or applications is a good means of prioritizing the most important environmental issues. Gap analyses are needed for soil and air. Efforts to fund the new unified database must be aggressive.

NRE should look for niche areas where CSREES and its institutional partners have a competitive advantage. The ENR working group, and all of CSREES, should start visioning and planning for how the U.S. will meet its needs for natural resource-related scientists in the future and how CSREES can help support the training of these scientists.

Finally, the panel suggests growing external relationships. Begin intensifying the relationship with the National Science Foundation and others so that dollars can be pooled for even greater impact. Collaborate with other grant-giving agencies to identify complementary goals in specific KAs, and fine-tune RFAs accordingly to prioritize those goals. Share information about KAs and activities with agencies/entities who might be able to use the information, or for whom this might spark interest. Perhaps most important of all, information-sharing will help avoid duplication of effort. Reach out not only to "agriculture" entities, but also to "environmental" ones. This is critical, especially in terms of state government.

Portfolio Score

Portfolio 5.2 received a total score of 81 from the panel. This score places the portfolio in the category 'moderately effective in supporting CSREES objectives.'