United States Department of Agriculture
Cooperative State Research, Education, and Extension Service,
Office of the Administrator

Self-Review for 2006 Portfolio Review Expert Panel

Portfolio 2.1: Expand Economic Opportunities through Economic and Business Decision-Making

Supporting Objective 2.1: Expand Economic Opportunities in Rural America by Bringing Scientific Insights into Economic and Business Decision-making

CSREES *Goal 2: Support Increased Economic Opportunities and Improved Quality of Life in Rural America*

For the period 2000-2004

Executive Summary

Through the highly effective efforts in this portfolio, CSREES produced the following long-term impacts on rural communities in America:

- New and strengthened businesses that contributed to community and family economic stability.
- Management strategies that improved natural resource and ecological conditions.
- Reduced financial and health risks that improved economic and lifestyle conditions.
- Improved rural economic development opportunities and prosperity.
- New research methods that led to more cost efficient and relevant creation of knowledge.

The executive Office of Management and Budget (OMB) requires that all Agencies use the OMB Program Assessment Rating Tool (PART) to systematically examine and rate their efforts and ability to achieve stated objectives, goals, and missions. Agencies are also directed to conduct independent evaluations of their programs and report on these in the PART. CSREES has responded to this directive by implementing the Portfolio Review Expert Panel (PREP). The Office of the Administrator convenes the panels of external experts, commissions self-review papers from relevant program managers, and receives the panel's report and recommendations. The self-review papers provide comprehensive yet concise insight into activities so that the expert panels may assess whether CSREES is fulfilling OMB's requirements for relevance, quality, and performance. The PREP addressed OMB's primary interest, the outcomes and impacts of agency work. This report specifically focuses on work supporting CSREES Strategic Objective 2.1: Expand economic opportunities in rural America by bringing scientific insights into economic and business decision-making.

CSREES-sponsored research, education, and extension work is funded from multiple authorities and funding sources. To fully articulate this integrated, mission-related work, portfolios of topically linked issues are aligned with the five USDA Strategic Goals, and 14 CSREES Strategic Objectives. This work is categorized in Agency databases by knowledge area (KA) codes, a listing of which on the Agency's website. Portfolio 2.1 includes seven related Knowledge Areas integrating research, education, and extension. This portfolio is one of two self-review documents addressing Goal 2: Support increased economic opportunities and improved quality of life in rural America. It is prepared by National Program Leaders (NPLs) assisted by staff from the Office of Planning and Accountability. This portfolio and the related KAs demonstrate the capacity of integrated efforts of research, education, and extension to solve national problems and to ensure that public investment is effective and efficient. The portfolio report includes detailed descriptions of activities and results.

Portfolio 2.1 represents efforts of CSREES to "expand economic opportunities in rural America by bringing scientific insights into economic and business decision-making." Activities in this portfolio included investments in new knowledge to inform stakeholders about a community's capital; the rural economy - poverty, jobs, farms, and firms; rural infrastructure and services; in order to improve the governance, leadership, planning, and civic engagement; and response to accelerating changes in technology, demography, and the global economy.

During the period of this review, farmers, ranchers, business people, communities, and facilities across the country have faced challenges and new opportunities. As change accelerated, CSREES programs in rural and community development helped people and communities position themselves for a more prosperous and secure future. Because community and community institutions have been the focal points of these efforts, CSREES investments have been directed toward advancing knowledge in agriculture, the environment, human health and well-being, and communities. Among the smallest portfolios in CSREES in terms of dollars invested, a key strategy in this portfolio is to use its federal investments to leverage other funds and resources to support and sustain comprehensive, locally led economic and community development.

Challenges in rural areas differ significantly from those in urban areas. Small-scale, low-density settlement patterns make it more costly for rural communities and businesses to provide critical services. Declines in agricultural jobs and income have forced many workers to seek new sources of income, and today many small farmers rely on off-farm work for the lion's share of their support. Five hundred thousand U.S. farmers have household incomes below the poverty line. Low-skill, low-wage rural manufacturing industries must find new ways to meet the challenges of an increasing number of foreign competitors. Additionally, changes in the availability and use of natural resources in rural areas have further affected people who earn a living from these resources, as well as those who derive recreational and other benefits from these natural amenities. Finally, there have been rapid changes in both communication technologies and demographics. Some rural areas have met these challenges head on, achieved prosperity, and are ready to move into the next century. Other rural areas have kept up with change at some level, but have little capacity to adapt further. Still other rural areas are not well positioned for the future.

CSREES is engaged in a unique partnership with other federal agencies, states, institutions and the private sector focused on solving these problems. Vital work over the period of review was done through research, education and extension activities. Research activities included studying community assets and systems, understanding the linkages between local economies and contributing industries, assessing opportunities to diversify the economic base, creating accurate and precise economic models and decision-support tools, understanding conflicts & management strategies, understanding leadership and community dynamics. Education activities included instructing & training undergraduates & graduates, as well as other public & private professionals about social, economic, infrastructure, and environmental aspects of community development; leadership & participatory decision making; understanding and application of decision- support tools; community asset mapping; feasibility analysis. Extension education created local capacity through, leadership development; understanding local culture, traditions and change; creating and embracing opportunity; economic assessment and planning; accessing and applying community development resources and tools; creating and managing institutions; and fostering entrepreneurship.

As documented in this review, CSREES' work has contributed to the quality of life in rural America. These accomplishments are noted for the years 2000 to 2004, but their direct and indirect results will continue well into the future. Increasing the availability of human and financial resources will increase opportunities for advances being made within this portfolio, which may lead to improvements in rural America as well as the nation's overall well-being. While significant work has been accomplished, additional work needs to be done.

From the portfolio analysis applied here, we were able to identify emerging issues that need attention in the coming years. Through listening sessions with stakeholders, and attending public forums, CSREES program leadership has been actively monitoring the leading-edge knowledge and trends in economic and business decision-making in rural communities. Additionally, through the review process, we learned and identified the following highly significant issues and trends. Within the four central themes these are:

Improved Decision-Making in Community Planning and Development
One research trend is the application of the "Community Capitals" approach to community development research. Other issues include analyzing the distribution of benefits from community development initiatives, the examination of community governance, farm viability, and migration patterns.

Stewardship of Natural Resources
Greater emphasis will be placed on ecosystem research and management at the landscape scale. More interdisciplinary approach will be applied to outdoor recreation management analysis with broader collaborations across public and private sector participants. There will be increased monitoring of recreational sites on both public and private lands. Finally, there will be greater efforts to identify and remove policy and institutional barriers to equitable access to outdoor recreation services.

Provision of Decision-Enhancing Management Tools for Farmers and Agribusinesses
Continued focus on providing decision-enhancing tools to help farmers and agribusinesses adapt to greater uncertainty and risk; and continued efforts in improving the understanding of the sources of uncertainty, and the development of educational curricula. Part of this will be done through Extension that packages and delivers vital information to producers and businesses. Lastly, more formal management techniques will be adopted that allow for greater flexibility in agricultural business operations.

Development of Economic Theory, Program Design, and Statistical Methods
This theme is more process focused then the ones above. That is, the topics focus on the how CSREES and partner knowledge is developed, transmitted and converted into practical applications for rural America. It includes the development of theory behind agriculturally oriented economics, statistics, programs and education, as well as investigations of their communication and delivery. Emerging issues here are:

- Implications of risk and uncertainty on forecasting and resource allocation decisions;
- New conceptual approaches to handling risk and uncertainty;
- Focus on insurance and other devices for helping rural America mitigate risk;
- Advances in the application of statistically based tools in remote sensing & imagery, using global positioning system (GPS) data and statistical algorithms;
- Efforts to use statistical methods to reduce public fears of bio-technology;
- Programmatic innovations similar to the SARE model; and,
- Educational programs to improve communication and delivery of knowledge.

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Section II – Portfolio Discussion: Expand Economic Opportunities through Economic and Business Decision-Making

Portfolio Assessment Report

INTRODUCTION

Rural America is home to 49 million people – 20 percent of the nation's population – and comprises 75 percent of the nation's land. Rural people and places are challenged by profound social, economic, technological, and demographic changes. Although endowed with physical, natural, human, and organizational assets, many other factors, including geography, infrastructure, history, economy, leadership, civic engagement, and institutional capacity, affect the ability of rural people and rural communities to mobilize these assets to address the changes and challenges they face and to capitalize on new opportunities. While agriculture is still critical to many areas, it is not sufficient to insure the prosperity of rural people and places.

This portfolio represents the five year (2000-2004) efforts of CSREES and its stakeholders to enhance the security and prosperity of rural people and places through research, education, outreach, and extension. It thereby addresses USDA/CSREES **Strategic Goal 2:** ***Support increased economic opportunities and improved quality of life in rural America***.

Portfolio 2.1 represents the more specific efforts of CSREES to "expand economic opportunities in rural America by bringing scientific insights into economic and business decision-making." Activities in this portfolio include investments in new knowledge to inform stakeholders about a community's capital; the rural economy - poverty, jobs, farms, and firms; rural infrastructure and services; in order to improve the governance, leadership, planning, and civic engagement; and response to accelerating changes in technology, demography, and the global economy.

During the period of this review, farmers, ranchers, business people, communities, and facilities across the country have faced challenges and new opportunities. As changes accelerated, CSREES programs in rural and community development helped people and communities position themselves for a more prosperous and secure future. Because community and community institutions have been the focal points of these efforts, CSREES investments have been directed toward advancing knowledge for agriculture, the environment, human health and well-being, and communities. Among the smallest portfolios in CSREES in terms of dollars invested, a key strategy reflected in this portfolio is to use our federal investments to leverage other funds and resources to support and sustain comprehensive, locally led economic and community development.

Challenges look very different in rural areas than in urban ones. Small-scale, low-density settlement patterns make it more costly for rural communities and businesses to provide critical

services. Declines in agricultural jobs and income have forced many workers to seek new sources of income, and today many small farmers rely on off-farm work for the lion's share of their support. Five hundred thousand U.S. farmers have household incomes below the poverty line. Low-skill, low-wage rural manufacturing industries must find new ways to challenge the increasing number of foreign competitors. Additionally, changes in the availability and use of natural resources in rural areas have further affected people who earn a living from these resources, as well as those who derive recreational and other benefits from these natural amenities. Finally, there have been rapid changes in both communication technologies and demographic shifts. Some rural areas have met these challenges head on, achieved prosperity, and are ready to move into the next century. Other rural areas have kept up with change at some level, but have little capacity to adapt further. Still other rural areas have fallen behind and are not well positioned for the future.

It is assumed that rural communities have an intense resolve to thrive and need only the opportunity to prosper. Furthermore, while opportunity may take many forms, communities are best at deciding their own outcome and allocating resources accordingly; that smart, sustainable economic development can take place and quality of life can improve; and CSREES programs in support of these efforts require a systems approach in their design and implementation. By providing knowledge to enhance community investment in infrastructure, human capital, natural resources and the environment, financial security, and social/partnership capital, CSREES programs support, and funding encourage prosperity and improvements in the quality of life in rural American communities.

Finally, the leaders and managers of this portfolio are continually improving the overall effectiveness and value of the research, education and extension projects within it by:

- Subjecting proposals to rigorous merit review processes;
- Improving the quality of new knowledge and knowledge transfer through the application of new analysis methodologies;
- Increasing the relevance of projects through the collection and use of stakeholder input;
- Coordinating the development and delivery of products to minimize duplication and target the scope of the collective outputs; and,
- Ensuring fiscal responsibility through budget development and accountability.

OVERVIEW

The purpose of this self-study is to characterize a body of work undertaken by CSREES to help accomplish the Agency's mission:

> *To advance knowledge for agriculture, the environment, human health and well-being, and communities.*

CSREES has five Strategic Goals which support our vision and mission and align with USDA's Strategic Goals. Specifically, this portfolio describes investments by CSREES and its partners that contribute to Goal 2 of CSREES' strategic plan:

Strategic Goal 2 - Support Increased Economic Opportunities and Improved Quality of Life in Rural America

In detailing Goal 2, the strategic plan states,

> The economic opportunities and quality of life enjoyed by residents and businesses in communities depend significantly on their capacity to take full advantage of the resources available to them, and to adjust to changing circumstances. The well-being and needs of communities and their residents vary widely. Minorities are especially likely to be disadvantaged due to poverty, lack of access to education and health care, and limited opportunity for high-wage employment. Disparities are found among communities across America in income, savings, education, housing, and other quality-of-life measures. CSREES promotes the well-being of America through research, analysis, and education to better understand the economic, demographic, and environmental forces affecting regions and communities, and using knowledge to develop strategies that make maximum use of local assets. Through higher education, research, and extension, CSREES supports the education and training of residents and community and business leaders to help their communities thrive in the global economy.

Strategic Goal 2 is defined by two closely related strategic objectives.

> Strategic Objective 2.1: Expand Economic Opportunities in Rural America by Bringing Scientific Insights into Economic and Business Decision Making
>
> Strategic Objective 2.2: Provide Science-Based Technology, Products and Information to Facilitate Informed Decisions Affecting Quality of Life in Rural Areas

This document focuses on strategic objective 2.1. Objective 2.2, although inextricably related to objective 2.1, is not described in this document. It is discussed in the self-review of Portfolio 2.2. Users of this document may conclude that other agency programs (including those responsive to objective 2.2) would be well suited to inclusion in this document. However, three sometimes subjective factors drove the classification of programs into these particular KAs and ultimately into their respective portfolios. These were: 1) choices made by researchers, educators, and extension professionals to categorize their own work, 2) decisions made by CSREES as to best fit of a given KA within the Agency's strategic plan, and 3) the inclusion of KA's that were in the CSREES domain but had not been covered by earlier portfolio work. The organization of this portfolio remains true to the criteria in the most recent classification systems.[1]

CSREES' Strategic Plan expands upon Strategic Objective 2.1, adding,

[1] The evidentiary materials supporting this portfolio (available on site during the review) will include other related self-review documents to provide information on where seemingly missing yet related information is reported.

> A sustainable local economy is a major factor in creating stronger communities and fostering a desirable social and economic environment for individuals, families, firms, and the community as a whole. A strong economy gives residents access to meaningful, financially rewarding employment, and it is the foundation of the tax base that supports vital public services such as education, law enforcement, fire protection, health care, and recreation. Understanding the dynamics of the economy and the policies and programs that promote economic activity is critical to success.

In furtherance of this strategic objective, CSREES supports the generation, dissemination, and use of research-based information and knowledge as the foundation for new and innovative economic opportunities for communities and to assist public and private sector leaders in their decision-making on rural issues.

A total of seven knowledge areas (KAs) will be described in this report. However, the strategies and performance criteria for Goal 2, Objective 2.1 are only associated with the four specific knowledge areas described in this portfolio, KAs 134, 602, 608 and 609. The three other KAs, 901, 902, 903 were not covered in earlier portfolio work and were added to this portfolio in order to complete a portfolio review of all KAs in this cycle. As stated previously, these KAs are not mutually exclusive, as some of the work classified under them also has been reported in other related portfolios; some work reported here may relate to other portfolios. These Knowledge Areas are used by Principle Investigators to code their work. KAs represent a vast number of research, education, extension, and integrated activities, only some of which can be detailed in this document.

The Knowledge Areas classified under Portfolio 2.1 include:

- KA 134 – Outdoor Recreation
- KA 602 – Business Management, Finance and Taxation
- KA 608 – Community Resource Planning and Development
- KA 609 – Economic Theory and Methods
- KA 901 – Program and Project Design, and Statistics
- KA 902 – Administration of Projects and Programs
- KA 903 – Communication, Education, and Information Delivery

Four of these KAs are uniquely appropriate in a portfolio of research, education and extension efforts that leads to expanded economic opportunities and advances in economic and business decision making. These are:

- KA 134 – Outdoor Recreation;
- KA 602 – Business Management, Finance and Taxation;
- KA 608 – Community Resource Planning and Development; and
- KA 609 – Economic Theory and Methods.

KA 134 is closely related to rural community decisions regarding amenities, land and resource use and so will closely follow. The projects in KA 602 had a significant and direct impact on

rural localities through improving farmers and communities approach to crop and financial risk management, but they are somewhat separable from community governance decisions, because they are implemented through regional centers. KA 608 is the broadest in scope, and the work there covered a wide range of rural community activities and processes. Finally, KA 609 contains the activities involved with the development of economic and statistical theories behind the models and datasets of rural community development decision-making,

The remaining three KAs have the common feature that they add value to other areas of research and education through the examination of concepts, methodologies and theoretical underpinnings of economic analysis, program & project design, and delivery. They are often equally relevant to other USDA goals, objectives, and KAs, and might be described in combination with other programs and in other portfolios. The programs in these KAs affect decisions that result in better, more effective and efficient research, education and extension, so it was determined to associate the programs with this portfolio since it described enhanced opportunity and decision-making. In other words, their effects are as important, but can be more indirect than in the previous four KAs. These three KAs are:

- KA 901 – Program and Project Design and Statistics;
- KA 902 – Administration of Projects and Programs; and
- KA 903 – Communication, Education, and Information Delivery.

In combination, the programs described in this portfolio represent a substantial investment by CSREES, other Federal agencies, and by partners including the Land-grant universities. Investment decisions are guided by need, as determined through multiple levels and iterations of stakeholder input. Once prioritized, program concepts and methods are reviewed for merit and are then implemented, often through partnerships with public and private individuals and organizations, often through collaborations among faculty from multiple universities and from multiple states, and often with direct participation by CSREES National Program Leaders and other staff.

The topics in this Portfolio can be quite disparate and thus require conceptual clarification in order to present them together in a coherent way. The approach that is adopted here is to discuss the projects that are the most applied or directly address critical national needs of rural communities first. These primarily reside in knowledge areas 608, 134 and 602. Projects that are no less important but discuss and examine the more methodological or general aspects of decision-making in rural America are discussed later in the document. These projects are most likely to occur in 609, 901, 902 and 903. Consequently, the presentation of the knowledge areas in Section III will not be in numerical order, but in the following topical order: 608, 134, 602, 609, 901, 902 and 903.

PORTFOLIO 2.1 LOGIC MODEL & HONEYCOMB

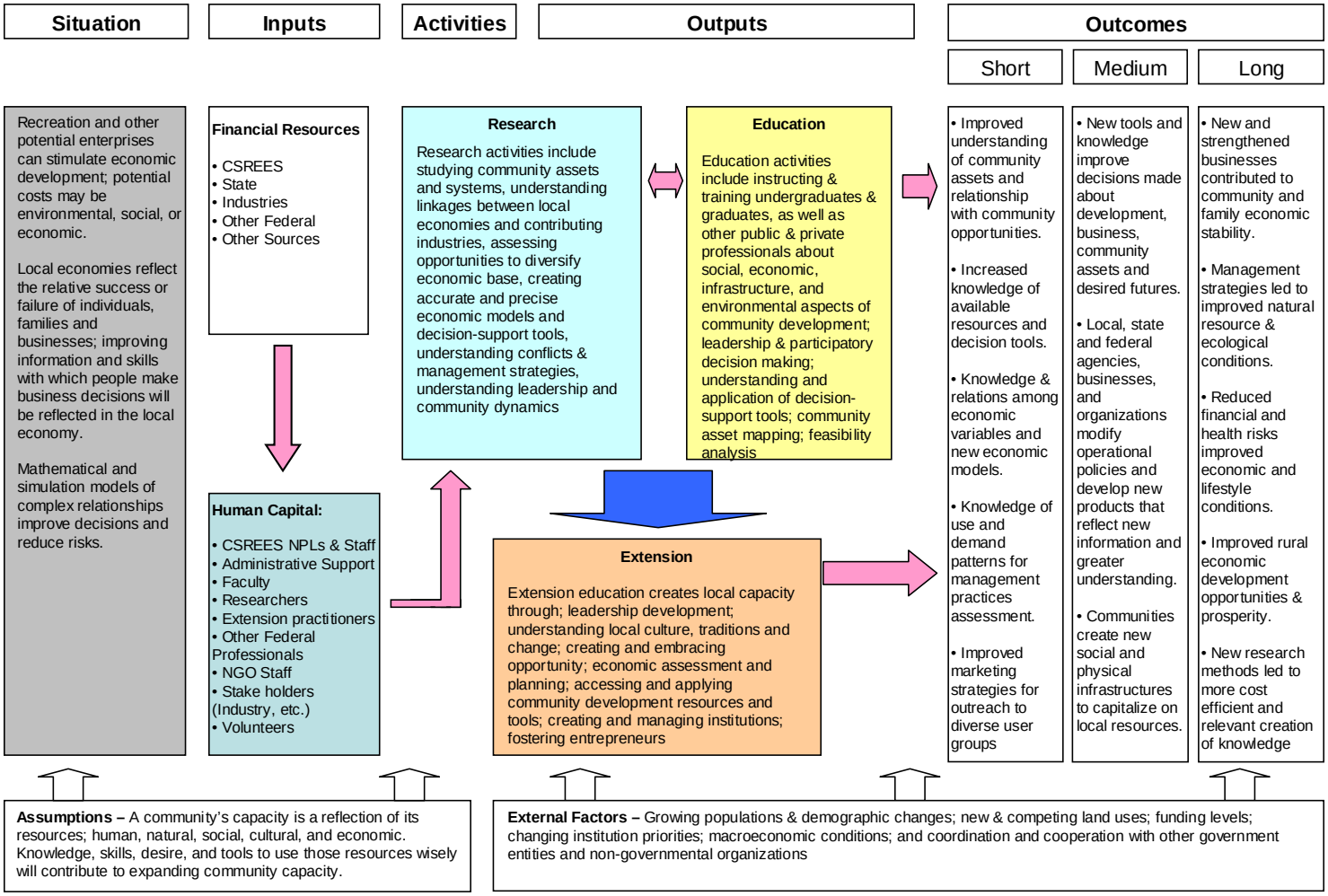
A logic model is presented here in order to provide a useful picture of this portfolio. It not only serves to illustrate the flow of the programs, but also creates a framework for the textual portions

of this document that follow. Each of the pieces in the logic model is expanded to develop a more comprehensive textual section. This means a situation will be presented, the inputs will be listed, the outputs and outcomes will be discussed, and the assumptions surrounding the program as well as the possible external factors affecting the program will be introduced (see p. 28 for details on logic models). Section II will use the logic model format to discuss the portfolio as a whole. Section III will then expand upon Section II following the aforementioned structure to provide a detailed account of this portfolio at the KA level.

As the discussion unfolds from the logic model, the work that comprises each knowledge area (where possible) has been broken down into major themes or areas of focus. This breakout is also the foundation for the honeycomb graphic. Each major theme or area of focus within the document should have related success stories and new directions. The honeycomb model graphically displays the connectivity between major program themes while also highlighting one or more sound examples of what has been done and what needs to be done within each theme.

Figure II-1

Portfolio 2.1: Expand Economic Opportunities through Economic and Business Decision-Making



SITUATION

Rural communities face significant social and economic challenges – out-migration of young adults to seek greater opportunity and resultant aging of the traditional population; influx of culturally-diverse immigrants and the changing faces of the school-age population; historical reliance on agriculture to drive local economies and resistance to embrace new economic engines; shrinking tax bases and local revenues to support and adapt public infrastructure and institutions to meet changing needs and expectations. These are a few of the complex interrelated issues.

To maintain and enhance rural communities, people need to (a) recognize the causes of change; (b) have the skills, talents, and motivation to incorporate those changes into their visions of the future; and (c) hold the tools suited to their situation that will help them achieve that desired future.

ASSUMPTIONS

Supplied with useful knowledge and tools, local investment of human and fiscal resources, people will adopt strategies that lead to enhanced quality of life.

EXTERNAL FACTORS

Farm programs, tax structures and incentives for businesses and entrepreneurs, costs and prices for agricultural production, public investment in underrepresented farmers in rural communities, advances in communication technology, and in the application of new technologies to improve the efficiency, quality, and value of business outputs.

INPUTS

Table II-1: Number of Projects within each Knowledge Area during 2000-2004

Knowledge Area	Number of Projects
134 – Outdoor Recreation	365
602 – Business Management, Finance and Taxation	519
608 – Community Resource Planning and Development	954
609 – Economic Theory and Methods	329
901 – Program and Project Design and Statistics	463
902 – Administration of Projects and Programs	283
903 – Communication, Education, and Information Delivery	1,476
Total for all KAs	**4,389**

Table II-2: Total CSREES Funding by Knowledge Area for Portfolio 2.1 during 2000 – 2004

Knowledge Area	Fiscal Year *(in thousands)*					
	2000	2001	2002	2003	2004	**Total**
134	$929	$711	$767	$1,070	$1,160	**$4,637**
602	$1,808	$2,018	$1,379	$1,636	$1,476	**$8,317**
608	$2,618	$6,112	$2,561	$3,374	$3,219	**$17,884**
609	$354	$572	$461	$929	$646	**$2,962**
901	$1,319	$1,282	$939	$1,213	$1,653	**$6,406**
902	$8,145	$9,575	$12,142	$13,974	$13,203	**$57,039**
903*	$21,135	$28,552	$23,849	$29,352	$29,509	**$132,397**
Total for all KAs	**$36,308**	**$48,822**	**$42,098**	**$51,548**	**$50,866**	**$229,642**

* 2000-2002 data for KA 903 funding are estimates since SERD data was not reported in the CRIS database until 2003.

Table II-3: CSREES Funding for Portfolio 2.1 by Source during 2000 – 2004

Funding Source	Fiscal Year *(in thousands)*					
	2000	2001	2002	2003	2004	**Total**
Hatch	$5,040	$5,026	$4,457	$4,300	$4,374	**$23,197**
Mc-Stn	$615	$644	$771	$756	$641	**$3,427**
Evans Allen	$889	$906	$388	$204	$679	**$3,066**
Animal Health	0	$3	$4	0	0	**$7**
Special Grants	$1,299	$2,286	$2,600	$3,122	$3,486	**$12,793**
NRI Grants	$720	$374	$604	$1,475	$1,847	**$5,020**
SBIR Grants	$390	$390	$485	$158	$521	**$1,944**
Other CSREES	$27,355	$39,193	$32,789	$41,533	$39,318	**$180,188**
Total CSREES	**$36,308**	**$48,822**	**$42,098**	**$51,548**	**$50,866**	**$229,642**

Table II-4: Funding From All Sources for Portfolio 2.1 during 2000 – 2004

Funding Source	Fiscal Year* *(in thousands)*					
	2000	2001	2002	2003	2004	**Total**
CSREES	$36,308	$48,822	$42,098	$51,548	$50,866	**$229,642**
Other USDA	$2,371	$2,953	$3,914	$2,938	$2,768	**$14,944**
Other Federal	$4,979	$7,793	$9,367	$7,705	$9,743	**$39,587**
State Appropriations	$23,767	$22,352	$24,634	$21,886	$23,558	**$116,197**
Self Generated	$1,470	$1,152	$1,718	$1,915	$1,735	**$7,990**
Indep. Grant Agreement	$1,793	$2,199	$2,735	$2,721	$4,249	**$13,697**
Other Non-Federal	$3,296	$2,743	$2,994	$3,043	$2,814	**$14,890**
Total All Sources	**$73,984**	**$88,014**	**$87,460**	**$90,518**	**$93,839**	**$436,947**
CSREES as a % of Total	**49%**	**55%**	**48%**	**57%**	**54%**	**53%**

--Numbers may not add exactly to values in the total columns due to rounding

Two major themes capture the essence of the objectives of this portfolio. These are:

1. Building Community Capacity through Knowledge that Increases Human and Economic Capital, and
2. Increasing Relevance, Quality, and Efficiency of Capacity-Building Research, Extension, and Education Programs.

BUILDING COMMUNITY CAPACITY THROUGH KNOWLEDGE THAT INCREASES HUMAN AND ECONOMIC CAPITAL

OUTPUTS

Research

Outputs from research activities generally include new knowledge, expressed and communicated in a variety of forms (journal articles, books and book chapters, research reports, professional presentations, etc.) and products that incorporate new knowledge into new or improved user recommendations, research directives, or decision-making tools (new end-user guidelines, new research proposals, new or continued grants, new investigative procedures, simulation models, etc.). In many cases, outputs from research also include trained graduate students, trained scientists, etc. However, those outputs are treated under the heading of education outputs. Examples of research output include the following:

KA 134:
- Publications about research findings related to user demand for recreation;
- Methods and models to select among potential recreational sites;
- Reports of research results about user preferences.

KA 602:
- Descriptions of new knowledge of financial markets and risk-rating tools;
- Determination of the impacts of crop insurance subsidies on farmers.

KA 608
- Articles describing the role of HBCUs to foster higher education in racially diverse rural communities;
- Findings related to access to credit for small businesses, including the role of local banks in small business financing and characteristics of the local-bank industry.

KA 609
- Journal articles, research reports and briefings for agencies and insurance industry related to crop insurance and moral hazard;
- Probabilistic methods to find inconsistencies in economic model specifications and assumptions;
- Knowledge created about economic behavior of food firms able to capitalize on growth opportunities in foreign markets.

Extension
Outputs from extension activities most often include educational events and educational materials. Outputs also include the individuals and groups of individuals who have participated in training events or have accessed training materials. Examples of extension output include the following:

KA 134:
- ♦ Published training manual for using trail assessment software;
- ♦ Established master trainer program and train-the-trainer workshops for trail assessment
- ♦ Delivered workshops on starting tourism business on farms and ranches.

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KA 602:
- ♦ Educational programs and materials for minority and underserved farmers and entrepreneurs;
- ♦ Educational programs for producers to improve their knowledge of human risk issues to increase safety and reliability of the labor force.

KA 608
- ♦ Outreach and assistance programs for socially disadvantaged farmers have been developed and implemented;
- ♦ Workshops, classes, and field days for small and medium-sized farm entrepreneurs.

KA 609
- ♦ Online courses in risk communication, assessment, and management;
- ♦ Risks associated with production of alternative crops have been assessed for local conditions and presented to local producer groups.
- ♦ Learning events and materials for producers to select insurance products based on expected crop yields, risk perceptions, and cost of insurance.

Education
Outputs from educational programs include new learning models, new curricula, and improved teaching methods. Also considered to be outputs from educational programs are communications about those outputs (e.g., journal articles) and also those who graduate from the new programs and those who are trained to use new teaching methods. Examples of education outcomes include the following:

KA 134:
- ♦ 44 Land-grant universities awarded approximately 1,300 undergraduate and graduate degrees in Parks, Recreation and Leisure Studies, or Parks, Recreation and Leisure Facilities Management annually;
- ♦ New interdisciplinary approaches to recreation and tourism education have been incorporated into model degree-granting programs in several universities.

KA 602:
- ♦ Matriculated 8-12 doctoral students per year trained in agribusiness management, marketing, and related fields;

- Offered opportunities for doctoral and masters students to develop an expertise in disciplines identified as a national need area, e.g. agribusiness management, marketing, markets and trade policy and information systems.

KA 609
- 45 Land-grant universities confer approximately 1,000 undergraduate and graduate degrees annually in agricultural economics and business management;
- Incorporation of cutting-edge science (game theory, allocation models, etc.) into Agricultural Economics classrooms and curricula.

Integrated Programs

Much of the work described in this portfolio is actually integrated, although funding for individual projects may be targeting only a portion of the whole integrated project. Outputs from integrated projects represent a continuum from the creation of new knowledge; through the development and delivery of teaching or extension programs and materials; through the application of learned knowledge to write new policies, create new products, or adopt new strategies; and ultimately to enhance the economic condition of farmers or businesses, to lessen environmental impact of land uses, or to improve the social/cultural conditions in which people live, work, and play.

OUTCOMES

Short-Term

KA 134:
- Recreation planners have access to new information about conflicts among trail users;
- New knowledge about attitudes of adjacent landowners is available to professionals and communities interested in sustainable recreation and tourism planning.

KA 602:
- Dairy farmers have increased understanding of the farm and financial management factors that influence firm profitability and financial performance;
- Lenders have new knowledge pertaining to lending risks, and possess skills to use tools to assess those risks based on characteristics of a specific farm enterprise.

KA 608
- Community members, rural bankers, and policy makers have acquired new knowledge about sources of deposits and recipients of credit, and are learning to mitigate costs related to geographical remoteness through community investment working groups;
- Researchers acquired new knowledge about rural labor markets, relevant to rural labor policies.

- Socially disadvantaged farmers have enrolled in numerous USDA programs including EQIP and FSA loans.

KA 609
- Theories explaining risk preferences, perceptions, and attitudes have been re-examined and refined;
- USDA Risk Management Agency has new knowledge from research reports useful for evaluating current and future policy options.

Medium-Term

KA 134:
- Trail managers and planners have used new information to develop more effective trail plans to reduce conflicts and improve management of trails and greenways;
- Trail managers apply new use-pattern information to identify use conflicts and site congestion issues, and develop scheduling and management plans to mitigate potential environmental problems.

KA 602:
- Both farmers and lenders adopted improved tools that enhanced decision-making in the application for and the consideration of credit;
- Farmers implemented appropriate strategic farm and financial management plans for the purpose of enhancing long-run profitability.

KA 608
- Policy makers considering the Community Reinvestment Act are equipped with new information about incentives inherent in the rural banking industry;
- Researchers shared new knowledge with Senate and House Finance Committee members about employment barriers facing low-income adults in rural areas.
- New knowledge about using waste agricultural fibers to improve the characteristics of recycled plastics will be incorporated into plastics manufacturing processes.

KA 609
- Researchers incorporate new knowledge about farm characteristics into models predicting insurance needs and preferences;
- USDA and private insurance providers apply new information to develop new programs and specialized insurance products.

Long-Term

KA 134:
- Recreational opportunities are an important and sustainable contributor to rural economic development efforts;
- Negative environmental impact, caused during use of recreational trails, is reduced.

KA 602:
- Farmers' employer and labor relationships and practice improvements result in decreased costs, enhanced quality of product, and greater returns;
- Improved credit products and more affordable credit are readily available to producers

KA 608
- States (Oregon is first) using new rural-labor knowledge base are more capable of creating effective policies and monitoring changes that result from rural labor policies.
- Socially disadvantaged farmers in Alabama have accessed $1,879,750 in new loans and program support, resulting in improved economic conditions.
- Anticipated increased income for farmers selling waste fiber (straw) for the manufacture of recycled plastics; establishment of plastics manufacturing businesses in rural areas.

KA 609
- Farmer participation in crop insurance and government programs has increased (10-fold increase in use of specialized insurance products in Illinois between 1997-2004);
- More efficient risk management strategies and products are in place while keeping public costs low.

INCREASING RELEVANCE, QUALITY, AND EFFICIENCY OF CAPACITY-BUILDING RESEARCH, EXTENSION AND EDUCATION PROGRAMS

OUTPUTS

Research

Outputs from research activities in this major theme are similar to those described above. Here too, outputs include new knowledge, expressed and communicated in a variety of forms (journal articles, books and book chapters, research reports, professional presentations, etc.) and products that incorporate new knowledge into new or improved user recommendations, research directives, or decision-making tools (new end-user guidelines, new research proposals, new or continued grants, new investigative procedures, simulation models, etc.). A point of divergence for this major theme is that outputs may also include new ways conduct research (new survey methodologies, new laboratory techniques, new computer algorithms) and new ways to conduct extension and education programs. Examples of research output include the following:

KA 901:
- Published results of studies that identify procedures to reduce measurement error;
- validation of estimated statistical values useful to interpret precision of predictive models;

- ♦ Published methods to use multiple genetic markers to improve accuracy of prediction.

KA 902
- ♦ Characterization of locally-relevant priorities learned through innovative stakeholder needs research (e.g., biotechnology baseline survey);
- ♦ Description of investigations to validate creative and effective methods to conduct participatory research;

KA 903
- ♦ Guidelines for applying new knowledge about teaching methods and learner preferences;
- ♦ Reports of institutional assessments that identify unmet educational opportunities and describe alternatives to meet new needs.

Extension

Few of the projects included in this theme are classified only as extension, although extension functions are performed as part of numerous research and integrated projects. Similar to the first major theme, outputs from extension activities generally include educational events and educational materials. Outputs also include the individuals and groups of individuals who have participated in training events or have accessed training materials. Examples of extension output include the following:

KA 901
- ♦ Research findings are presented to various audiences through technical publications, extension bulletins, databases, posters and presentations.

KA 902
- ♦ Workshops to share innovative methods to involve stakeholders in educational programs;
- ♦ Requests for applications that incorporate guidelines for efficient and effective management of grant resources;

KA 903
- ♦ Developed policy recommendations and program priorities for communication, education and information delivery.

Education

Outputs from educational programs include new learning models, new curricula, and improved teaching methods. Also considered to be outputs from educational programs are communications about those outputs (e.g., journal articles) and also those who graduate from the new programs and those who are trained to use new teaching methods. Examples of education outcomes include the following:

KA 901
- ♦ Graduate students receive advanced training and experience through involvement in funded research projects.

KA 902
- ♦ Workshops to share innovative methods to involve stakeholders in educational programs;

- Requests for applications that incorporate guidelines for efficient and effective management of grant resources;

KA 903
- Performed educational needs assessments and identified critical areas, areas of strength, and areas with opportunities to improve;
- Conducted education programs in the food and agricultural sciences at the undergraduate and graduate levels.

Integrated Programs

Much of the work described in this portfolio is actually integrated, although funding for individual projects may be targeting only a portion of the whole integrated project. Outputs from integrated projects represent a continuum from the communication of new knowledge, through the development and delivery of teaching or extension programs and materials.

KA 901
- New knowledge is created through research and incorporated into new statistical tests and computer models, then are used to improve future research and to train aspiring professionals (students) with the latest techniques and theories.

KA 902
- Identification and publication of best management practices for handling and storing biohazardous materials, and subsequent training workshops;

KA 903
- Developed and managed international experiences for teaching and research faculty and students.

OUTCOMES

Short-Term

Short-term outcomes from research, extension, and education programs under this major theme include: project managers equipped with knowledge and skills to improve the efficacy of their projects; researchers equipped with knowledge that enables them to perform their work with greater accuracy, precision, or efficiency; and teachers with better understanding of learner needs and expectations.

KA 901
- Research results in new methods that improve the sensitivity and reliability of data analysis techniques;
- Procedures and models are conceived and validated, leading to new knowledge about reducing measurement error in mail surveys and interviews
- New knowledge is created that enables optimization of sample size, data sensitivity, and cost of data collection.

KA 902
- Shared leadership of regionally structured programs results in knowledge and skills to conduct effective and efficient programs that conform to high standards of accountability;
- New scientific and practical knowledge that is gained from the projects that these programs fund;
- Knowledge gained in applied/integrated programs (e.g., SARE) by Extension and other agricultural professionals, producers and other clientele.

KA 903
- Partner universities are aware of the educational challenges and threats to food and agricultural professions;
- Participating institutions are equipped with knowledge about tools and techniques to recruit and retain diverse students (e.g., scholarships available for Latino students).

Medium-Term

Medium-term outcomes occur when new knowledge, either created or learned, is put into practice. New knowledge about genetic variability results in a mid-term outcome when that knowledge is incorporated into research to isolate specific genes. Similarly, when recommendations to initiate, reform, or restructure academic programs are incorporated into a university's curriculum, mid-term outcomes are achieved. Specific examples of mid-term outcomes follow:

KA 901
- Researchers employ new experimental designs that increase the volume of useable data and reliability of research results.
- Application of new simulation models improves the accuracy of predictions about heritability of economically important genetic traits in poultry.

KA 902
- Researchers adopt procedures that improve the design and assessment of experiments and investigations;
- Projects and programs incorporate fundamental policies such as stakeholder input, non-discrimination, fiscal responsibility, and program planning & evaluation.
- Dissemination of project results that influence the actions of other scientists, agricultural professionals, farmers, ranchers, policymakers, and others;

KA 903
- Universities apply new skills and techniques, resulting in more, better qualified minority students studying food and agricultural sciences;
- States and institutions are investing more to help recruit and retain diverse students in food and agricultural sciences.

Long-Term

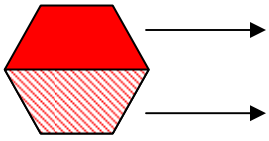
KA 901
- Application of those new information and results will lead to more effective policy and management decisions.

KA 902
- Capacity across the partnership to manage programs and perform research, education and extension, and efficient use of system infrastructure and human resources.
- Improved economic, social and environmental conditions resulting from improved decision-making based on program results (e.g. SARE, T-STAR).

KA 903
- The Nation's educational system has greater capacity to train students with the experiences and skills necessary to meet the needs of society;
- A larger number of minority and diverse graduates are available to populate the workforce in food and agricultural sciences.

PORTFOLIO 2.1 HONEYCOMB

The honeycomb graphic is an attempt to summarize and simplify the complexity of this KA. The honeycomb figure is intended to illustrate the relationship between the KAs (and in Section III between themes of a particular KA) as well as the degree of their accomplishment.

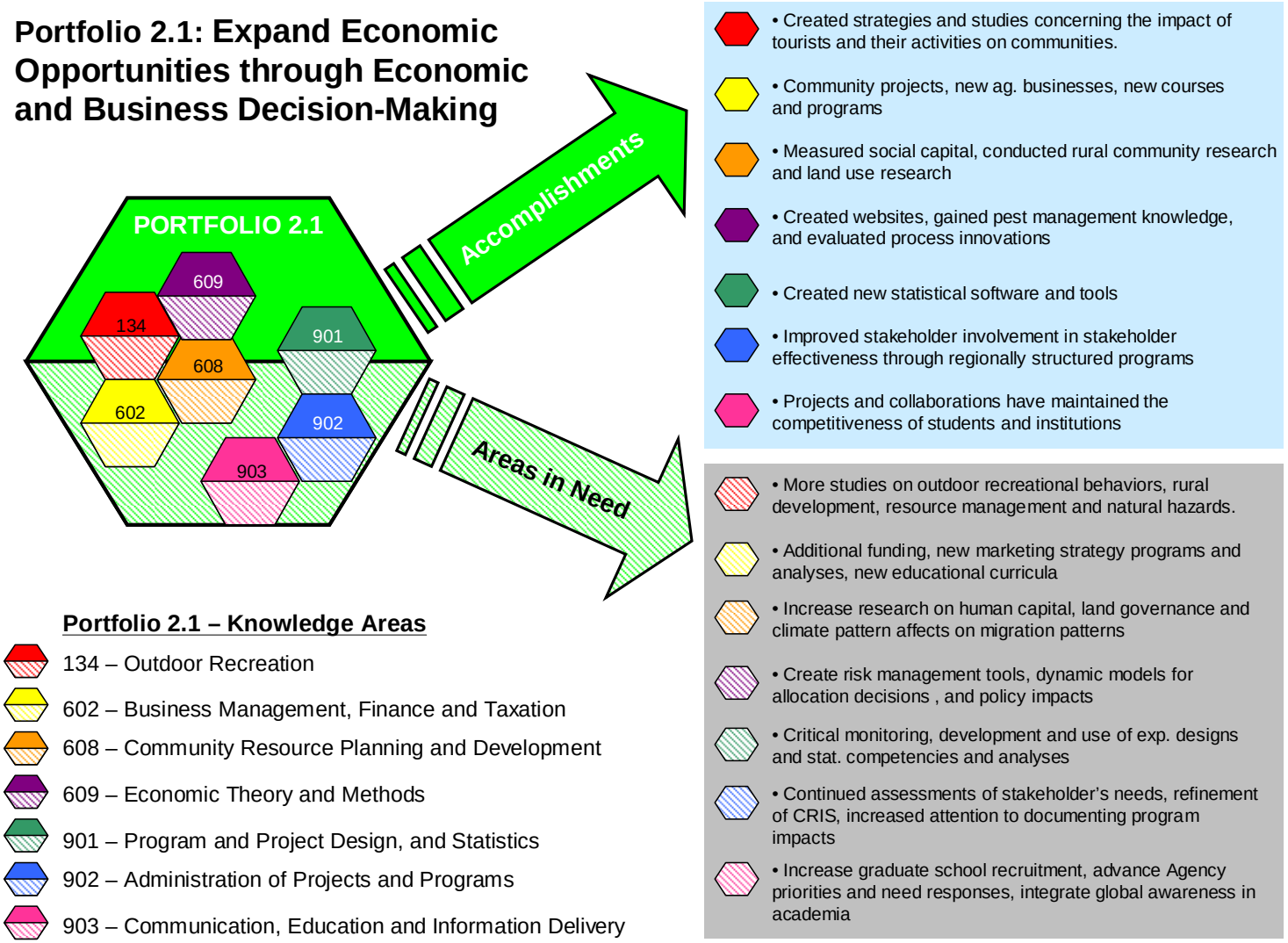


Solid Colors = **Accomplishments** = ***Success Stories***

Shaded Colors = 'Gray Areas' = **Areas in Need** = ***New Directions***

Each honeycomb figure represents a whole that can be subdivided into interrelated parts. These wholes may represent a portfolio, a program, an area of focus or some other subdivision. The split in color represents that within each whole there are both accomplishments (solid colors) & areas in need (shaded colors). Although placement of the parts within the whole is not always perfect or necessarily representative of how much of that part has been accomplished or in need, it is an attempt to show graphically how the various parts relate to one another and to the whole. Note- relative size of the honeycomb does not have any underlying meaning.

Figure II-2


Portfolio 2.1: Expand Economic Opportunities through Economic and Business Decision-Making
PORTFOLIO 2.1
609
134
901
608
602
902
903
Accomplishments
Areas in Need
• Created strategies and studies concerning the impact of tourists and their activities on communities.
• Community projects, new ag. businesses, new courses and programs
• Measured social capital, conducted rural community research and land use research
• Created websites, gained pest management knowledge, and evaluated process innovations
• Created new statistical software and tools
• Improved stakeholder involvement in stakeholder effectiveness through regionally structured programs
• Projects and collaborations have maintained the competitiveness of students and institutions
• More studies on outdoor recreational behaviors, rural development, resource management and natural hazards.
• Additional funding, new marketing strategy programs and analyses, new educational curricula
• Increase research on human capital, land governance and climate pattern affects on migration patterns
• Create risk management tools, dynamic models for allocation decisions , and policy impacts
• Critical monitoring, development and use of exp. designs and stat. competencies and analyses
• Continued assessments of stakeholder's needs, refinement of CRIS, increased attention to documenting program impacts
• Increase graduate school recruitment, advance Agency priorities and need responses, integrate global awareness in academia
Portfolio 2.1 – Knowledge Areas
134 – Outdoor Recreation
602 – Business Management, Finance and Taxation
608 – Community Resource Planning and Development
609 – Economic Theory and Methods
901 – Program and Project Design, and Statistics
902 – Administration of Projects and Programs
903 – Communication, Education and Information Delivery

SUCCESS STORIES

The following section, Section III, will introduce a number of success stories relevant to the specific knowledge area discussions. There are many of them. However, they are by no means an all-inclusive list of all the accomplishments achieved in each KA. Of these numerous projects, the most outstanding projects are briefly summarized below. While just glimpses into the extensive efforts in each KA, they nevertheless should capture their essential relevance, quality and performance.

- **Community Resource Planning and Development (KA 608)**
  - "Rural Economic Development: Alternatives in the New Competitive Environment" was a multi-state project with 23 sub-projects undertaken across the nation. All yielded valuable insights into the decision-making that takes place in rural communities. Rural communities learned from an extensive array of theoretical and practical results about the effects on the industrial and employment in rural communities from restructuring, and other shocks, trends due to changes in firm structure, migration and commuting and other changes in the forestry, mining, agricultural processing industries. (p. 89)

- **Outdoor Recreation (KA 134)**
  - "Public Access, Open Space, and Regenerative Planning in the Sacramento Valley Bioregion" This project continues to catalog sustainable land management and development patterns for the Sacramento Valley region. Researchers from the University of California at Davis generated two major accomplishments, a full manuscript, and the creation of a volunteer non-profit bioregional organization. This bioregional non-profit organization in turn succeeded in securing a Packard Grant to fund a comprehensive conservation framework for 800,000 acres of wild lands in the upper Putah and Cache Creek watersheds. (p. 148)

- **Business Management, Finance and Taxation (KA 602)**
  - "Family Business Viability in Economically Vulnerable Communities" was a multi-state project involving eleven universities located around the continental United States, Hawaii and Alaska. The project undertook detailed studies of 794 family businesses since 1987, and documented that more than 18 million U.S. households. In 2001 the project received the Northeast Regional Agricultural experiment Station Directors Research Award for Excellence for quantifying the economic and social contributions of family businesses to their local, state and national economies and communities; for developing state extension materials for business owners, their families and policy makers; and for producing numerous academic publications on family functioning, management and business viability. (p. 168)
  - New Agricultural Business Models - A vision of John Hall, and farmers participating with Chesapeake Fields LLC, places more emphasis on the actual needs of farmers as opposed to the perceived needs. As a result, more relevant and

pertinent research, education and extension programs are being developed and implemented. While not a new "big bang theory," the model is a constructive gradual shift in resource allocation toward more practical and timely solutions to agribusiness and agricultural problems, such as niche marketing to consumers with high quality produce requirements. (p. 169)

- **Economic Theory and Methods (KA 609)**
  - The University of Illinois Farm Decision Outreach Central (FarmDoc) improves microeconomic (farm level) decision-making under risk through extensive education and research. (p.184)
  - Cornell University investigators developed quantitative models of measures of trade restrictiveness and evaluated the consequences of multilateral trade liberalization. This policy support research helped predict the potential impact of future liberalization efforts. (p. 190)
  - The benefits of publicly funded agricultural research and extension were determined. Studies consistently documented high rates of return on publicly funded research and extension. (p. 190)
  - Parameters characterizing the overall dynamic research–development–adoption–disadoption process were estimated. This is one of the most challenging empirical problems in evaluating R&D. (p. 190)

- **Program and Project Design and Statistics (KA 901)**
  - Development of a Gradient-Based Landscape Pattern Analysis Methodology. (p. 205)
  - The Statistical & Biometrics Consulting Service at Cornell assists researchers with the selection of appropriate advanced experimental designs and methods. (p. 212)
  - Scientific breakthrough! The rate of telomere shortening in cells was determined. Telomere shortening is associated with the normal aging process, but if becomes unstable can lead to cancers in humans and animals. (p. 213)

- **Administration of Projects and Programs (KA 902)**
  - The Sustainable Agriculture Research and Education (SARE) Program works to increase knowledge about – and help farmers and ranchers adopt – practices that improve profits, environmental stewardship, and quality of life. It does so through competitive grants and other activities carried out by four regional programs with national collaboration and coordination. (p. 216)

- **Communications, Education, and Information Delivery (KA 903)**
  - The Seacoast School of Technology, Exeter, NH sponsored summer institutes for New Hampshire teachers to foster the integration and expansion of agricultural biotechnology in New Hampshire secondary education institutions. (p. 252)
  - Texas Tech University established the International Cotton Research Center, which is conducting a comprehensive research program on enhancing the

profitability and sustainability of the cotton industry by integrating the expertise of scientists from several disciplines. (p. 258)

- The Extension Disaster Education Network (EDEN) – links Extension educators from across the U.S. and various disciplines. It provides a national clearinghouse to local Extension workers across the United States to help them build working relationships with their local and state emergency management networks. (p. 262)

NEW DIRECTIONS

Through listening sessions with stakeholders, and attending public forums, CSREES program leadership has been actively monitoring the leading-edge knowledge and trends in economic and business decision-making rural communities in order to adapt to changes and new developments and recalibrate the resources. With this input, they felt the following issues and trends were sufficiently significant to require attention as well as potentially directing new CSREES efforts in their direction. Organized along the four themes of this portfolio, they are:

(1) Improved Decision-Making in Community Planning and Development

- Application of the "Community Capitals" approach to community development research. This is now getting results after conceptually and empirically assessing the connection between human capital impacts and the economic development of rural communities. (p. 131, also 78-82, 86)
- Investigations into the distribution of benefits from community development initiatives. (p. 131, also 89)
- Continued efforts to push out the boundaries of knowledge about Governance, Leadership, Planning, and Civic Engagement. In particular, the examination of community governance as farm viability changes when previously agricultural counties move toward suburban and ultimately urban land use. (p.131 also 112)
- The examination of migration patterns of various demographic groups. (p. 131 also 122)

(2) Stewardship of Natural Resources

- Greater emphasis on ecosystem research and management at the landscape scale. (p. 149)
- A movement to make outdoor recreation truly interdisciplinary with broader understanding of the environment, ecology, natural resources, human behaviors, history, culture, demography, and their interactions and interrelationships. (p. 149)
- Establishment of long-term recreation monitoring sites on both public and private lands, and from rural and urban outdoor recreation activities. (p. 149)
- Greater collaboration between researchers, educators and government agencies that encourages the evaluation of policies and institutional settings that may be barriers for access to outdoor recreation services. (p. 149)

(3) Provision of Decision-Enhancing Management Tools for Farmers and Agribusinesses

- Greater emphasis on being directly involved in the business & management needs of farmers and agribusinesses, particularly as external factors continue to create uncertainty. (p. 170)
- Improved understanding of the sources of uncertainty and the development of practical models to estimate the "what ifs" and educational curricula to satisfy the needs of farmers. (p. 170)
- More research to develop models that provide a quick yet realistic set of implications of alternative developments. (p. 170)
- Extension that convey vital information needed by producers and businesses to adjust their production and marketing strategies so they may take advantage of any opportunities presented. (p. 170)
- Greater use of formal management techniques that allow flexibility in operating farms and agribusiness will be needed to successfully respond to changing markets and business opportunities. (p. 170)

(4) Development of Economic Theory, Program Design, and Statistical Methods

- Economic Theory and Methods
    - More complex risk management tools, products and assessment methods. (p. 186)
    - There will be continuing issues related to moral hazard and adverse selection and a continuously changing risk environment, especially for regionally diverse, minor or niche crops. (p. 186)
    - Dynamic models that endogenize positive and negative factors influencing resource allocation decisions. (p. 188)
    - More comprehensive forecasting models and methods will be developed, especially the simulation of policy impacts, and dispersal of costs and benefits of policy and regulation induced changes. (p. 191)
    - Reducing the inconsistencies in economic model specification and assumptions
    - Endogenization of external factors to reduce error terms and increase the predictive value of simulations and forecasts. (p. 191)
- Program and Project Design and Statistics
    - New satellite imagery and modeling methods will be used by the National Agricultural Statistics Service (NASS) to provide supplementary information on crop yields. (p. 208)
    - Reduction of concerns about the safety of biotechnology in agriculture, through the development of risk assessment models in secure, simple ecosystems. (p. 208)
- Administration of Projects and Programs
    - Development of innovative programs and cross-program integration (e.g. Sustainable Community Innovation Grants of SARE & Regional Rural Development Centers. (p. 232)
    - Increased integration of research, extension and education with increased program planning and evaluation. (p. 232)
- Communications, Education, and Information Delivery
    - CSREES education programs will encourage agriculture colleges around the country to re-double their recruitment efforts. This is especially true in fields preparing future scientists and engineers. (p. 248)
    - Future grants will be targeted more specifically toward advancing agency priorities and responding to demonstrated national workforce and scientific needs than in the past. (p. 255)
    - Higher education programs will fully integrate global awareness into academic programs across the board in the agriculture, food, natural resources, and human sciences. (p. 258)
    - CSREES will utilize several mechanisms to increase educational outreach to its constituents. (p. 265)
    - Financial pressures on state and institutional budgets, projected shortages of advanced-knowledge professionals in certain fields, plus the fluidity of jobs and people in today's market, all argue for initiatives that reduce competition, increase cooperation and shared resources, and the use of leveraged funds through multiple partnerships. (p. 273)

Section III – Knowledge Area Discussions: Expand Economic Opportunities through Economic and Business Decision-making

Portfolio Assessment Report

A NOTE ABOUT PRESENTATION

The topics in this Portfolio can be quite disparate and thus require some conceptual clarification in order to present them in a coherent way. The approach adopted is first to discuss the projects that most directly address Objective 2.1 or critical national needs. These primarily reside knowledge areas 608, 602 and 134. Projects that are of no less importance, but examine more methodological or theoretical aspects of decision-making in rural America, and therefore have impacts that are more diffuse are discussed later. These projects are most likely to occur in 609, 901, 902 and 903. Consequently, the presentation of the knowledge areas will not be in numerical order, but in the following topical order: 608, 134, 602, 609, 901, 902 and 903.

Knowledge Area 608: Community Resource Planning and Development

OVERVIEW

Rural people and places are challenged by profound economic, technological, demographic, and social changes. Although endowed with physical, natural, human, and organizational assets, many factors—geography, infrastructure, history, economy, leadership, civic engagement, and institutional capacity—affect the ability of rural people and rural communities to mobilize these assets to address the changes and challenges they face and to capitalize on new opportunities.

This knowledge area encompasses a wide array of programs that address the way rural community activities act to "expand economic opportunities in rural America by bringing scientific insights into economic and business decision-making." Activities in this KA make significant investments in uncovering new knowledge that informs our understanding of community capital—assets and liabilities; the complex relationships found in the rural economy—poverty, jobs, farms, and firms; rural infrastructure and services. As well as the forces behind the institutions of governance, leadership, planning, civic engagement; and community participation and response as they adapt to accelerating social change in technology, demography, and the political economy.

One important note: This is a very broad-based KA. During the period of interest, fiscal year 2000 to 2004, the topics that fell into it changed. Investigators in this area[2] initially used the 1996 CRIS Manual of Classification. However, the manual of classification that is being used to review this KA is the current 2005 CRIS Manual of Classification. The extensive and complex details of these changes can be found in the footnotes.[3]

[2] Referred to at the time as Research Problem Areas (RPAs), or just Problem Areas (PAs).

[3] Knowledge Area 608, now titled Community Resource Planning and Development, was reported in the 1996 CRIS Manual of Classification used by Project Directors during the FY2000 through FY2004 time span to report their relevant research and education activities. It was then titled Community Resource and Development Economics. This classification designated *economic* research that provides insight and understanding, and facilitates the analysis of community needs and preferences." Although applicable research reported in this knowledge area was not exclusively limited to the five areas, 1) to 5) given below, there were specific exclusions to discourage reporting as KA608, a) to f) below, and redirect it to other knowledge areas.

Areas of research in KA608 included, but were not limited to:

1) economic planning, development, and industrialization,
2) regional economics and sector analysis,
3) land use planning and zoning,
4) entrepreneurship, and
5) public administration.

Research to exclude from reporting under KA 608 was related to:

a) natural resource and environmental issues (use KA605)
b) poverty and welfare programs (use KA 607 and 703),

In order to capture the program logic of this KA, we have included a logic model that captures the essence of its programmatic direction.

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c) consumer issues (use KA607),
d) policy (use KA610),
e) family issues (use KA801), and
f) public services (use KA805).

This current portfolio review however, is guided not by the 1996 CRIS Manual of Classification, but rather the 2005 CRIS Manual of Classification which titles KA 608 as Community Resource Planning and Development. In contrast, this classification designates work that "provides understanding about community needs and preferences by providing local leaders and organization the information, skills, and decision-making tools to help understand problems, identify opportunities, and plan for renewal and growth." The original five areas of research to be included in this revised KA608 are retained, but three additional areas have been articulated:

6) jobs and employment,
7) small business and home-based business, and
8) community planning and development.

Likewise, the six areas of research that were to be excluded from KA608 earlier remain, but are joined by four other excluded categories:

g) sociological and technological change affecting communities (use KA 803),
h) measuring the adequacy, quality, and cost of public services (use KA 805),
i) community and civic engagement (use KA 805), and
j) conflict resolution (use KA 803).

Figure III-1

Portfolio 2.1: Expand Economic Opportunities through Economic and Business Decision-Making
KA 608-Community Resources Planning & Development Building Organizational Capacity

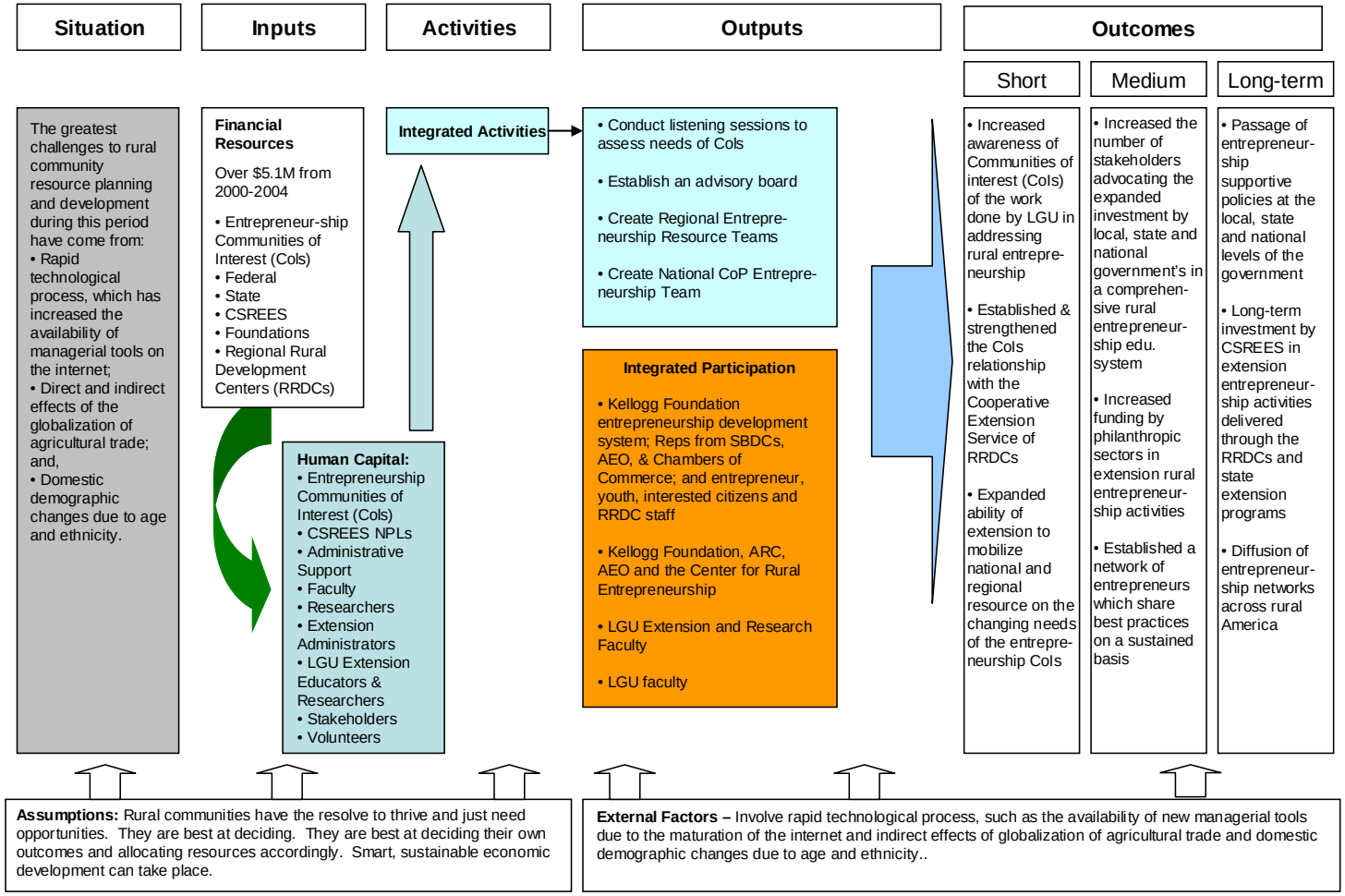
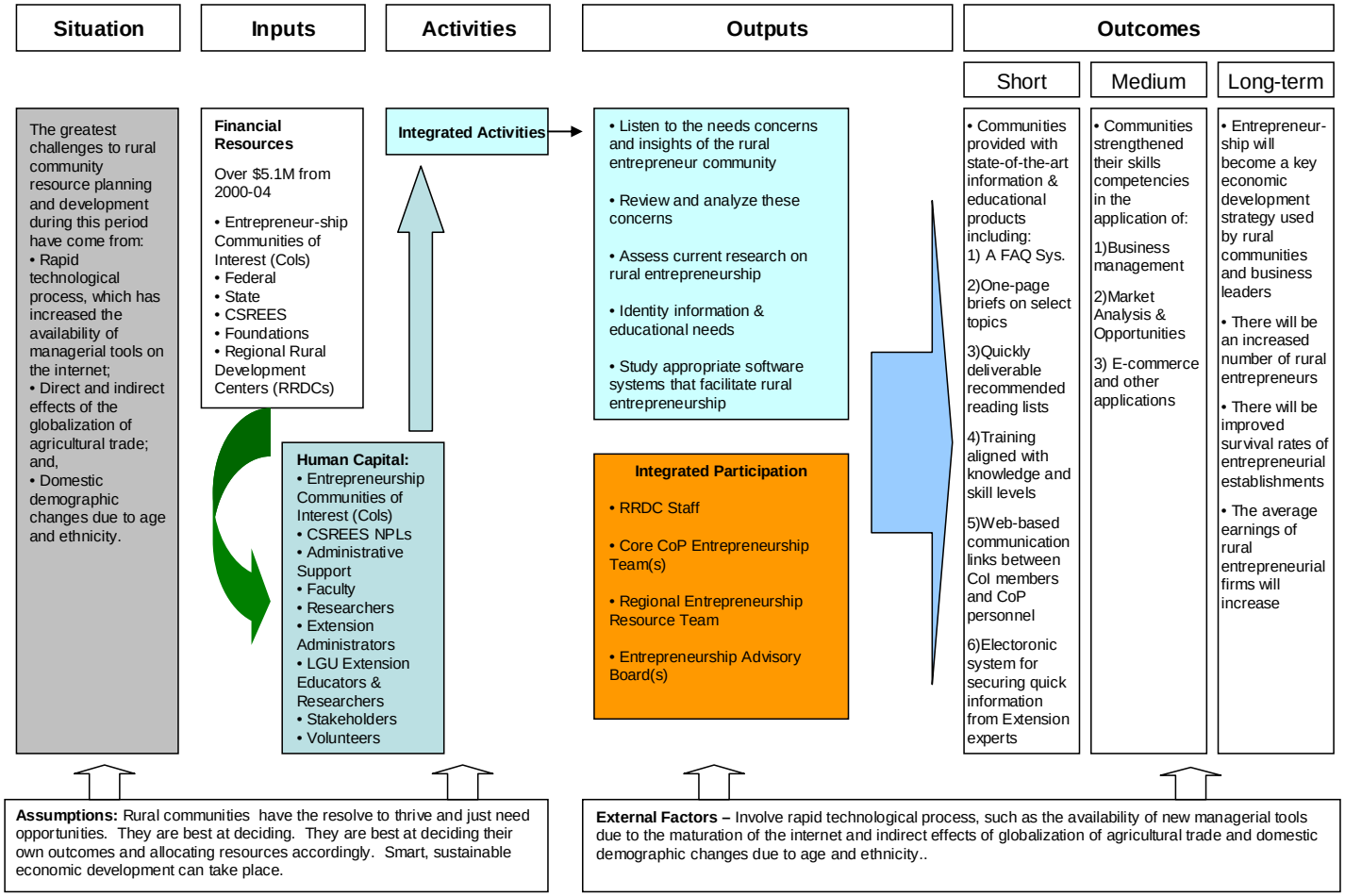


Figure III-2

Portfolio 2.1: Expand Economic Opportunities through Economic and Business Decision-Making
KA 608-Develop Rural Entrepreneurship Educational Products



SITUATION

Quite a number of challenges and opportunities have affected Rural Community Development and Planning. The greatest challenges during this period have come from the indirect effects of globalization of agricultural trade and many domestic demographic changes due to a variety of changes in age, race and ethnicity. Just as importantly, there have been a number of increased opportunities due to rapid technological process, particularly from the increasingly wide-spread availability of the internet, which has minimized the negative impacts of distance on intra-rural communication as well as brought distance education to rural communities including CSREES sponsored extension products such as risk management tools.

ASSUMPTIONS

A principal assumption behind these programs is that transferring leading edge knowledge to the decision-makers in rural communities will improve their economic and social acumen, and so lead to improvements in rural community sustainability and enhancement.

EXTERNAL FACTORS

Many of the challenges to rural community resource planning and development involved rapid technological processes, the availability of managerial tools due to the maturation of the Internet, direct effects of globalization of agricultural trade, and domestic demographic changes in age and ethnicity. Many of these influences stem from sources that are beyond the direct control of the programs and thus may be considered external.

INPUTS

The resources that are used in support of this KA can be divided into human and financial. In addition to the NPLs at CSREES, the faculty, researchers, and extension personnel of our partners, there has been considerable support from the Entrepreneurship Communities of Interest, agribusiness leaders and the volunteers in the local community groups.

Financial resources came from inside and outside CSREES. There were several CSREES initiatives directed toward this KA. For instance in 2001, "The Fund for Rural America" was established to develop knowledge-based solutions for rural economic development. It addressed the development of value-added and bio-based industries and changing rural demographics. Proposals we accepted in two main priority areas, "Harnessing Demographic Change to Increase Rural Opportunity" and "Rural Community Innovation." Specifically, they first focused on the need of communities to understand the challenges of an aging population, the arrival of new immigrant populations, youth retention and workforce development. Then they focused on the communities' capacity to translate on- and off-farm innovations into economic growth and

community revitalization. Innovations in value-added processing, e-commerce, distance learning, niche markets and new industries can help rural communities share more fully in economic opportunities.

Substantial financial inputs outside of CSREES have also come from the Entrepreneurship Communities of Interest, "Other" Federal and State funds as well as foundations. A large portion of these funding inputs has been funneled through Regional Rural Development Centers (RRDCs). However, other significant funding has come from such initiatives as IFAFS or the National Research Initiative. The funding for this period is given in Tables III-1 and III-2 below.

Table III-1 CSREES-based funding for KA 608

Funding Source	Fiscal Year *(in thousands)*					
	2000	2001	2002	2003	2004	**Grand Total**
Hatch	1,511	1,427	1,192	1,259	1,344	6,733
McIntire-Stennis	75	29	48	52	44	248
Evans Allen	330	320	163	30	103	946
Animal Health	0	0	0	0	0	0
Special Grants	347	1,167	519	289	371	2,693
NRI Grants	211	0	399	724	331	1,665
SBIR Grants	0	49	58	75	280	462
Other CSREES	143	3,120	182	945	745	5,135
Total CSREES	2,618	6,112	2,561	3,374	3,219	17,884

The annual investment in the NRI Rural Development program funds almost all of the NRI research devoted to KA 608 has remained relatively stable at around $2 million annually during the five year time span of this review. Table III-1 suggests considerable fluctuation by fiscal year in the amount distributed to KA 608: $211K of NRI Rural Development program dollars were expended in FY2000 for KA 608, $0K in FY2001, $399K in FY2002, $724 in FY2003, and $331K in FY2004. The $0K figure does not reflect a departure from Community Resource Planning and Development as an important research priority of the program, but rather is simply the result of exigencies in program administration. The program was without a full-time Program Director (NPL) for about eighteen months; the awards for proposals submitted in FY2001 were not processed until FY2002. Likewise, awards for proposals submitted in FY2002 were not processed until FY2003. Because awards for FY2003 proposals were processed in that fiscal year, the KA608 expenditures appear doubled. The results of this chain reaction are that FY2001 appears as $0K expenditures and 2003 appears as $724K expenditures. In reality, expenditures toward KA608 activities have remained relatively stable over the five year span, averaging $333K per fiscal year and ranging from $211K to $399K.

There have been shifts in program priorities since FY2003 that reflect a heightened emphasis on "forces and opportunities" that impact rural development and the structural changes in rural communities that both cause and result from those forces and opportunities. As a result, it is anticipated that expenditures toward KA 608 activities will increase in the future.

Other program changes contribute to this increased investment, as well. Even though the budget for the NRI Rural Development program remained relatively stable at $2 million annually, a new $300K funding floor and $500K funding ceiling per award were imposed on the program in FY2004. While the $2 million budget allowed for only 5 awards to be granted in FY2004, the higher amount per award maintained the relatively high level of investment in KA608.

Between 2000 and 2004 there was also a shift in the structure of funding for the Regional Rural Development Centers. Prior to 2003 the Centers were funded by annual Congressional earmarks, each receiving a Federal Extension Administration and a Special Research Grant. In 2003, the Centers were included in the CSREES agency budget request to USDA and were included in the USDA budget request to the President. They continued to be included in CSREES budget requests, under the Integrated Activities – Special Grants budget line, as essential programs for meeting Goal 2.1 and other Strategic Goals of CSREES and USDA.

Table III-2 CSREES, Federal, State and other sources of funding for KA 608

Sources of funding	Fiscal Year *(in thousands)*					
	2000	2001	2002	2003	2004	**Total**
CSREES	2,618	6,112	2,561	3,374	3,219	17,884
Other USDA	495	383	665	403	235	2,181
Other Federal	652	422	413	714	802	3,003
State Appropriations	4,796	4,560	4,838	4,700	4,183	23,077
Self Generated	313	180	154	228	210	1,085
Independent/GR Agreement	333	419	398	406	358	1,914
Other Non-Federal	491	394	668	509	645	2,707
Total KA 608	9,698	12,469	9,698	10,335	9,652	51,852
CSREES as % of Total	27.0%	49.0%	26.4%	32.6%	33.4%	34.5%

MAJOR PROGRAMMATIC THEMES – OVERVIEW AND EXPLANATION OF APPROACH

In developing the major programmatic themes of this diverse KA, we have chosen to use the "Community Capitals Framework" as means of conceptualizing this diverse KA.[4] This approach offers a unique method for determining both the strategic nature of community mobilization and interventions as well as their impact on community systems and so provides a good framework for understanding research, education, and extension activities in rural development. Then after presenting this approach, we will present programs reflecting five major themes for this KA. We will also present brief discussions of several institutional and programmatic initiatives and mechanisms that are particularly relevant for this KA.

[4] Flora and Flora ( ).

The major themes for the KA are:

1.0 - Understanding the 7 Capitals,
2.0 - The Rural Economy: Poverty, Jobs, Farms & Firms,
3.0 - Governance, Leadership, Planning, and Civic Engagement,
4.0 - Amenities, Infrastructure, and Services, and
5.0 - Social, Technological, Demographic Change and Community Response.

Basic research for Community Planning and Resource Development is necessary for CSREES and its partners in the Land-Grant University system and public and private sectors to wisely invest resources that will lead to increased economic opportunities and improved quality of life for rural America. Communities are understood as comprised of dynamic, diverse, and interdependent interactions between their diverse residents, organizations, institutions, groups, and resources and assets, internal as well as external. To understand these interactions and the players and influences, including variation across time and place, basic research with a complex, holistic perspective is required. This is what the "Community Capitals" framework devised by social scientists over the past decade provides.

Cornelia Flora, Director of the CSREES funded North Central Regional Center for Rural Development, describe the need for new knowledge that is anchored in a systems framework as follows:

"Rural America is a complex mixture of peoples and cultures struggling for survival by implementing innovative approaches to their problems. These people range from miners, who have been laid off in West Virginia, to Laotian immigrants relocating to Kansas, to work at a beef-processing plant, to entrepreneurs drawing up plans for a world-class ski resort in California's Sierra Nevada … [an] integrative approach [using the] sic [Community] capitals provides… for understanding rural society based on the concepts and explanations of social science." ("Using Social Science to Affect Community Change, Rural Development News, vol. 26, no 4, 2003).

Lionel "Bo" Beaulieu, Director of the CSREES Southern Rural Development Center, stresses the urgent need for basic research that informs multi-faceted science-based community and development applications:

"Rural America now finds itself at a critical juncture. While still home to millions of people, it continued to struggle in its capacity to provide the quality of life that can keep its young people home and that can attract people with new ideas and with strong human capital endowments." ("Creating Vibrant Communities & Economies in Rural America," SRDC Publication No. 225, August 2002).

During the 2000 – 2004 period covered in this Portfolio Review, advocates for improved economic opportunity and quality of life in Rural America whose work is within the private and public sectors have pointed out new challenges for rural people and places and called for new frameworks, knowledge, and practice.

In September 2001, the USDA released a new book of policy priorities: "Food and Agricultural Policy: Taking Stock for the New Century" (USDA September 2001). In it, Secretary of Agriculture Anne M. Veneman said, "Our challenge today is to address the vital forces of change while at the same time modernizing the foundations of our farm and food system to ensure continued growth and development for the 21st century." Principles identified to guide USDA's programs reflected these insights:

- Farming no longer anchors most rural economies;
- Commodity-based farm policies do not address the complexities of rural economies and populations;
- Challenges defy homogeneous solutions;
- Unique partnerships [are needed to] service rural America.

From the private sector, the Federal Reserve Bank of Kansas City's Center for the Study of Rural America released a landmark conference report in October 2002 titled, "Beyond Agriculture: New Policies for Rural America." In that report, Mark Drabenstott, Vice President and Director of the Center for the Study of Rural America, stressed described rural America as "at a crossroad," caught between needing new and broad policy initiatives for economic and community development and operating in a policy environment focused on the traditional assumption that the agricultural sectors is the "tide that lifts all rural boats." The more than 250 rural leaders from across the nation reached consensus that "a new path is essential if rural America is to seize its full economic potential" (p. 1).

Similarly, the private sector Farm Foundation identified Rural Community Viability as one of its "Priority Area Action Plans" and stressed the need to explore the changing nature of the economic links between agriculture, agribusiness and rural communities.

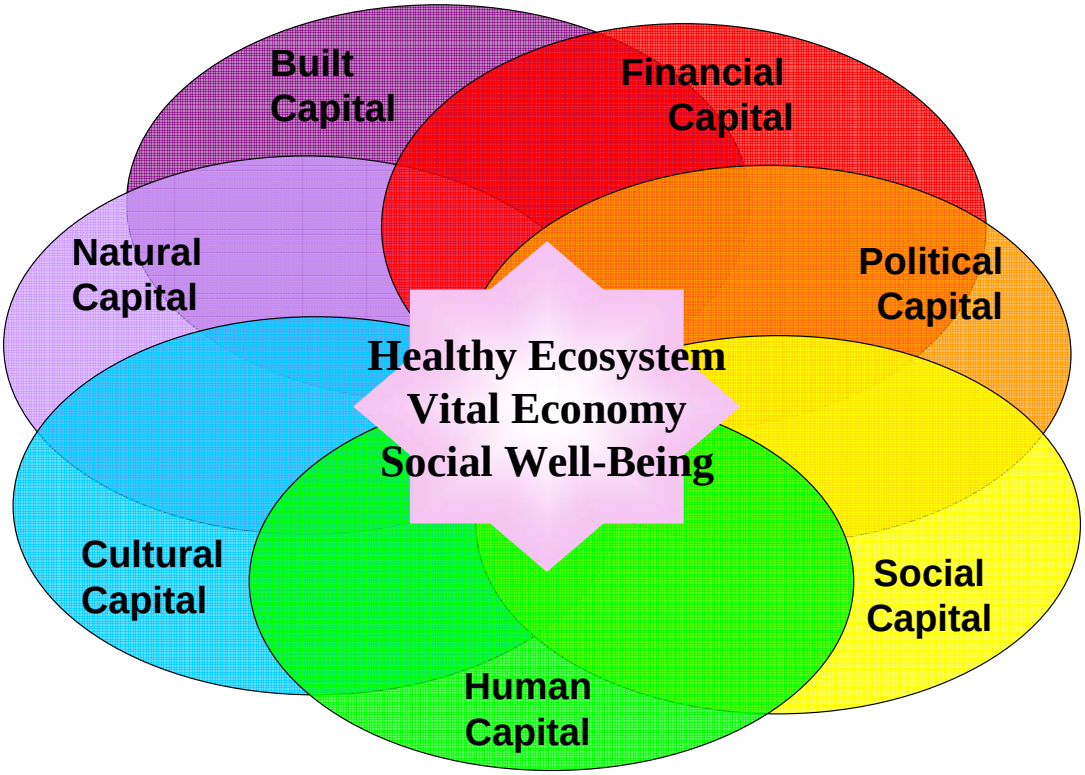
At CSREES, competitive grants, formula (core) funds, special "earmarks", the Regional Rural Development Centers and other programs with over-lapping objectives but described in other Portfolio Reviews of the agency's investments made numerous and leading contributions from 2000-2004 to increase knowledge for community resource planning and development by building research programs and as well as they research capacity needed to inform successful rural development activities in the states, counties, parishes, and territories of rural America. Over this period, social scientists have increasingly adopted the "Community Capitals" framework to a guide systems research approach as well as for evaluating the strategic nature of community and economic development programs and interventions.

Explanation of Community Capitals Framework

Carving up CSREES programs into separate knowledge areas can sometimes mask the convergence and synergies reflected in the portfolio. Likewise, the change in definition of knowledge areas during the reporting period, although intended to better capture the breadth of portfolio activities, can make it difficult to present a comprehensive and coherent picture of research, education, and extension activities devoted to Community Resource Planning and

Development. To overcome these limitations, the National Program Leaders responsible for the majority of rural development efforts of CSREES have opted for a different conceptual framework, but one that will be familiar and fruitful to most social scientists reviewing Portfolio 2.1. That framework is the "Community Capitals" framework. As shown in the diagram below, these seven capitals that are considered vital to rural community well-being are: (1) Built Capital; (2) Financial Capital; (2) Political Capital; (4) Natural Capital; (5) Social Capital; (6) Cultural Capital; and (7) Human Capital.

Figure III-3



Through self-evaluation and strategic planning, individuals and communities can analyze their comparative strength in each capital, rank the importance of each capital in achieving a specific personal or collective goal, and strategically invest in the optimal mix of capitals to achieve that goal. Because these seven Capitals comprise the net accumulation of a community's assets and liabilities, this framework serves to focus on what can be done to accumulate assets and shed or minimize its liabilities. In addition, a community's assets in a particular capital can theoretically be drawn upon to eliminate its liabilities in another capital. Furthermore, these assets may reflect both external (exogenous) factors as well as those that are internal (endogenous) to the community system. Thus, the capitals may serve as both cause and effect, or both the input and the outcome of investment, and so can be mutually informing and reinforcing.

We will use this framework as a foundation for our discussion of Knowledge Area 608, Community Resource Planning and Development, because the seven community capitals are the very resources communities use to plan and strive to develop.

Working through our Land-grant universities and other partners, and by leveraging public and private dollars to work in partnership, CSREES brings many people to the table to pursue the goal of enhanced economic opportunities and improved quality of life for rural Americans. Through competitive grants, formula (core) funds, and special "earmarks", CSREES administers research, education, and extension activities devoted to KA 608—Community Resource Planning and Development, beginning with basic research to (1.0) better understand the seven capitals. Then the capitals are deployed, assessed, and evaluated through applied research, education, and extension activities directed toward (2.0) The Rural Economy: Poverty, Jobs, Farms & Firms, (3.0) Governance, Leadership, Planning, and Civic Engagement, (4.0) Amenities, Infrastructure, and Services, (5.0) Social, Technological, Demographic Change and Community Response.

The Community Capitals framework introduces seven capitals that represent the significant assets communities can invest in to achieve enhanced economic opportunities and improved quality of life for rural America. These assets can be identified and quantified in a community—a process known as asset mapping—the results used for strategic planning. Any severe deficits in any of these community assets suggest a liability that requires community attention and investment. The goal is to optimally invest in all the capitals. An asset becomes a capital when it is invested to achieve higher levels of individual and community well-being, expressed through a lens of maintaining sustainability of the community as a vital economy, with social well-being, and a healthy ecosystem. These seven capitals include: 1) natural capital, 2) financial capital, 3) built capital, 4) human capital, 5) social capital, 6) political capital, and 7) cultural capital. There is no hierarchy as they all play an interrelated role in the community. These are explained in-depth below:

- Natural capital refers to those assets that abide in a location, including resources, amenities, and natural beauty. Components of natural capital include air, water, soil, biodiversity, landscape, etc.
- Financial capital refers to the financial resources available to invest in community infrastructure and capacity building, to underwrite business development, to support civic and social entrepreneurship, and to accumulate wealth for future community development. Measures of financial capital include savings, debt and investment capital, tax revenue, and grants.
- Built capital refers to the infrastructure with which the community is endowed and that supports the community, such as telecommunications, water and sewer systems, roads, private and public buildings, and the community's housing stock.
- Human capital includes the skills and abilities of people to develop and enhance their resources, as well as the ability to access outside resources and bodies of knowledge in order to increase their understanding, identify promising practices, and to access data.

Human capital includes such things as education, skills, health, self-esteem, self-efficacy among individuals and the aggregate community.

- Social capital reflects the connections among people and organizations or the social glue that make things happen. Bonding social capital consists of interactions within specific groups and bridging social capital consists of interactions among social groups. Components of social capital include mutual trust, reciprocity, collective identity, working together, and a sense of shared future.
- Political capital refers to access to power and power brokers, the ability of a group to influence the distribution of resources, including helping set the agenda of what recourses are available. Components of political capital include organization, connections, voice, and power.
- Cultural capital refers to symbols and language, ways of knowing, what we value, ways of acting, and definitions of what is problematic. Cultural capital reflects the way people "know the world" and how to act within it. It also includes the dynamics of who we know and feel comfortable with, what heritages are valued, and collaboration across races, ethnicities, and generations.

We believe these themes provide a convenient way to describe how CSREES-supported rural communities in addressing the challenges and opportunities addressed in the situation statement. A substantial amount of research adopted and applied the Community Capitals perspective, so any research that takes this approach is found in Theme 1.0. This approach can conceptually encompass all of the work in this knowledge area and we welcome the reader to take this approach. The research using the Community Capitals concepts has helped local governments and organizations to think more effectively about their situation and improve their governance, leadership, planning and civic engagement.

Figure III-4

The majority of research addressed rural economic issues, so this became Theme 2.0. CSREES supported knowledge helped rural communities handle significant economic challenges and opportunities, leading them to "open the farm gate," to nurture e-commerce, agricultural innovation and agri-tourism; and to help local communities adjust to agriculturally induced structural effects. Examples are farmers transitioning from mono-crop to diversified crops production, the impact of greater vertical integration in agribusiness and effects from other changes in rural commerce. The important problems of rural poverty and other structural issues were also studied in this knowledge area. Many programs addressed structural unemployment, barriers to opportunity, individual and family capacity to participate in new economy, e-Commerce and the digital divide, entrepreneurship, clustering, jobs, and amenity development.

Since this knowledge area is aimed at better decision-making, many of the studies that were completely classified in this KA examined governance and leadership in rural communities, so this became Theme 3.0. A sufficient number of studies focused specifically on community amenities, infrastructure and services for it to become Theme 4.0. Finally, there was quite a bit of research done on social, technological, demographic change and community response as they affected development and planning. This became Theme 5.0.

INSTITUTIONS SUPPORTING THIS KA'S OBJECTIVES

Before discussing the themes, it should be noted that many CSREES supported efforts at improving community resource planning and development are channeled through various regional centers where they are significantly leveraged with funding and programs from other entities whose goals and priorities parallel those of CSREES, Of particular importance for this KA, are Rural Regional Development Centers (RRDCs), Regional Risk Management Education Centers (RMECs), regional Sustainable Agriculture Research and Education (SARE) centers, and the Rural Poverty Research Center (RPRC) program of the Rural Policy Institute (RUPRI). While we are focused on their outcomes in this review, a brief discussion of their roles, sources of funding and successes may be useful.

Rural Development Centers

The CSREES Regional Rural Development Centers (RRDCs) play a unique role in the USDA's service to rural America. They link the research and educational outreach capacity of the nation's public universities with communities, local decision-makers, entrepreneurs, families, and farmers and ranchers to help address a wide range of development issues. They collaborate on national issues that span regions—like e-commerce, workforce quality and economic diversification, balanced use of natural resources, and vital communities capable of playing a leading role in their own development. Each center tailors programs to address particular needs in its region. See: http://srdc.msstate.edu/about/rdcenters.htm

The RRDCs bring together the most innovative minds—from inside and outside universities—to address cutting-edge issues without regard to state boundaries. They respond to emerging issues, generate credible science-based information to clarify these issues, and create public-private partnerships to address them.

The RRDCs were established by the Rural Development Act of 1972. The first was the North Central Regional Center for Rural Development, based at Iowa State University. Subsequent RRDCs were established in the South, Northeast, and West. The Southern Rural Development Center is based at Mississippi State University. The Northeast Regional Center for Rural Development is based at The Pennsylvania State University, and the Western Rural Development Center is based at Utah State University. Each RRDC is administered by a joint agreement between USDA and a host institution operating for the Extension Services and the Agricultural Experiment Stations in the respective region. Core funding is from CSREES for integrated research, education, and extension activities.

The RRDCs were highly successful in leveraging CSREES core funding during the 2000-2004 period covered in this portfolio and that trend continued in 2005. From 2000-2004 the RRDCs were awarded a combined amount of extramural funds of $5,889,917. In 2005 their extramural funding was $3,146,899.

Public and private partners that share rural community and economic development goals and objectives with USDA-CSREES who funded the RRDCs over this time period include: the Farm Foundation, the Ford Foundation, the Walton Family Foundation, the W.K. Kellogg Foundation, the Foundation for the Mid South, the Pew Partnership for Civic Change, the Rural School and Community Trust, the Southern Growth Policies Board, Southern SARE, the Tennessee Valley Authority, the USDA Economic Research Service, the Rural Policy Research Institute, the Northwest Area Foundation, the National Rural Funders Collaborative, the USDA Forest Service, EPA, USDA Rural Development, the California Endowment, ADEC, Pegasus T.V., Lumina Foundation, the Claude Worthington Benedum Foundation, the Leopold Center, the Pennsylvania Department of Labor, the Kauffman Foundation, and the Progress Fund.

Detailed information about the RRDCs' integrated research, education, and extension activities is available on their websites:

- Southern Rural Development Center: http://srdc.msstate.edu
- Northeast Regional Center for Rural Development: http://www.cas.nercrd.psu.edu
- North Central Regional Center for Rural Development: http://www.ncrcrd.iastate.edu
- Western Rural Development Center: http://extension.usu.edu/wrdc/

Risk Management Education Centers

These centers and their associated programs are described in greater detail in KA 602. However, briefly, the CSREES Extension Risk Management Education (RME) Program is carried out through four regional Risk Management Education Centers. They provide competitive RME grants that address the whole gamut of financial risk management issues. The program's primary goal is the development of educational materials to help producers better manage their farm financial risks. The Agricultural risk Protection Act, establishing the CSREES' RME Program notes that funds provided are to be used "*…for the purpose of educating agricultural producers about the full range of risk management activities, including futures, options, agricultural trade options, crop insurance, cash forward contracting, debt reduction, production diversification, farm resources risk reduction, and other risk management strategies."*

A secondary goal was to have a user-friendly way of dispersing results of funded projects. As a result, the Agricultural Risk Library was established through the CSREES RME Competitive Grants Program at the University of Minnesota. All materials developed with RME regional grants are available in the library.

Rural Poverty Research Center

In addition to the CSREES investments in understanding rural poverty through projects funded by the NRI, the Rural Poverty Research Center (RPRC) worked during 2000-2004 to expand research on rural poverty. The RPRC, located at Oregon State University, is funded by the Rural Policy Research Institute (RUPRI) which is headquartered at the University of Missouri-Columbia and funded by a Congressional Special Research Grant earmark through CSREES.

In 2003, the RPRC encouraged faculty across the land grant university system to focus on collaborative rural poverty research, sponsored a conference in 2004 to identify a national research agenda and develop strategies to advance knowledge about patterns of persistent poverty. RPRC joined with the CSREES Regional Rural Development Centers to sponsor four regional research conferences. Two follow-up regional research conferences focused on regional variations in rural poverty and building capacity for research on rural poverty:

- "Cultures, Governance, and Rural Poverty in the Midwest," Chicago, 2004, sponsored by the North Central Regional Center for Rural Development. Proceedings and additional information are published on the conference Web site: http://www.ncrcrd.iastate.edu/poverty/index.html
- "In the Shadows of Plenty: Rural Poverty Research Capacity of the South," Memphis, Tennessee, 2004, sponsored by the Southern Rural Development Center. Proceeding and additional information are published on the conference Web site: http://srdc.msstate.edu/poverty/index.html

Two additional conferences were slated for 2005, in the West and Northeast.

Results from the RPRC conference are available on the web, and the spring 2004 issue of "Perspectives on Poverty, Policy, and Place," the RPRC newsletter, includes summaries of the main conference presentations.

RPRC Co-Director, Bruce Weber developed a hypothesis about the current economic system in relation to rural poverty. "Our economic system is a game of musical chairs: no matter how much we increase people's agility and speed in getting into a seat, there will never be enough chairs for people to sit in. The implication [for future research] is that we need to increase the number of chairs and/or change the rules so everybody doesn't need a seat to live well."

This research emphasis continues to expand in 2005, as the RPRC works with CSREES's four Regional Rural Development Centers to expand the capacity and volume of research on rural poverty and develop fundable research proposals.

Sustainable Agriculture Research and Education (SARE) Program

The SARE program is primarily directed toward the issue of sustainable agriculture rather than economic development per se. The concept of sustainable agriculture includes profitability, environmental stewardship and quality of life and has significant impacts on the decision-making that takes place in rural communities. More information on SARE can be found in Knowledge Area 902 (later in this document).

Theme 1.0 – UNDERSTANDING THE 7 CAPITALS

This theme involves research, education and extension projects that reference or discuss community assets and liabilities, how we invest in them, what existing community assets and investments are deployed, and what are the outcomes. Three individual projects will be highlighted.

<u>Project 1.1</u> - "Network Analysis for Communities." Maureen Kilkenny, Project Director. Department of Economics, Iowa State University. (NRI)

The United States and other countries are actively seeking alternatives to farm subsidies to support rural development, often through local capacity-building. This project fills critical gaps in knowledge. Because there has been little cross-sectional analysis of initial capacity (measured by social capital or network) and no identification of desirable community network structures in support of economic outcomes, there are no techniques for the cross-sectional analysis of networks.

This project measured the social capital of small towns through network analysis. It emphasized research activities with significant outreach components. The primary goal of the research was to quantify the roles of various entities in small towns. It tested five propositions in cross-section: (i) are community network structures different, or (ii) better with respect to economic outcomes, (iii) how comparable are social capital and network measures, (iv) what is the dependence of local policy choices on community network composition, structure, and quality, and (v) do economic outcomes determine or depend on community network characteristics.

OUTPUTS

<u>Research</u>

Data on community networks were collected about three relationships (money, income and support) in 60 towns across four states. Secondary data about the towns were also collected. These included:

- **Geographic Data**: Zip codes, FIPS codes,[5] Latitude and Longitude, place of work, travel times to work, miles from the nearest interstate;
- **Demographic Data**: Town populations with age and education distributions, previous residence of citizens, place of their birth, ethnicity, origin of foreign-born population;
- **Economic Data:** Town labor force, real per capita income; and,

[5] "'FIPS place codes'" are a U.S. Federal Information Processing Standard for geographic coding of human settlements in the United States. They are used in Geographic Information Systems (GIS).

- **Real Estate Data:** Average value of a 3 bedroom home, median home value, median real estate taxes, % occupancy, and age of average home.

OUTCOMES

Short Term
The social network analysis has augmented the understanding of the role of town social capital as well as provided a useful database of geographic, economic, demographic, and fiscal data. With this data in hand, small town mayors, city councils, local activist, and property owners can convince more of their fellow citizens and businesses to take cooperative responsibility for the future of their towns.

Medium Term
The town leaders now say "Research has shown that in towns where the [churches/banks/restaurant owners/…] participated in activity [XXX], [80%] of the time the towns were successful at achieving their goal [ZZZ]."

Long Term
Improved rural community development and planning.

<u>Project 1.2</u> - "The Role of 1890's in Building Human Capital Among Rural People: Methods and Case Studies, Virginia State University, W. Clarke, A. Essel, A. Tegene, and N. Ballenger. (NRI)

This research study measured human capital and its consequences with significant higher education and outreach/extension implications. It built an analytical base for assessing and further enhancing the role of the 1890s Institutions to build human capital. It collected data on public investments in 1890 programs, the number and characteristics of 18890 students and external clientele, and the accomplishments and impacts of these programs. It also developed methodological approaches for analyzing the contributions of the 1890s teaching, research and extension in the development of rural human capital and transferring this knowledge to 1890 institution researchers. It used case studies to empirically apply the methods developed and quantify the private and social returns to human capital development.

OUTPUTS

<u>Research Findings</u>
- Historically Black Colleges and Universities (HBCUs) were found to play an important role in fostering post-secondary education among African Americans in racially diverse rural counties.

- Data on HBCU graduates was combined with Department of Labor statistics on age-earning relationships and compared with African American graduates at other universities.
- Two peer-reviewed articles and two papers resulted from this project.
- The number of African Americans with college degrees increased by 1.7% for every ten mile reduction in distance to the closest college or university. This is augmented by an additional 0.8% increase for a ten mile reduction in distance to an HBCU.

OUTCOMES

Short Term
This project explored conceptually and empirically the connections between human capital impacts and the economic development of rural communities. The research documents investments in education, particularly associated with HBCUs provided an important means of understanding economic advancement for African Americans in the rural south.

Medium Term
Documentation of the success of HBCUs strengthened the base of support for continued investments in HBCU mandates. Project results assisted the federal government in its allocation of 1890 research and extension funds, and the 1890s in setting program priorities.

Long Term
The improved understanding of how human capital was developed and improved through 1890 institutions, provides valuable information about the best practices in program development as well enhancing human capital in underserved rural communities.

Project 1.3 - "Structural Determinants of Rural Poverty: An Expanded Analysis." Stephan Goetz, Project Director. Northeast Regional Center for Rural Development, University of Pennsylvania. (NRI)

The theme of this research project relates to structural, rather than individual, determinants of rural poverty. Its innovation is its initial efforts to apply elements of the social capital framework to investigating the research's empirical questions. This research project will have significant community outreach and extension implications, although these are not yet detailed. The project is included as one of several to illustrate the increasing application of community capitals theory in scientific research on community resource planning and development.

OUTCOMES

Persistent rural poverty is one of the most stubborn social problems facing public policy makers. To expand our knowledge of the determinants of poverty, the research team compiled a county-level database on poverty, economic growth, social capital and political forces up to the year 2000, they conducted descriptive analyses of poverty within counties and identified the independent effects of economic, social, political, and other factors that determine poverty and they interactions. They classified counters in terms of their exposure to global forces, urban expansion, economic structure, and levels of social capital as well as political power.

Short Term
This project expands knowledge of determinants of poverty by focusing on causes that have previously not been considered: social capital and political capital or democratic governance variables.

Medium Term
The research team identified and quantified a number of important factors affecting both poverty rates and changes in poverty rates over time.

Long Term
Results of the study have generated considerable interest among practitioners because they offer new approaches for dealing with the problem of long-term and persistent poverty. By implementing some or all of the recommendations presented in this study, rural (and urban) communities may be able to start reducing their poverty. Implications are also drawn out about the impact of structural changes in the retail sector, and these results represent an important contribution to the debate currently surrounding big-box stores such as Wal-Mart.

Theme 2.0 - The Rural Economy: Poverty, Jobs, Small Farms & Firms

Due to the considerable breadth of this theme, nine projects will be highlighted.

<u>Project 2.1</u> - "Rural Economic Development: Alternatives in the New Competitive Environment" (Multi-State Research Project)

This extensive multi-state project involved 20 land grant universities and 23 separate projects. While this project was terminated in FY2002, its objectives were squarely in KA 608. The project involved three principal objectives, with individual research projects generally focusing on just one of them.

1) Identify the implications of industrial and employment restructuring on non-metropolitan communities;

2) Identify and analyze the demographic and socioeconomic implications of economic restructuring in non-metropolitan areas, with special emphasis on labor market implications and how various ethnic groups are affected by policy and market changes;
3) Identify changing public policy initiatives and the relationship of their impacts on rural economies and governments; and investigate the effectiveness of alternative policy instruments to affect rural economic and fiscal viability and structure.

Nine institutions investigated Objective 1 with ten projects, five institutions examined Objective 2 with five projects, and seven institutions investigated Objective 3 with 8 projects.

Objective 1) Projects - Implications of industrial and employment restructuring on non-metropolitan communities

Most projects directed collected secondary data from state, national or commercial sources regarding employment growth, firm location variables, characteristics of work, disadvantaged households in rural areas, international tourism, local economic development strategies and patterns of development. Once the data were in hand, specific methodological approaches were employed including survey development, econometric analysis and modeling. Specific topics investigated in depth were, the forest-products industry in New Hampshire, immigration in Colorado, the growth differential between rural and metropolitan areas in New York, the investigation of industry clusters in various states using IMPLAN input-output or Social Accounting Matrix (SAM) models, International Tourism, and other structural trends in rural communities.

Objective 2) Projects - Identify and analyze the demographic and socioeconomic implications of economic restructuring in non-metropolitan areas

Two projects investigated socioeconomic data and trends across entire local and regional economies using spatial models and variables. One focused on how these variables affected economic growth in 39 cities and towns in Rhode Island, and the other investigated them with respect to people's choices to commute or migrate as a joint outcome of a household optimization process. Another two projects explored the socioeconomic effects of plant and mine closings as well as the positive effects of the opening of agricultural processing plants. The remaining project looked at how prisons and waste disposal and diversion impact rural economies. In some cases, the methodologies applied IMPLAN input-output models along with statistical and econometric analysis to these issues.

Objective 3) Projects - Identify changing public policy initiatives and relationships and their impacts on rural economies and governments; and investigate the effectiveness of alternative policy instruments to affect rural economic and fiscal viability and structure

The majority of these projects examined the fiscal impacts of local government economic development polices using regional, multi-regional and interregional economic models, social accounting matrices (SAMs) or Computable General Equilibrium Models (CGEMs). One project examined the strategic interactions between local governments and business location choices utilizing game theory and principles of mechanism design. Again, the projects would rely on secondary data sources, especially the IMPLAN input-output data and PUMs data from the Census Bureau.

OUTPUTS

Due to the large scale of this project, there were numerous outputs, but they can be grouped into the following categories or types. Some project specific results can be found in the discussion of examples.

Research Findings

- Several Primary databases were developed and extensive additions were made to secondary Socioeconomic Databases
- Numerous conclusions were drawn about the socioeconomic and fiscal impacts of economic and demographic shocks to rural communities.
- An unspecified but large number of new socioeconomic models were developed
- 47 peer-reviewed publications
- 21 non-peer reviewed papers, posters or other publications
- Seven books

OUTCOMES

Short Term

- An extensive array of both theoretical and practical results led to greater understanding of the effects on rural communities from industrial and employment restructuring due to changes in the forestry, mining, agricultural processing industries and firms, migration and commuting.
- Specific conclusions and recommendations were effectively made to various federal, state and local governments

Medium Term

- Researchers/educators learned many lessons in the application of socioeconomic models and data to the study of rural communities, which caused them to change their course curricula.
- Research results were communicated to federal, state and local officials, leading them to make better decisions and rulings.

Long Term

- Better governance decisions that improve the economic conditions and quality of life in rural localities.
- Smooth community transitions during periods of decline and growth.

DISCUSSION OF SPECIFIC EXAMPLES

<u>Project 2.1a</u> - "Rural Economic Development: Alternatives in the New Competitive Environment," Goldman, G.E. Agricultural and Resource Economics, University of California - Berkeley.

A descriptive analysis was conducted of changing employment structures in three regions in California. Data from the regional economic modeling system, IMPLAN, was used to examine shifts in industry and employment, highlighting the types of structural changes that have affected the economic well-being of the residents of rural communities. The first set of regions was where prisons were established. The second set was where waste disposal and diversion systems were set-up. A final region, the "Delta" region was examined for effects on boating and fishing industries.

OUTPUTS

California Prison Industry Sub-Project: This project examined the impact of the California Prison Industry Authority (PIA) on the economic regions in which it operates and on the state of California as a whole. The economic impacts of PIA on California are $230.1 million in sales, $142.4 million in income, and 3,000 jobs (including PIA employees). Purchases of inputs to PIA industries contribute more to the sales impacts ($86.3 million) compared to personal services ($78.3 million), and facility and general operating ($65.4 million). However, in terms of impacts on jobs, personal services account for the most impacts (871 jobs, excluding 692 PIA employees), followed by inputs to PIA industries (730 jobs), and facility and general operating (707 jobs).

Waste Disposal and Diversion Sub-Project: This was the first attempt to estimate the economic impacts of the waste disposal and diversion system in California. The economic impacts from diversion and disposal at 1999 rates are 16-19% higher than the impacts if all the waste was disposed. The study looked at the economic impacts in six

regions of California. Waste diversion and disposal at 1999 rates have stimulated the regional economies even more than if all the generation had gone to disposal-only in every region but the Eastern California Region. The cost advantages for diverted materials come partly from the saving of landfill fees. The added positive impacts of diversion come from sales of the separated materials, their processing into feedstock, sales of energy for transformation and biomass products, and the value added in manufacturing that uses recycled feedstock. Typically, for every marginal ton of waste disposed in 1999, we estimate that $108 in total income impacts and $144 in value-added impacts would have been generated in the state economy. Whereas, for every marginal ton of waste diverted, $206 in total income impacts and $286 in value-added impacts would be generated.

Delta Sub-Project: The report estimates the impacts of recreational expenditures (boating and fishing) on the Delta regional economy. The total boating expenditures of $247 million generate $445 million in total output, $183 million in income, $279 million in value added, and 8,058 jobs within the Delta region. For fishing, expenditures of $186 million generate $336 million in total output, $138 million in income, $209 in value-added, and 6,152 jobs. These values represent 1.7 percent of total Delta income and 3.2 percent of employment in the Delta for boating recreation. Fishing recreation impacts represent 1.3 percent of total Delta income and 2.5 percent of employment.

OUTCOMES

Short-Term

- The PIA report demonstrated the positive economic impacts that controversial prison and waste programs have on the rest of the state.
- The Waste Disposal report demonstrated the positive economic impact in California, and the regions of California, of diversion, as opposed to disposal, of waste material. This has important policy implications for diversion and recycling activities as the state tries to reach the legislative goal of a 50% reduction in landfill.

Medium-Term

- State policy-makers and other stakeholders gained a greater understanding of the issues from these results before making decisions about these three programs.
- This project estimated the economic impacts of recreation in the Delta, which was useful to the Delta Protection Commission, who requested the study, as well as the regional and statewide policy makers.

Long-Term

- Improve the economic conditions and quality of life due to better government decision-making, which smoothes transitions during periods of decline and growth.

<u>Project 2.1b</u> - "Rural Economic Development: Alternatives in the New Competitive Environment," D. S. Kraybill and E. Irwin, Agricultural, Environment and Development Economics, Ohio State University.

Job readiness programs bring unemployed persons into the labor force. Participation in these programs tends to increase the earnings of participants. However, when the programs are administered to large numbers of people, the aggregate effect in the labor market is to increase the supply of labor and lower wages slightly. While local wage decline is not good for the currently employed, lower wages reduce the cost of production and may stimulate exports to the rest of the nation and the rest of the world, thus in turn increasing the demand for labor and potentially leading to an increase in wages.

OUTPUTS

A dynamic economic simulation model was developed and applied to Oregon to assess the potential for job readiness programs to reduce household poverty at the state level. The simulation model is used to assess the strength of competing influences on the poverty rate at the state level. The net effect on poverty depends on the number of new workers brought into the labor force, the responsiveness of exports to changes in the cost of production, and the responsiveness of the poverty rate to changes in the wage rate.

Several different models were used to investigate the potential of preserving open space as an economic development strategy in rural-urban communities. One set of models uses data from housing sales in an exurban region of Maryland to estimate a hedonic pricing model to test whether different types of open space have significantly different marginal effects on the value of neighboring residential properties. The identification problems that arise due to endogenous land use spillovers and unobserved spatial correlation are addressed using instrumental variables estimation on a randomly drawn subset of the data that omits nearest neighbors. The results show that there is a premium associated with permanently preserved open space relative to developable agricultural and forested lands and provide evidence that open space is most valued for providing an absence of development, rather than for providing a particular bundle of open space amenities. Another set of models used conjoint data from a survey of Franklin County Ohio homeowners to examine how households value open space around them and how willing they were to trade-off surrounding open space for accessibility to employment and other amenities. Results from this analysis show that households are willing to pay a nearly equal premium for preservation of open space as permanent cropland within their immediate neighborhood.

OUTCOMES

Short-Term

- The dynamic simulation model was presented to Oregon State government officials, including the Oregon Progress Board and the state's human resources

agency. The Progress Board is charged with setting targets for evaluating state policy, and this is one of the first attempts of the Board to forecast the effect of state policies on socio-economic targets.

- The results on the value of open space were presented at an Extension workshop attended by public officials, planners, Extension agents and others involved in environmental management issues within the State of Ohio. It raised awareness of the value surrounding open space contributes to the value of a house and provided reference points for its estimation.

Medium Term

- These research projects were used by state policy-makers and other stakeholders in making practice decisions about these three programs.

Long Term

- Improvement in quality of life and incomes due to a reduction in poverty and better land-use planning and decision-making by local governments.

<u>Project 2.2</u> - "Business Networks and Rural Community Economic Vitality," Besser, T. L.; Korsching, P. F. Department of Sociology, Iowa State University. (NRI)

This was a highly integrated effort to:

- Learn how enduring business networks are created and sustained;
- Field test the findings by developing five new rural business networks:
  (1) A retail store network,
  (2) A pharmaceutical crop growers network,
  (3) A food chain network,
  (4) A community based network of farmers and business people, and
  (5) An import substitution network or a career ladder network; and
- Produce materials and workshops to make project findings available to rural community leaders, developers, and businesses.

Using institutional and social capital theories, three variations of concepts of trust were tested for their association with member involvement and resource exchanges that offer differing potentials for opportunism. Loosely speaking these conceptions involved (1) an analysis of opportunism, (2) an analysis of business networking and social responsibility, and (3) the trust relationships involving shared vision, network membership and gender.

OUTPUTS

<u>Research</u>

Several sets of findings were developed through the combination of data from literature searches, a telephone survey of 460 business operators, and interviews with 1122

members of 29 business associations. This knowledge was distributed through presentations at professional conferences and articles in peer-reviewed journals.

Findings regarding the problems of "free riders," opportunism and dyadic defection were the following:

- Trust based on personal acquaintanceships is associated with fewer free riders.
- Trust based on shared values and common vision is more likely to generate resource exchanges with the greatest risk of opportunism.
- Trust based on instrumental gain is the best predictor of less risky resource exchanges.
- These conclusions both support and challenge institutional and social capital theories.

Findings regarding the relationship between business networking and business social responsibility to communities, defined as the provision of leadership and support for community betterment projects were:

- Networked businesses provide more leadership and support for their communities than non-networked businesses.
- Networked businesses were no more likely than non-networked businesses to use local suppliers of goods and services.

The findings regarding trust relationships surrounding shared visions, network membership and gender were:

- Few differences beyond gender were found related to owner or business demographics and these characteristics held little to no affect on the specific variables hypothesized to affect continuance in the network. This suggests that although males rated resource sharing significantly higher than females, no other differences were discovered for level of shared vision, business activities, perceived advantages nor network continuance.
- (Extension) The investigators continue to work with the five newly created business networks: a women's specialty store network in Nebraska, a Hispanic business network and an entrepreneurship network in two rural Iowa towns, and a collaborative arrangement between agricultural producers and upscale chefs in Ohio.

OUTCOMES

Short Term
The results offered support for social capital and strategic networking theory, and practical applications for promoting small business creation, retention, and expansion in small communities.

Medium Term
This information will help develop materials for small rural businesses to be more innovative and successful.

Long Term
Innovative, successful businesses may in turn improve the employment situation for their employees and enhance the economic vitality of rural communities.

<u>Project 2.3</u> - "The Geography of Rural Financial Intermediation." Maureen Kilkenny, Project Director. Department of Economics, Iowa State University. (NRI)

Community banks are critical to rural development not only because they finance rural businesses and home mortgages, and manage savings, but also because of their voluntary and philanthropic activity in support of their communities. Banking regulations and banking technologies are also now changing radically. This project studies rural commercial banking to help identify what practices and bank structures are sustainable for both banks and rural communities. Moreover, it provided a benchmark for future studies of the impacts of the regulatory and technical changes. Research goals were to (1) determine where rural savings go to and where rural investment comes from, (2) determine if and how rural credit market participants (savers, borrowers, and community banks) are disadvantaged relative to their urban counterparts, (3) explain the observed patterns, and (4) relate the patterns in financial intermediation to rural development outcomes.

It sought to form rural community investment working groups to design & implement new approaches to mitigate the costs of rural remoteness (on rural banks as well as citizens) in capital markets and to prepare for the internet age and the new universal banking regulatory environment. Using ARCVIEW Geographic Information System software, Federal Deposit Insurance Corporation data was used to document the spatial networks between bank offices, headquarters, and holding companies across the Midwest. The Grameen Bank social collateral approach to rural small business credit access problems was studied in-depth.

OUTPUTS

Research Findings

- Maps showed most bank firms still branch across contiguous counties. Very little geographic diversification occurs across non-proximate counties.
- Data in the 1998 National Survey of Small Business Finances, indicated differences and similarities between metro and non-metro (rural) small business access to, and costs of, credit.
- The major form of capital for small business expansion is owner/partner equity. Bank credit is rarely available to start-up businesses, entrepreneurs, or young people. The lack of access to bank credit to these types of businesses was no worse in non-metro than metro areas.
- Over 85% of all small business credit relationships are with bank offices located within 10 miles. Nonmetro small businesses have longer relationships with their bankers than metro businesses.
- Nonmetro businesses pay higher interest rates on loans, but the difference is not statistically significant.
- Self-formed, self-diversified, and self-monitoring borrower groups are very successful solutions to credit access problems for new and small rural entrepreneurs in the Third World. The Grameen replication programs in the U.S. have not been self-formed, self-diversified nor self-monitored and successful. This failure is most likely due to the availability of other lines of small credit (e.g., credit cards) that do not require individuals to submit to a group. The social collateral approach does not hold much promise for expanding credit to new or small businesses in the US Midwest.
- The null hypothesis that rural banks do not exploit market power was tested and it was rejected. Rural banks enjoy more market power because there are fewer competitors, and they exploit it just as much as any other type of bank.
- The null hypothesis that distance and low population density is insufficient to insulate rural banks from competition was tested. It was found that the profitability of some rural banking areas has been sufficient to encourage the opening of branches in those areas.
- Preliminary findings from the analysis of primary data indicate that banks appear to accept deposits both close and far away, but they make loans only nearby.
- The research results suggest that significant information asymmetry problems (adverse selection: making loan contracts with high-risk borrowers; and moral hazard: when borrowers behave unaccountably after they have the funds) are solved by banks that lend locally; which is why even small rural banks enjoy surprisingly high profits.
- In general the preliminary analyses of the geo-data show that all types of banks, large and small, locally-owned and branched make loans only to close-in borrowers. Banks profit most when they funnel funds into their communities. They do not siphon funds out, nor do they reallocate funds across branches.

Bankers do not appear to chase higher returns farther away than they can drive within about two hours (90-120 miles).

OUTCOMES

Short Term
This research has fundamentally changed the way these researchers think about the role of banks in rural development. It shows unequivocally that banks do NOT take rural deposits out to make loans to borrowers in urban areas. This data is the first of its kind and will support many other analyses. The implications include that banks are natural agents of development in the communities in which they are located.

Medium Term
The results suggest that the imposition of the Community Reinvestment Act regulations on rural or non-metro banks may not only be costly, it is also likely to be redundant. Nonmetro banks appear to have strong incentives to make loans within the area from which they accept the majority of their deposits, no matter what the regulations are. (In contrast, metro banks may have incentives to redline some neighborhoods whose residents are self-selected on other criteria that are correlated with high default rates.)

The research team is using these findings to inform community members, rural bankers, and policy makers. They advocate formation of rural community investment working groups to design and implement new approaches to mitigate the costs of rural remoteness (on rural banks as well as citizens) in capital markets and to prepare for the Internet age and the new universal banking regulatory environment.

Long Term
This research could potentially have consequences for the savings and investment decisions of rural and urban banks, as well as fiscal policy and the federal and state economic development policy and programs.

Project 2.4 - "The Impact of Retail Restructuring in the Non-Metropolitan U.S., 1988-1997." Alex Vias, Project Director. Geography Department, University of Northern Colorado and University of Connecticut. (NRI)

The goal of this research program was to examine the structural changes in the retail sector of American non-metropolitan counties and its impact on the rural economy.

Economic restructuring has transformed rural America over the past 30 years. Within the retail sector changes such as retail concentration (fewer, larger stores owned by fewer corporations), technological innovation, and new labor practices have revolutionized the industry from top to bottom. These broad changes will have profound impacts in rural America because retail is a major component of the rural economy (about 17% of total

employment). The goal of this research was to develop a fuller understanding of retail change in the non-metropolitan counties of the US between 1988 and 1997. It focused on the geographic variability of retail restructuring and changes in the size of retail establishments in over 2200 non-metropolitan counties across America, and examined the relationship between the structure of the retail sector and community well-being at the county level.

OUTPUTS

Research Findings

- The data showed that in all parts of the retail sector (2 digit SIC sectors) the size of the stores have exploded over the 11 year period, especially the general merchandise sector (this includes such companies as Wal-Mart and K-Mart)
- Aggregate statistics for all non-metro counties do not show the degree of spatial differentiation the retail sector experienced between 1988-1999.
    - County-level classifications indicate there are significant differences in the process of retail change around the US.
    - At the regional level, the areas hit hardest by declining store numbers are the Great Plains counties.
- With respect to relative location, the most rural and smallest counties are losing stores at a much faster rate than larger counties closer to major cities. Scale effects (changes in store size) are most profound in these same rural counties.
- Cluster analysis showed there are 5 distinct groups of counties, each taking different paths to restructuring in the retail sector.
    - One group of counties shows that increased employment in retail is manifested in more stores locally,
    - Another county group had increased employment expressed simply through larger stores (scale increases), but the number of stores may have actually decreased.
    - Finally, in another group of counties, where retail employment remains stagnant, the number of stores declined, also indicating increases in the scale of retail.
- Retail change in the distressed region of the Great Plains was examined. The results show that while retail employment continues to increase, even with population losses in many counties, the number of retail stores has significantly declined throughout the region. Perhaps even more alarming is the loss of whole retail functions in a large number of counties in the region, potentially leading to a lower quality of life for local residents.
- A regression analysis on the socioeconomic health of communities most affected by changes in the retail sector produced unexpected results. Controlling for population change, size, economic structure, and relative geography, it was found that:

- Counties that experienced increases in scale in retail (the rise of big box stores), had higher median incomes and lower family poverty rates. This finding is the opposite of that hypothesized in the research proposal, but may be a result not so much of the impact of restructuring of communities, but the result of prosperous communities being targeted by the big box chains.

- Overall, there are clear and distinct patterns of retail restructuring taking place and systematic factors associated with these different patterns.
- For example, in both the academic and popular media, retail change has been depicted in very dramatic terms, especially the impact of the retail giants on rural communities. However, the current research shows that the restructuring process varies enormously from county to county around the US, depending on a number of locally contingent social and economic conditions. While some areas are seeing a decline in small retail stores and an increase in the larger stores often feared, this process is far from uniform. Much depends on recent demographic trends in the county/region. The variety of paths for retail change suggests that single catch-all policies aimed at preserving rural downtown CBD areas may not be appropriate.

OUTCOMES

Short Term
The trends analyzed on retail change in the non-metropolitan counties of the US shows a number of significant trends that were of interest to local and federal policymakers.

Medium Term
This research provided a broader picture of retail change and its impacts, and helped government officials develop and institute economic development policies designed to support the economic viability and social well-being of rural communities across the U.S., while remaining more in tune with local conditions. It identified trends, variability, and contingencies that should be of interest to local and federal policymakers. The variety of paths for retail change suggests that single catch-all policies aimed at preserving rural downtown CBD areas may not be appropriate.

Long Term
These findings, along with additional analyses on the impacts of retail change on rural communities throughout the US, should help officials develop economic development policies that are more responsive to variations in local conditions.

<u>Project 2.5</u> - "Plastics Recycling: Using Agricultural Residues to Improve Performance II." (SBIR)

Having established the feasibility in Phase I, Agro-Plastics, Inc, of Lawrence, KS, received a Phase II grant in FY 2002, to conduct additional research on the process of

using wheat straw fibers as a means to improve the characteristics of commingled plastic. This project will yield the following benefits: supplemental income for farmers by creating new markets for wheat straw; recycling option for the community's plastic; high paying plastic's manufacturing jobs; and an increased tax base.

OUTPUTS

The company expects that this process will be successful enough to create significant additional income streams for rural areas while reducing high waste disposal costs. Community profiles developed for the grant found that people would welcome a plastics recycling facility in their county and know people who would be willing to work at the plant. The data also show that development of such a plant may encourage the repatriation of people who have left the community due to a lack of jobs.

OUTCOMES

Short Term
The project increased the knowledge about using agricultural fibers to improve the properties of recycled plastic. Currently, in the U.S., only 5.6% of the plastic waste generated is recycled. Location of these plastic recycling firms near suppliers of agricultural fibers can help create new employment opportunities.

Medium Term
Increased income generating opportunities from recycling of plastic may help change human behavior towards recycling. Supplemental income from agricultural fibers can have an impact on farm decision making regarding resource allocation and crop mix. In addition, Phase I research suggested new high paying employment opportunities in rural areas may help repatriate labor that has migrated to urban areas in search of jobs.

Long Term
Increased recycling of agricultural fibers and waste plastic can have positive environmental impacts in rural areas. In addition, new jobs and higher farm incomes can increase the rural tax base and in turn, help improve the economic and social conditions of rural areas.

Project 2.6 - "From Welfare to Work: The Effectiveness of Policy in Rural Labor Markets." Bruce Weber, Project Director (team). Department of Agricultural and Resource Economics, Oregon State University. (NRI)

This project investigated policies directed toward poverty specifically through the investigation of the effectiveness of public welfare policy in helping families achieve

economic self-sufficiency in rural labor markets. This was primarily a research-based project with significant community outreach/extension activities.

This research team examined the impact of programs designed to assist people moving into employment. They analyzed the transitions toward economic self-sufficiency made by rural workers in Oregon who receive social supports such as welfare, job training, child care subsidies, or health insurance and measured the relative importance of personal characteristics, local labor market conditions, and social supports to successful transition of welfare to work.

OUTPUTS

Research Findings

- Principal conclusion: Low-income workers in Oregon face serious economic disincentives to working longer hours or at higher wages because of the interaction of tax and subsidy programs. In some cases, net spendable income actually declines if earnings increase.
- Their study has reached several important conclusions about Oregon's working poor (those who entered the Oregon Health Plan in 1994 and were working at intake):
    - For nearly half of the Oregonians in the sample who were poor and working in 1994, quarterly earnings were below the 1996 poverty threshold for a family of three with 2 children in every quarter in 1995 and 1996.
    - Frequent job changes and periods of non-employment place important constraints on earnings outcomes. Poor working adults in rural Oregon worked about 2 weeks less on average over the period 1994-96 than their urban counterparts, made about $230 less per quarter, and experienced more quarters with poverty level earnings ($3160 per quarter, the poverty threshold for a family of 3 with 2 children in 1996).
    - Local labor market conditions matter: local job growth increases the probability a jobless poor adult will get a job and shortens the length of time until she finds a job.
    - After accounting for both the effects of personal demographic characteristics and local job growth, no significant difference remains in the probability of employment or the duration of joblessness for rural compared with urban areas.

OUTCOMES

Short Term

This project revealed that local labor market conditions in rural areas (i.e., lack of jobs paying a living wage) limit the effectiveness of pubic policy in helping families achieve economic self-sufficiency. Low-income workers in Oregon (and probably elsewhere) face serious economic disincentives to working more or working at higher wages because of the interaction of tax and subsidy programs. Net spendable income actually declines if earnings increase for these workers. Frequent job changes and periods of non-employment place important constraints on earnings outcomes. Rural low-income workers work less, make less, and experience more time at poverty-level earning than their urban counterparts. Local labor market conditions matter: local job growth increased the probably that a jobless poor adult will get a job and shortens the length of time until s/he finds a job.

Medium Term

Through interactions with the Senate Finance Committee and House member staff, the research team helped Congressional staff and policymakers better understand some of the barriers to work facing low-income adults in rural areas and the differential impacts of welfare reform in rural and urban areas. Research results are also being disseminated for broad use through interaction with analysts at policy research organizations such as the Brookings Institution, the Urban Institute, and Mathematica Policy Research.

Long Term

The results of this research are being used at the state level in development of a tool for policy analysis linking alternative policies and poverty outcomes. Results are a reference point for calibration of the Oregon Poverty Dynamic Simulation model being developed with support from the Oregon Progress Board and the Oregon Department of Housing and Community Services.

Project 2.7 - "Poverty, Labor Markets, and the Potential Impact of Welfare Reform on Single Female-headed Households." B. F. Mills, J.R. Alwang, and J.F. Findeis, Department of Agricultural and Applied Economics, Virginia Polytechnic Institute. (NRI)

This research project investigated the impact of welfare reform on poverty among single female-headed households in the rural South.

The rural south exhibits high rates of poverty, particularly among female-headed households with children. There was hope that welfare reform would benefit such families by providing more incentive to work. Welfare roles are declining in the south as provisions of welfare reform take hold, but rates of poverty have not shown similar declines. This project examined how women's decisions whether to work are affected by conditions in the local labor markets, and it demonstrated how removal of some

constraints to working poor women changed work behavior and overall well being of their households.

OUTPUTS

Research Findings

- The results provided a number of insights on how rural and urban labor markets differ and how these differences impact welfare to work transitions of single mothers in rural areas. The principal conclusions were:
    - Lower levels of economic well-being in rural areas are not due to greater barriers to employment for single mothers. Rather, lower levels of well-being stem from lower real wages in rural areas. The associated policy implication is that efforts to assist single mothers in moving off welfare and into the workforce need to focus on generating employment opportunities that provide living wages.
    - Observed gains in well-being among families headed by single mothers are largely due to increased levels of education and improved economic conditions. Between 1999 and 2001 however, increased propensities to enter the workforce did contribute to improvements in economic well-being. This suggests that welfare reform measures that created incentives to enter the workforce are having an important to impact on family well-being.
    - Long-term declines in TANF program benefits as a share of total per-capita receipts in single mother families were documented. In the rural south where TANF payments have historically been a relatively small component of total per-capita receipts, TANF payments and Food Stamp Program receipts declined as a share of single mother family per-capita receipts from 24.4 percent in 1993 to 9.6 percent in 1999.
    - Declines in TANF program participation and FSP participation appear to be linked. Exits from the TANF program and increases in family earnings have both contributed to observed family exits from the Food Stamp Program, but many families who have left the Food Stamp Program and TANF at the same time appear to have still been eligible for Food Stamp Program benefits.
- Four journal articles, two masters theses, two policy oriented publications, two conference papers referenced as Joint Center for Poverty Research Working Papers, and numerous other presentations to fellow researchers and TANF and Food Stamp program administrators.

OUTCOMES

Short Term
This research provides insights on how rural and urban labor markets differ and how these differences impact welfare to work transitions of single mothers in rural areas. Associated policy implications require focus on generating employment opportunities that provide living wages.

Medium Term
Research findings were presented in a variety of venues, perhaps most importantly to TANF and Food Stamp program administrators. Results were used by USDA to explore options for increasing TANF leavers retention in the Food Stamp Program.

Long Term
Welfare reform efforts must be complemented by broader efforts to support the well-being of working families below or near the poverty threshold to have an effect on poverty alleviation, enhanced economic opportunities, and increased quality of life for rural women in the South.

SUB-THEME – RURAL ECONOMY: SMALL FARM INITIATIVES

CSREES-supported small farm initiatives that have had a significant impact on Community Resource Planning and development include the following:

- Strengthening and expanding community development through Farmer's Markets
- Business Networks and Rural Community Economic Vitality Initiatives
- Collaborative Research & Outreach for Small Farm Enterprises & Community Development in the Black Belt South
- Northeast organic network: Enhancing farm viability through organic agriculture
- Integrated Future Agricultural Food Systems (IFAFS) - Re-integrating crop and livestock enterprises in the three northern states

The IFAFS program, which was largely devoted to agricultural production, had a large impact on small farm programs between 2000 and 2002, since some of the $600 Million appropriated to all of the IFAFS programs were directed toward the KA 608. For instance, the following project was classified as entirely in KA 608. Funding went from $0 in 1999 to $613K in 2000 to $1.49 M in 2001 back down to $447 K in 2002.

<u>Project 2.8 – Small Farm Initiatives</u> - Economic Development and Diversification through the Outreach and Assistance to Socially Disadvantaged Farmers and Ranchers (OASDR) Competitive Grants Program

The Outreach and Assistance for Socially Disadvantaged Farmers and Ranchers Competitive Grants Program (OASDFR) provided funding to organizations and institutions that develop and implement outreach and technical assistance to encourage and assist socially disadvantaged farmers and ranchers to own and operate farms and ranches and to participate equitably in USDA agriculture programs. The success of farmers and ranchers in areas with this program bolsters low-income community economies.

The OASDFR program is a competitive grant program administered by the Cooperative State Research, Education, and Extension Service (CSREES), USDA. The program was delegated to CSREES in 2002 and has funded 56 grants with funding from 2002-2004 in the period of this self-study. Eligible institutions are defined in the legislation as target groups of the outreach and assistance (see evidentiary information).

Funding for the OASDFR program has been extensive, as the table below demonstrates.

Table III-3

Year	Total Budget (Millions $)	Total Grants Awarded
2002-3	6.4	34
2004	5.935	22

OUTPUTS

<u>Extension</u>

- The project's outreach included mailings, meeting, conferences and one-on-one assistance. It also led to the development of cooperatives from the outreach projects working with groups of socially disadvantaged producers (SDP).
- In Arkansas, loan application assistance was provided to 57 SDPs. Twenty-nine applications were submitted. To help increase the participation rate of SDPs in the LDP Program (LDP payments are made to farmers when the market prices are low), participants were contacted indirectly by mail and directly by 2,501 staff members and informed about the availability and requirements necessary to collect LDP payments.

OUTCOMES

Short Term
Through OASDFR programming, SDPs learned about USDA farm programs.

Medium Term
SDPs formed marketing cooperatives; developed other direct marketing strategies; improved production techniques, farm management, and record keeping skills.

Socially disadvantaged producers applied for USDA farm programs like Natural Resource Conservation Service (NRCS)'s Environmental Quality Improvement Program (EQIP), Farm Service Agency (FSA)'s loan programs. They practiced better farm management and production techniques and diversified plantings in response to the marketplace.

- In Virginia, there was an increase from 50% participation in USDA programs to 69% among socially disadvantaged farmers and ranchers.
- In Arkansas, there was an increase in the participation rate of SDFs in the USDA loan program. Loan application assistance was provided to 57 SDFs.
- In Virginia, 30% of the farmers participating in the program have diversified their farming operations by adding new enterprises that will supplement their income. 25 former tobacco farmers are now producing and marketing at least an acre of seedless watermelons as a result of our field demonstrations. Net income from seedless watermelons has been $1,000+ per acre when the melons are sold in local markets.
- Thirty landowners have established naturalized populations of American ginseng and/or goldenseal in their privately owned woodlands. Twenty farmers have begun raising poultry, beef cattle or swine for selling as "natural meats" in local markets and directly to consumers.

Long Term
Socially disadvantaged producers will acquire cost sharing through EQIP, loans to improve operations and increase their market share and income for new crops marketed directly to consumers and form new organizations that strengthen their communities.

<u>Project 2.9 – Small Farm Initiatives</u> - "Sustainable Communities Innovation Grants"
(SRDC and Southern SARE Partnership Initiative)

In 2001, Southern Region SARE and the Southern Rural Development Center initiated a new collaboration designed to "open the farm" gate and link sustainable, entrepreneurial agricultural innovators with people looking for creative and new community and economic development strategies. Traditionally research, education and extension in these two rural development sectors have not worked together, and people in each sector

have seen their mutual efforts as occurring in separate realms. This new grants program has significantly changed this mentality, launching an "open farm" gate approach that is helping to diversify local economies and build a robust portfolio of development approaches.

In its first three years (2001-2004), the program has funded, competitively, 33 projects. The average grant is $10,000. Collectively, the funded projects are increasing knowledge, building capacity, and making connections among on and off-farm sustainable agriculture activities, economic and community development, civic engagement, nutrition and health, and local government policy.

Jeff Jordon, Professor and Director, Southern SARE Program, comments that the partnership grant program "opened the door for Southern SARE to address such crucial issues as farmland preservation, fair treatment of farm workers, and local food systems. Based on the success [of the program] the Southern Region Administrative Council made research in the social sciences a priority area for all our grant programs, including a special category for women in agriculture" ("A Proud Heritage: 30 Years of Rural Development in the South," Southern Rural Development Center Annual Report 2003-2004, pg. 11).

Grantees pursue local strategies that link sound farm and non-farm economic development with agricultural and natural resource management. Successful applicants in the program have demonstrated their ability to increase knowledge, build capacity, and make connections among on and off-farm sustainable agriculture activities, economic and community development, civic engagement, nutrition and health, and local government.

As the funded evaluation of this program is underway at the time of the portfolio review, we are reporting sample outcomes. Specific impacts, evidence of integration, and best practices will be available in 2006.

OUTCOMES

- Coastal Alabama communities are addressing farmland preservation issues;
- Henderson County, North Carolina, community planners are coordinating policies and actions to sustain threatened agricultural communities;
- Northern Louisiana farmers, community leaders, and agriculture and community development technical assistance providers are developing local markets for produce and promoting value-added activities to grow the local economy;
- An Appalachian community college is passing along to farmers what students and faculty have learned about raising trout, crawfish and tilapia using water from abandoned coal mines;
- Kentucky farm women are building their policy-making skills.

For summaries of funded programs, impacts to date, and success stories see: http://www.griffin.uga.edu/sare/winners.html and http://www.griffin.uga.edu/sare/bulletins/sci.pdf. Additional materials are provided with supplementary documents to assist the portfolio review.

NEW DIRECTIONS

Initially, this innovative program was supported by a CSREES investment to the SRDC from the Economic and Community Systems Unit and by SARE funding. It continues into 2005 as part of each partner's Plan of Work and is supported by their base funding. In 2006 the southern program plans to encourage proposals that focus on entrepreneurship efforts that build on the agricultural and nonagricultural assets of rural communities.

The other three SARE regions have been exploring the benefits of developing similar programs. In 2005, Northeast Regional SARE and the Northeast Regional Center for Rural Development launched their new "Sustainable Communities" competition and received 87 applications. Awards will be announced early in 2006. Also in 2005, the Economic and Community Systems funded an evaluation research project (being conducted by Professor Glenn Israel, University of Florida), to examine 11 completed projects and determine if the program is generating intended outcomes, any follow up needed by recipients, outcomes, and the how well sustainable agriculture and sustainable community concepts integrate. The research will improve the southern program and provide important directions for the new effort in the northeast and future efforts elsewhere in the country.

Theme 3.0 – GOVERNANCE, LEADERSHIP, PLANNING AND CIVIC ENGAGEMENT

Issues in this theme involve rural governance, elected officials, non-profits and durable organizations, youth development, decision-making, strategic planning, capital investment and deployment. When the subject of a study involves programs directed toward families and individuals, they usually fall into KA 802 or 803. The interested reader should also look at the extensive discussion of youth development and civic engagement in KA 806, Portfolio 2.2.

Project 3.1 - "Impacts of State-imposed Growth Management on Rural Areas." J. E. Reynolds, Project Director (team). Department of Food and Resource Economics, University of Florida. (NRI)

This research project examined local government capacity to implement growth management in rural areas.

Has the implementation of growth management at the local level placed pressure on local rural governments' capacities and resulted in significantly changed local government expenditures and revenue patterns? Has growth management contributed to a decline in rural land values? Answering these two questions was the goal of a project in Florida. The research team examined twelve rural counties to study the impacts of state-imposed growth management on rural areas. Changes in local government expenditures and rural land values resulting from the compliance with the Florida Growth Management Act of 1985 were analyzed. The institutional and fiscal capacity related to the impacts that resulted from the Act were also evaluated. The project was motivated by the resurgence of the urban sprawl issues and its impacts on rural areas though the country. The project focused on the relationship between explicit policy goals and the consequences to rural areas of implementation of state and local plans. The research analyzed the effect of growth regulatory policy and its consequences, as well as local government budget outcomes. Three groups of rural counties were included in the study: 1) Deep rural, 2) Rural exurban, and 3) rural amenity. Four counties in each of these categories were analyzed.

OUTPUTS

Research Findings

- Some rural counties were required to raise additional revenue or reallocate funds to meet the mandates of growth management laws.
- Some rural counties relied on impact fees and other revenues from growth.
- The research on rural land values indicated that the value of rural land in rural counties was not substantially affected by growth management legislation, primarily due to the relatively low pressure to convert rural land to nonagricultural uses in these remote locations.

OUTCOMES

Short Term

The research indicated that the value of rural land in rural counties was not substantially affected by growth management legislation, primarily due to the relatively low pressure to covert rural land to nonagricultural used in these remote locations.

Medium Term

Local governments are responding to the state planning mandate by altering their fiscal behavior. Implementation of a concurrency management system is associated with sixteen percent higher road spending.

Long Term
Institutional and legal changes at the state level are necessary to facilitate the process of land use planning and growth management. If rural counties with small growth rates have less stringent planning requirements than the large fast-growing metropolitan counties, the cost of complying to growth management legislation could potentially reduce the cost of complying for small rural counties and result in substantial savings.

<u>Project 3.2</u> - "Farm Viability, Farmland Preservation, and Smart Growth: Seeking Convergence." J. D. Esseks, Project Director. Center for Great Plains Studies, University of Nebraska. (NRI)

This research project focuses on farm viability as agricultural counties transition to suburban and urban land use is the overarching theme of this research project. Although specific outputs are not detailed here, we include the project and a discussion of its outcomes to illustrate CSREES projects researching the pressing issues of farmland preservation and land use.

OUTCOMES

The main objective of this study is to strengthen the capacity of agriculture to remain viable within the diverse political economy of exurban areas through better understanding of the linkages among farm enterprise policy, farmland preservation programs, and 'smart growth' advocacy. The central research question is: What conditions lead to sustaining a viable agriculture sector as a county urbanizes? Among the subordinate questions to be addressed are: 1) How important to sustaining a viable farming sector is the protection of the farmland base provided by local government zoning and/or by public and private purchase of agricultural conservation easements? 2) How important are right-to-farm ordinances that shield farming operations from complaints by neighbors who object to farm smells, dust, and other perceived nuisances resulting from normal farm operations? 3) How important is it to have government directly subsidize farming such as by providing grants to launch value-added enterprises (e.g., processing of crops) or to facilitate the operations of farmers' markets? 4) In order to retain farm-input businesses like implement dealers and fertilizer distributors, should government be providing incentives for them to adjust to urbanizations (e.g., tax relief, low-interest loans)? 5) Or can the goal of a viable farming sector producing jobs for local workers, patronage for local businesses, and fresh food for local consumers be achieved largely or entirely without government intervention?

Short Term
Because this project was initiated in late 2004, few findings are yet available to report short, medium, or long-term impacts. Community leaders have shown strong interest in the findings from the coordinated case studies. In addition to providing data and analysis for their decision-making needs, the research team expects to distribute findings widely

through the Internet sites at universities and the American Farmland Trust., as well as mailings of printed reports to leaders in local and state jurisdictions that have active farmland consideration and related programs. A draft report for comment will be sent to leaders in the studied communities as well as academic colleagues who have been studying the subject from varying disciplinary perspectives.

Medium and Long Term
These outcomes are currently being identified.

<u>Project 3.3</u> - "Increasing the Capacity for Community-Led Development" (RRDCS and partners Integrated Research, Education, and Extension)

During the 2000-2004 period covered in this Portfolio, there was a significant federal-state policy shift to "place-based" and "community-led" development. This put an increasing burden on local communities to envision, plan, and create their own futures, and to do so with broad civic engagement of a cross section of their increasingly diverse communities. The Regional Rural Development Centers, working with the Extension partners with expertise in community resource planning and development, launched major efforts in this time period to insure that needed research was encouraged, professional skills of Extension educators were improved and fine-tuned, and educational opportunities were expanding, including distance learning and specialized training institutes. This work was endorsed by the Regional Associations of Extension Directors and university leaders across the land-grant system.

Project 3.3 is discussed here departs from the style reporting other projects as it is an initiative involving CSREES NPLs, the Regional Rural Development Centers, land grant university research, education, and extension partners, and many partners in the private and public sectors. Exemplary highlights of these efforts follow.

- On-Line Master's Degree in Community Development
    - During 2001-2004, a new on-line Master's Program in "Community Development" was conceived, designed, and prepared for launching in 2005; participating universities include Iowa State University, Kansas State University, North Dakota State University, South Dakota State University, the University of Missouri, and the University of Nebraska. An interdisciplinary program, it includes faculty from architecture, agriculture, community and regional planning, economics, communications, Native American Studies, and sociology. This is supported by the Great Plains Interactive Distance Education Alliance and the North Central Regional Center for Rural Development plays a key coordinating and leadership role.

- Business Retention & Expansion Program Reviewed (BR&E) Updated
    - The Southern Rural Development Center, in partnership with the Northeast Regional Center for Rural Development appointed a multi-state team of researchers and Extension educators to update, strengthen and expand the widely-used BR&E curriculum. This team provided a design to move the curriculum forward, making it more comprehensive from an economic development standpoint, easier to implement by community and economic development practitioners, and better informed by scientific advances in business development.

- Leadership Plenty training launched for Extension Educators
    - The Pew Partnership for Civic Change supported training across the southern region for Extension educators in its Leadership Plenty program. The Southern Rural Development Center supported launching the program in the region, compiled information and prepared background statistical reports to tailor the programs to two multi-county areas in Mississippi, and then shared the program and successes of its application with the other three Regional Rural Development Centers. They are working in 2005 to expand the program nationally.

- Community Development Extension Skills Expanded to Support Community Capacity in Place-based and Locally-led Development
    - The Regional Rural Development Centers worked together during 2000-2004 to respond to a growing need nationally to help build community development capacity in rural localities. Increasing pressure from stakeholders on Directors of Extension in many, if not most, of the land grant system institutions, led the Directors to turn to the Centers for help in building professional skills among Extension educators in the Community Resource Planning and Development areas so they could better serve their stakeholders. Some of their accomplishments follow:
        - The RRDCs joined with Community Resources and Economic Development Extension Educators to convene the first National "CRED" conference in February 2002, in Orlando, Florida: "Strengthening Communities: Enhancing Extension's Role"; over 300 participants from across the country shared start of the art educational curricula and met through research roundtables with leading researchers to incorporate new scientific knowledge in their curricula.
        - The Western Rural Development Center redesigned its popular "Western By Design Toolkit", a resource for

community leaders, planners, and educators, and then developed a web-based version of this resource.

- The Southern Rural Development Center spent two years developing a "Comprehensive Community Development Training Plans to Expand Capacity of the South's Land-Grant University System; given formal approval from the Association of Southern Extension Directors, the multi-year foundational and specialized training program tracks were launched across the region from 2001-2004. Training included face-to-face training; distance learning, and web-based resources. The SRDC is currently compiling data on the total number of participants and conducting evaluation research on the programs to capture outcomes and impacts.
- The "Foundations of Practice: Community Development core Competencies for Extension Professionals" program was developed by the North Central Regional Center for Rural Development and the North Central Community Resource Extension Leaders during 2000-2004 and approved by the North Central Association of Extension Directors for launch in 2005. It includes 3 components, or levels, of training: 1) Understanding Communities and their Dynamics (pilot tested in 2005); 2) Developing successful Community Initiatives (for testing in 2006); and 3) Areas of Specialization and Emphasis (for testing in 2006). In 2006 the full program will be in operation and all four Regional Rural Development Centers will engage in adapting the program to their region's needs. Two thirds of the training is offered by distance education with web-based resources.
- The Southern Rural Development Center and Southern Community Resource and Economic Development Extension leaders invested over 3 years between 2000-2004 developing a Community and Economic Development Taxonomy of existing and needed curricula and resources; these efforts were then fed into the southern region Extension system's "CECP" program (Cooperative Extension Curriculum Program) that is serving as the cornerstone for Cooperative Extension eXtension Program currently under development.
- The Northeast Regional Rural Development Center used 3 previous research conferences on land use issues to offer a 2004 "Regional Workshop on Extension Land Use Programming," at State College, Pennsylvania. This extended a2003 Regional Workshop that identified programmatic gaps and opportunities for cross-state

collaboration in the area of land use. A major outcome of this meeting was the creation of NEELUN – the Northeast Extension Land Use Network, which was approved by the Northeast Extension Directors summer 2004.

Theme 4.0 – AMENITIES, INFRASTRUCTURE, AND SERVICES

This theme involves research, education, and extension programs aimed at improving the understanding of decision-making regarding the balanced use of natural resources, the development and planning of housing and education and other basic services, and infrastructure.

Project 4.1 - "Balanced Use of Natural Resources" (RRDCs)

Sound cultural, economic, and ecological use of rural America's rich natural resources is of paramount importance to the nation and to the world. Decisions about land use are complex and may spark controversy and division in communities. The following is one examples of ways the Regional Rural Development Centers worked in 2000-2004 to help decision makers and community residents balance economic, social, and environmental needs.

To help communities make land use decisions responsibly, the Northeast Regional Rural Development Center (NERCRD) built upon and leveraged the scientific basis for evaluating land use opportunities.

Note that like Project 3.3, Project 4.1 is discussed in a format that departs from other projects as it is an initiative involving CSREES NPLs, the Regional Rural Develop Centers, land grant university research, education, and extension partners, and many partners in the private and public sectors. Additional documentation of outputs, impacts, and new directions is included in supplementary material for the Portfolio Review Team. See http://www.cas.nercrd.psu.edu/

OUTPUTS

Proceedings from research conferences and workshops for Extension and community development professionals from 2000-2004 are on the web at http://www.cas.nercrd.psu.edu/. These include:

- "What the Public Values about Farm and Ranch Land: Workshop Summary" 2004
- "Protecting Farmland at the Fringe: Do Regulations Work: Strengthening the Research Agenda" 2001

- "Proceedings of the 2003 Northeast Regional Workshop on Extension Land Use Programming" 2003
- "Land Use Problems and Conflicts in the U.S." 2002

OUTCOMES

- NERCRD developed a "Land Use/ Sprawl Briefing Room" on its website to help disseminate research findings and Extension resources.
- NERCRD published Extension education materials on land use issues and planning, including "Land Use in the Northeast US: Ten Things Members of Every Rural Community Need to Know:
- NEELUN – the Northeast Extension Land Use Network, approved by the Northeast Extension Directors summer 2004.

Project. 4.2 - "The Role of Education in Community and Economic Development" (RRDCS)

Partnering with the non-profit Rural School and Community Trust (RSCT) and the USDA Economic Research Service (ERS), the Regional Rural Development Centers worked during 2000-2004 to expand the scientific knowledge base to enable rural communities and rural schools to improve together. Below are three of these activities.

Note, again, that the report for these activities involving CSREES NPLs, the Rural Development Centers, the land grant system partners in research and extension, and public and private partners is designed to capture this body of work critically relevant to the importance of vital services in communities for successful Community Resource and Planning Development. Specific products from this work are included with supplementary materials for the Review Team.

- Convened a national meeting of researchers and youth educators in Kansas City, Missouri, March 12-13, 2001, to encourage greater rural social science research on the connections between rural schools, families, communities, educational attainment, and economic vitality;
- Sponsored, with USDA's Economic Research Service (ERS), a national research conference, *Promoting the Economic and Social Vitality of Rural America: The Role of Education,* New Orleans, Louisiana, April 14-15, 2003, to showcase some of the best research being conducted by research faculty dealing with rural schools, educational attainment, workforce issues, and human capital policies. *http://srdc.msstate.edu/ruraled/index.html*
- Continuing a Rural Education and Schools Initiative, with primary leadership from the RRDCs through the Southern Rural Development Center. http://srdc.msstate.edu

OUTCOMES

- Thirty-five leading research faculty from across the nation presented research papers at the April 14-15, 2003, national research conference: *Promoting the Economic and Social Vitality of Rural America: The Role of Education*, held in New Orleans, Louisiana. The papers were arranged in four sessions: achievement in rural schools; rural schools, communities and at-risk populations; schools and local community impacts; and education and the labor market in rural communities. Collaboration among the Rural School and Community Trust, USDA's Economic Research Service (ERS), and the Southern Rural Development Center (SRDC) led to the event, designed to showcase some of the best research being conducted on rural schools, educational attainment, workforce issues, and human capital policies. http://srdc.msstate.edu/ruraled/index.html
- Four research papers from *Promoting the Economic and Social Vitality of Rural America: The Role of Education* were published in abbreviated form for the general audience in the Summer 2003 issue of *Southern Perspectives*, the quarterly newsletter of the Southern Rural Development Center. http://srdc.msstate.edu/publications/newsletter.htm
- The conference organizers, Robert Gibbs of the Economic Research Service and Bo Beaulieu of the SRDC, are serving as guest editors for special rural education issues of two refereed journals: the *Journal of Research in Rural Education* and the *Review of Regional Studies*.
- In 2005, SRDC published in partnership with the RSCT and ECS, "The Role of Education: Promoting the Economic & Social Vitality of Rural America," a single-volume collection of policy briefs and research findings based on the full manuscripts from the conference.

Project 4.3 - "Local Housing Decisions and Economic Vitality of Rural Communities." C. C. Cook, Project Director (team). Department of Human Development and Family Studies, Iowa State University. (NRI)

Housing is a multibillion-dollar community asset and represents a sizable portion of rural citizens' wealth. Although there has been considerable interest in rural community vitality, previous studies have rarely considered the role of housing in promoting economic strength and social vitality. This was a research project that the role of rural housing as a critical community asset and a sizeable portion of rural citizen's wealth.

951 informants from 134 rural communities in 48 randomly selected counties within nine mid-western states were surveyed. Just over 40% of the 134 communities were under 500 residents and the largest community was under 10,000 residents. Informants included mayors, housing professionals, business executives, realtors and bankers. The focus of the survey was on the housing decisions and activities made in the private, not-for-profit,

and public sectors, including an enumeration of the extent to which mobilization of resources for housing development had occurred.

The final goal of the study was to incorporate the key variables measuring local housing activity and the decisions involved a model to portray the role of housing in the vitality of rural communities. Because not much previous research has been reported on the vitality of very small communities, of special interest are the more than 50 communities in these data with <500 residents.

OUTPUTS

Research Findings

- Community profiles were constructed from the quantification of the interview data
- State and North Central regional publications were produced.
- Analyses illuminating the differences in high and low vitality counties' housing decisions and activities were performed.
- Two levels of analyses on housing supply and demand were performed. The first level was derived from interviews with individual informants', mayors and/or elected officials, and the second analysis drew from the set of interviews with non-elected housing professionals.
- A community-level examination of strategies used to meet housing needs was performed.
- Two books were published.

OUTCOMES

Short Term

The research project increased knowledge and understanding of the housing delivery process in rural communities.

Medium Term

The team identified strategies that improve local housing situations for current residents and that draw potential new workers and retirees to the community.

Long Term

Dissemination of the research results to policy-makers can have a positive impact on public housing policy, especially through the implementation of strategies that promote rural development, to community planners, leaders, and decision-makers, and thus increase the vitality of rural communities.

<u>Project 4.4</u> - "Building a Balance: Housing Affordability, Environmental Protection, and Smart Land Use Decisions," Laquatra, J.; Pollak, P.; Bills, N.; Hattery, M.; Kay, D., Community & Rural Development, Cornell University. (NRI)

This project analyzed linkages between smart growth policies and fiscal implications, determined communities' needs for information on their affordable housing stock and projected housing needs, and facilitated discussion among interest groups related to development, environmental protection, and land use regulation. Considering how goals related to growth management, housing development, and environmental protection can be balanced, the investigators developed tools and guidelines for community policy-makers. GIS data and development probability models were used to simulate build-out over time under different policy rules. Fiscal analyses were conducted using data on municipal revenues and expenditures and industry standards for infrastructure costs.

OUTPUTS

Community forums were conducted in four New York State communities through the Public Issues Education (PIE) model, in partnership with Local Associations of Cornell Cooperative Extension. The forum transcripts were analyzed to identify issues to be addressed to facilitate consensus on housing development, environmental, and land use issues. Conference presentations have been made to state, national, and international groups; and a paper has been published in Housing and Society. A CaRDI Community Development Report was completed and posted on the Web site of the Community and Rural Development Institute. Fact sheets addressing educational needs of community leaders have been distributed to every town clerk in New York State and are also on the Web site of the Community and Rural Development Institute.

OUTCOMES

Short Term

- Community leaders accessed information about planning tools and practical educational resources that focused on growth-related issues these resources as they make land use decisions for their towns. A model was used to facilitate open discussions about land use with parties that have conflicting goals.

Medium Term

- Planning Boards and Housing governance organizations applied these materials to land use decisions.
- A proposal for the second phase of this project was developed with faculty in three Cornell departments and funded by the Cornell University Agricultural Experiment Station and Cornell Cooperative Extension.

Long Term

- The use of these analytical tools and planning materials can lead to more affordable housing, land use and greater quality of life in these localities.

<u>Project 4.5</u> - "Green Community Technologies: Alternative Technology Assessment for Rural Communities," Yellow Wood Associates, Inc., St. Albans, Vermont. (NRI)

Rural communities must invest in a range of infrastructure to support public services. Decisions on municipal investments are often made by part-time, volunteer community leaders who may lack access to information about innovative alternative technologies and approaches. Federal programs promoting alternative technologies often focus on urban areas, with limited resources to address rural communities' differences in scale, capacity, and financial resources. Yellow Wood Associates offers an assessment approach to small communities comparing existing rural community municipal infrastructure with alternative technologies and approaches. Their assessment process helps communities formulate cost-effective plans for phased implementation of appropriate alternatives, as well as connecting them with companies and methods of financing. Yellow Wood Associates, Inc. of St. Albans, Vermont worked with the Town of Richmond, Vermont to inventory the condition of their municipal infrastructure e.g. bridges, roads, vehicles and assess the potential of alternative technologies to improve municipal service delivery within the town. Communities range in size from population 3,000 to 53,000.

OUTPUTS

- Eight Green Community Technology (GCT) partner communities in six states were recruited. Initial on-site meetings were held in all eight communities: Six have signed letters of agreement, one more is in process, and the last was delayed.
- One contract with Hinesburg, Vermont regarding alternatives to wastewater system expansion has been successfully completed with assistance from Stone Environmental, technologists.
- A municipal technology checklist has been expanded and revised.
- Inventory and assessment forms, data entry forms, and databases have been created, pre-tested, revised, and distributed to communities.
- Marketing efforts have included:
    - Additions to the YWA website,
    - Numerous presentations at municipal officer training events in MA, NY, and VT, Vermont Environmental Consortium, Environmental Business Association of New York, Sustainable Communities Conference, What Works! Conference, and elsewhere;
    - Meetings with EPA Region 1 and staff of NYSERDA, OSC, and Dept. of State Quality Communities in Albany, New York.

    - A variety of slide shows and handouts have been created and used extensively.
- Worked with Foresight Science and Technology to further develop our business model and market research.
- Qualified as a contractor with the Massachusetts Technology Collaborative (MTC).

OUTCOMES

Short Term
Marketing and other information dissemination methods have increased the awareness of municipal employees about alternative technologies and approaches to water treatment and sewage disposal and other municipal services.

Medium Term
Changed the way municipalities make decisions about their infrastructure and related investments. In Hinesburg, Vermont, they identified innovative cost-effective and environmentally beneficial alternatives to expanding a centralized sewage treatment plant were identified through a combination of separation of sources, decentralized treatment, conservation and reuse, and new treatment procedures.

Long Term
Rural communities have saved on infrastructure costs, created new employment opportunities, and felt environmental benefits.

Theme 5.0 – SOCIAL, TECHNOLOGICAL, DEMOGRAPHIC CHANGE AND COMMUNITY RESPONSE

The Regional Rural Development Centers' e-Commerce program and three NRI projects highlight this theme.

Project 5.1 - "e-Commerce National Demonstration and Capacity-Building Program" (RRDCs)

Retail trade, services, and specialty agricultural production are increasingly important components to the economic foundation of rural America. Recent social, demographic and technological changes in these sectors are driving economic restructuring and leading to the rapid expansion of small business establishments in rural areas. In particular, the ability to apply information technology tools is vital for firms in the rural economy to flourish. The adoption of these tools is more challenging in rural areas than urban ones because of reduced diffusion rates due to higher than average distances between businesses and the smaller size of the firms. The majority of rural businesses employ less

than 10 persons. However, the benefits from the adoption of these methods by rural businesses can also be substantial because of increased productivity at smaller scales and the reduction of the impact of distance on their competitiveness.

Since 2003, the Regional Rural Development Centers (RRDCs) have been working with land grant university partners to expand the depth and breadth of science-based information technology adoption programming being delivered to rural small businesses, governments, and communities by the Cooperative Extension System (CES). This work is closely coordinated with the NASULGC Extension Committee on Organization and Policy (ECOP) E-Commerce Task Force, recently renamed E-Rural Economic Development Task Force with e-Commerce as an essential tool for growing the rural economy. The partnerships between the RRDCs, CES, and NASULGC-ECOP have helped launch a national "Rural e-Commerce Extension Initiative."

The Southern Rural Development Center (SRDC) provides the leadership for this effort. In 2003 ($357,660) and 2004 ($320,657) SRDC received support from Congressional Federal Administration Extension Grants that allowed SRDC and its partner Centers to leverage their core CSREES funding and launch a national demonstration project to encourage research on e-commerce technology adoption and to expand e-commerce programming by the Cooperative Extension Service throughout the United States. That funding continues in 2005 and 2006.

The specific projects to launch national e-commerce research, education, and extension capacity initiated with the Congressional funding through the Southern Rural Development Center were only possible because of years of precedent work through the Regional Rural Development Centers and their land grant university research and extension partners seeking to apply new Information Technology to rural economic and community development. In spots around the country, Extension educators and researchers working on e-commerce as an important economic development direction had been pioneering individual projects, developing educational curricula, and studying applications, barriers to, and possibilities for e-commerce.

Selected examples follow and others are reported as outputs.

- The North Central Regional Rural Development Center, using CSREES core funds, conduced "listening circles" with Native American communities to learn how native people use the internet, why they do so, and what they need in order to expand applications to small business development and rural economic opportunity. This culturally sensitive ("listening circles" methodology) research with native people was conducted in 2001 and 2002 and published in 2003.
- The Southern Rural Development Center, using CSREES core funds, conducted a survey in the southern region to learn which businesses were using the internet and e-commerce in their operations and to identify barriers to adopting internet technology for business expansion and success. This research was conducted in 2001.

- The Northeastern Regional Rural Development Center developed an extensive "Webbook of Information Technology Innovations in Extension in 2002, edited by Stephan Goetz (NERCDRD) and Bruce DeYoung (Oregon State). The Webbook, available online, includes research and Extension curricula by experts from across the country. Topics include: using e-Commerce in the forest products industry; exporting and international markets on the web; growth in business-to-consumer electronic commerce; online business alliances; technological bridges between cultural and economic divides for Latino youth; teleliteracy in the west; applications for e-government; and web-access for non-profit organizations.
- At the University of Nebraska-Lincoln, the Center for Applied Rural Innovation collaborated with the Applied Information Management Institute to survey Nebraska businesses about their use of information technology. Conducted in 2000, this research was supported in part by a Community Council grant of the Nebraska Information Technology Commission and in conjunction with connecting Nebraska and Nebraska Rural Development Commission. The research became the basis of the 2001 research by the Southern Rural Development Center.

Then the 2002 Farm Bill authorized the national initiative but no funds were appropriated to implement the program. By combining three sources of funding and innovative partnerships, the RRDCs, under the leadership of the SRDC, were able to launch a pilot demonstration project that is laying the foundation for an Extension program that spans the nation. Pilot Projects were developed by three land grant university Extension specialists and partners:

- Mississippi State University developed a mobile e-commerce lab and curricula;
- University of Nebraska surveyed participants in past UN sponsored e-commerce programs to identify successes, barriers, and educational needs;
- New Mexico State University updated its Teleliteracy Assistance for Business and Communities program and developed new curricula for local and county governments to support e-commerce community development activities.

Core CSREES funds for the RRDCs, a Congressional grant, and NASULGC-ECOP funding for an e-commerce Task Force enabled the Centers to launch the program.

OUTPUTS

Research

An online research survey was developed in 2004 to evaluate the effectiveness of the Mississippi State University's new Internet market channel, "msucheese.com". The results of this survey will be incorporated into educational curricula. In addition, evaluation research on Nebraska's electronic retailing training has led to the development

of six new models to better meet the needs of small businesses adopting e-commerce tools.

"Native American Business Participation in e-Commerce: An Assessment of Technical Assistance and Training Needs," was published in 2003 by the North Central Regional Center for Rural Development (Corry Bregendahl and Cornelia, Flora, RRD #185).

Extension

A new e-Commerce competitive grants program was initiated in 2004. The program was and remains open to land-grant faculty with a high level of experience in information technologies. It encourages them to develop priority e-commerce products that can (a) guide rural communities in developing a strategic blueprint for becoming a "connected" digital locality; (b) update, refine, and expand existing e-commerce educational products; and (c) pioneer new curricula to fill gaps in existing e-commerce educational programs.

In the first year, training workshops were delivered to Extension educators, rural development practitioners, and small businesses. These were held in three pilot locations and subsequent workshops expanded the educational outreach efforts even further.

In Mississippi, workshops focused on electronic retailing, selling via the Internet auction format, and building web stores. Some 338 people have participated, including small business owners (79%), government agencies/educators (10%), and prospective business owners (11%). In Nebraska, Extension educators delivered training in electronic retailing in 13 sites, reaching over 200 businesses during the one-day training sessions. Cooperative Extension in New Mexico hosted a workshop in the Four Corners region of the U.S. (NM, Utah, Colo, Ariz) that attracted 50 participants from Extension, and 18 business owners. Special focus was devoted to businesses working in agriculture; retail; art and tourism; and internet retailing. Two follow-up workshops were held in New Mexico with 27 business and economic development representatives participating.

Education

An e-Commerce resources webpage was created and placed on the SRDC website. An advisory team of Extension educators and researchers identify and catalogue high quality research publications, educational curricula, fact sheets, and training materials on e-commerce topics that are relevant to small business firms. Furthermore, they evaluate and assess these materials to ensure they are of high quality and have a sound scientific basis. The resources on this website are available at no charge to Extension educators and others across the country.

The Southern Rural Development Center trained Southern Community Resource Development Program Leaders and other Extension educators in skills to promote e-Commerce and information technology applications to help the south diversity its

economy. The training, "E-Commerce: Impacting the Way We Do Business!" was held October 2001 in Nashville, Tennessee attracting 90 participants.

Integrated Programs

The "National E-Commerce Extension Advisory Committee" was established to help coordinate the national e-commerce initiative. This committee provides input on emerging e-commerce related issues; research needs; directions for the competitive grants program; and, training and educational priorities for the Initiative.

The RRDCs coordinate four regional e-Commerce teams that include researchers and Extension educators in each region. They integrate scientific and technological advances to existing curricula, identify emerging needs, advance new research agendas, and develop and disseminate new knowledge, curricula, and practices across the land-grant system partners, rural development practitioners, and research community.

OUTCOMES

Short Term

- E-commerce programs in use were peer reviewed and updated.
- New e-commerce models were developed.
- Extension educators and rural practitioners were trained in these models and other e-commerce applications.
- Workshops informed rural small businesses of these techniques.

Medium Term

- Small rural businesses adopted strategies that utilized e-commerce skills that they learned from the various workshops and program.
- Websites at Extension and Rural Development Centers were established to help rural businesses adopt e-commerce tools.
- A competitive grants program began to spur innovation in e-commerce education and application
- A national advisory committee was established to coordinate this initiative

Long Term

- The e-commerce skills of rural businesses in agricultural and non-agricultural sectors will be improved, leading to greater productivity, profitability and sustainability.
- The knowledge base will expand and inform science-based and best practice e-commerce education, training, and applications in order to meet ever changing needs of small businesses and capture new market opportunities.

DISCUSSION OF SPECIFIC EXAMPLES

Short Term

- Extension educators, rural development practitioners and small businesses all learned useful e-commerce applications for rural businesses including, electronic retailing, selling via the Internet auction format, and building web stores.
- In Nebraska, Extension educators delivered training in electronic retailing in 13 sites, reaching over 200 businesses during the one-day training sessions. Follow-up surveys in four of these sites indicated that 96% of respondents rated the program as containing high quality up-to-date information; and 70% said they secured resource materials to help improve their retail businesses.
- The Southern Rural Development Center assembled a team to assess and evaluate e-commerce materials for dissemination on a website.

Medium Term

- In Nebraska, 30% of 200 businesses trained reported that the workshops changed their marketing strategies; 20% of the business owners said they are now working with a web designer on an online store.
- The Southern Rural Development Center set up a website that provides high quality information and resources about e-commerce.
- A "National E-Commerce Extension Advisory Committee" was established to help coordinate the national e-commerce initiative.
- Culturally appropriate technical assistance and training for disadvantaged Native Americans, Hispanics, and other groups to assist business owners transition to a new technological era.

Long Term

- The e-commerce skills of rural businesses will be improved, leading to greater productivity, profitability and sustainability.

SUCCESS STORIES

Each of the four RRDCs is developing new performance assessment systems to capture the short, medium, and long term pacts of programs in e-Commerce (and all RRDC programs) and to provide ongoing evaluation data to help programs adjust activities for greater success. Reports from these systems will be developed over the next 2-5 years.

NEW DIRECTIONS

The Center for Applied Rural Innovation at the University of Nebraska-Lincoln collaborated with connecting Nebraska Technology Team and the Southern Rural Development Center at Mississippi State University on research funded by the USDA

Pilot Rural Economic Development Initiative. Their 2004 research report, "E-Commerce in Nebraska: A Survey of Business Technology Use," is being used in 2005 and beyond to evaluate programs and identify new directions.

The E-commerce Competitive Grants Program in FY 2006 ("Round Two") will fill important gaps identified as a result of this program in the e-commerce educational programs of Extension. Priority topics for 2006 awards include building an e-Strategic plan; strengthening business-to-business e-commerce transactions; strengthening government-to-government activities; expanding global e-commerce; and inventorying e-commerce small business successes.

The RRDCs and their land grant university partners will link the advances from the Rural e-Commerce Extension Initiative to the emerging National Rural Entrepreneurship Initiative during 2005 and beyond. For example, the SRDC held a May 2005 training, "Entrepreneurship and e-Commerce: Building and Expanding Economic Opportunity." It integrated the building blocks of rural entrepreneurship with current e-Commerce topics, practices, and internet-savvy techniques. Trainers were outstanding Extension small business and technology experts and rural entrepreneurship development experts from across the country who collaborated to develop educational resources and tools to help entrepreneurs use e-Commerce applications. This linkage between e-Commerce and entrepreneurship promises to expand rural economic development opportunities and support a more robust and prosperous rural economy. The e-Commerce searchable online library will be expanded to support this linkage. This new direction illustrates the links between Theme B: Rural Economy and Theme D: Social, Technological, Demographic Change and Community Response.

<u>Project 5.2</u> - "Immigration, Employment, Incomes, and Poverty in Rural America." P. L. Martin, Project Director (team). Department of Agricultural and Resource Economics, University of California-Davis.

This project examined the demographic changes characterizing the "Latinization of rural America." This was primarily a research program, with significant community outreach (extension) activities.

This research project relied upon construction of the national rural community database and a detailed analysis of U.S. immigration, welfare, and other policies to identify the rural dimensions of emerging federal immigration policy. It investigated the hypothesis that the U.S. risks the re-creation of poverty via immigration and encouragement of the entry of immigrants with little education from rural Mexico to fill jobs in rural and agricultural areas. The research evaluated the costs and benefits of such migration using both cross section and temporal analyses.

OUTPUTS

Research Findings

- An integrated database was created from Census and administrative data.
- Models of the interaction between farm employment, immigration and rural poverty were developed.
- Found that the average education level of an entry-level farm worker was found to be six years in the late 1990s.
- Concluded the key to upward mobility for immigrants and their children was education.

OUTCOMES

Short Term

The research findings informed policy makers and programs that deal with immigrants and foster economic development and poverty alleviation in rural towns impacted by immigration.

Medium Term

Policy-makers learned that the US risks the re-creation of rural poverty via immigration without new practices.

Long Term

Economic mobility requires geographic mobility. Migrants will have to leave the areas in which they had their first US jobs in order to experience upward mobility. There may be a rural to urban migration wave over the next decades, as experienced farm workers and their children leave for urban areas. This will have longer-term impacts for rural communities that are currently experiencing the "Latinization of rural America," as well as for urban centers as they prepare for a second wave of Latin immigration.

Project 5.3 - "Public Finance Impacts of Population and Land Use Change in Pennsylvania," Kelsey, T. W, Agricultural Economics & Rural Sociology, Pennsylvania State University. (NRI)

This project examined how land use changes, population shifts and tax reform affected the public finances of local governments and communities in Pennsylvania. It developed and refined analytical tools to investigate these fiscal impacts as well as simply the *potential* impact of local tax reform. An on-line Revenues and Costs of Residential Development tool was revised and refined, using regional (rather than statewide) coefficients for average household size and income levels. An additional fiscal impact tool was developed to supplement the existing tools, with particular focus on infrastructure needs. This project produced information for use by local government

officials, local economic development officials, businesspersons, interested citizens, and local extension teaching programs.

OUTPUTS

- Conducted four training sessions on the fiscal impacts of residential development, using the fiscal impact model developed in the project. An additional five sessions were held on the economic role of agriculture.
- Developed outreach education materials on a new local tax reform option and made them available to Pennsylvania school districts during 2004.
- Helped co-lead a multi-county project focused on helping Pennsylvania farmers explore and adopt value-added enterprises, with a particular focus on the community aspects of agriculture-based economic development.
- In 2004, project results were used directly by the investigator in 33 local educational meetings across Pennsylvania, with 1286 direct person contacts; as part of an exhibit at a statewide annual conference of local officials and citizens, and at a statewide farm show; and for 13 in-service training sessions with county extension staff.
- Twenty extension publications were written.

OUTCOMES

Short Term
Generated awareness of analytical tools and available to assess the fiscal impacts of land use and population changes and tax reform in Pennsylvania.

Medium Term
Local county officials may incorporate these analytical tools and information into their governance decision-making.

Long Term
The use of the analytical tools should lead to better local county decisions and greater quality of life in these localities.

SUCCESS STORIES

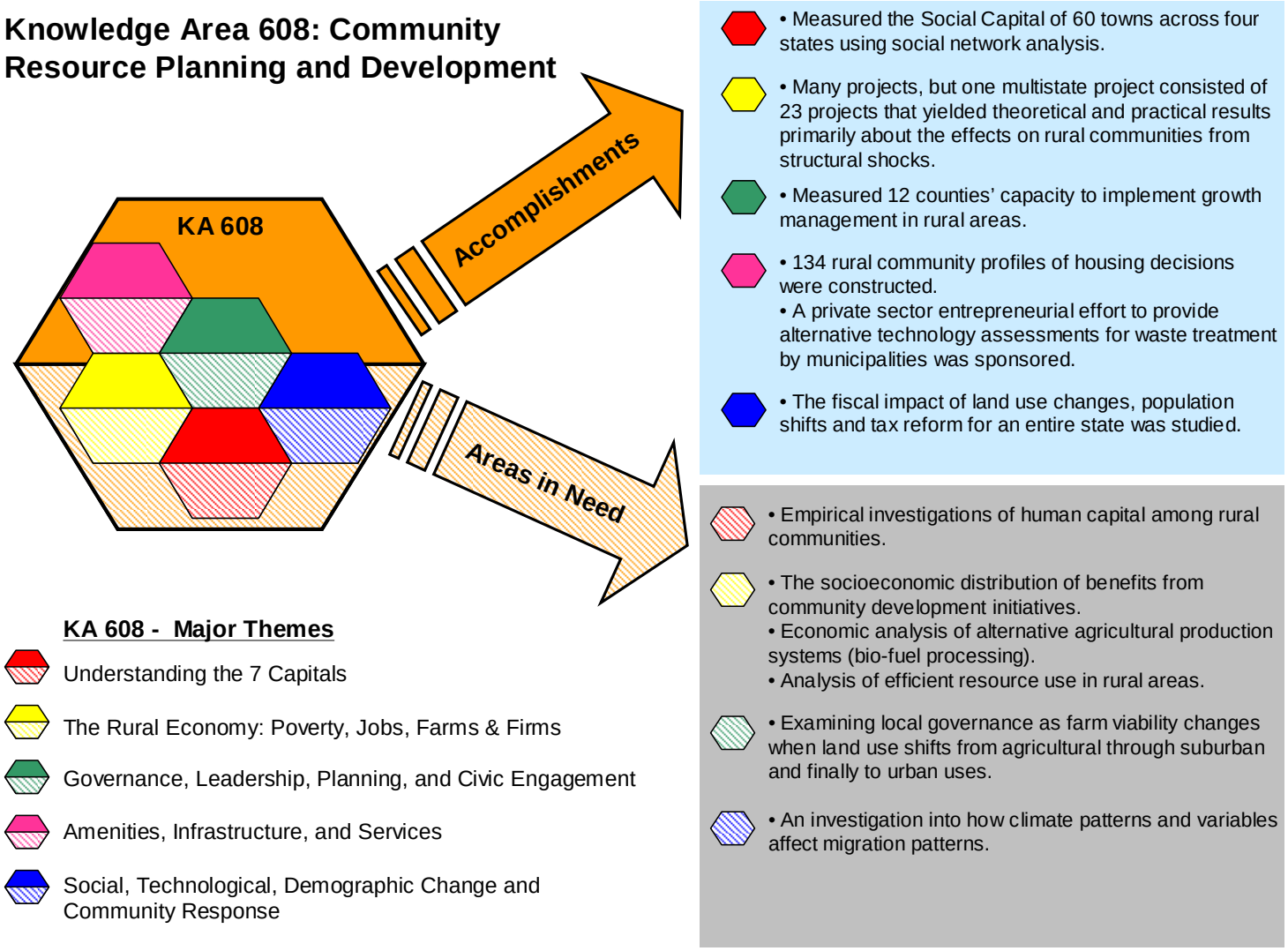
All nineteen projects featured above were highly successful with a relatively wide range of methodological integration, regional and sectoral foci. Every one led to valuable outcomes. Thus, the enviable task was to select the best of these. This was the multi-state project (Project 2.1), **Rural Economic Development: Alternatives in the New Competitive Environment.** One reason for this selection is simply its scale. Twenty-

three projects were undertaken across the nation and almost all of them yielded valuable insights into the decision-making that takes place in rural communities. Highlights from this project included, rural communities learning from an extensive array of both theoretical and practical results about the effects on rural communities from industrial and employment restructuring in the forestry, mining, agricultural processing industries and firms, migration and commuting. Many Federal, State and Local Governments relied upon the conclusions and recommendations of this work to make better governance decisions. For instance, in California, good estimates of the economic costs and benefits were made regarding establishing prisons, handling waste disposal, and the effects of tourism, boating and fishing throughout the state. Local communities throughout New York State with limited planning tools were given land-use planning tools and materials to help make important land use decisions. In addition, researcher/educators learned many lessons in the application of socioeconomic models and data to the study of rural communities, which caused them to change their own course curricula improving the education of future rural community leaders. Consequently, the project led to vastly improved decisions at the local level that improved the economic conditions and quality of life in rural communities.

NEW DIRECTIONS

A number of new projects are tackling the issues emerging in expanding economic opportunities through better economic and business decision-making. For instance, a current project that was undertaken by Virginia Tech in 2002, and involves the "Community Capitals" approach, is just now getting results after conceptually and empirically assessing the connection between human capital impacts and the economic development of rural communities (Accession #0193806). A project closely tied to the theme of Rural Economics is current investigating the distribution of benefits from community development initiatives and is being done by South Carolina State University (Accession #0199605). Several new projects push out the boundaries of the theme of Governance, Leadership, Planning, and Civic Engagement. Both involve examinations of community governance as farm viability changes when previously agricultural counties move toward suburban and ultimately urban land use (Accession #s 0198912 & 0201009). Finally, there is at least one new project involving Social, Technological, Demographic Change and Community Response, which is examining climate variables as factors in the migration patterns of the elderly (Accession # 0199605).

Figure III-5 - KA 608 Honeycomb Graphic



Knowledge Area 134: Outdoor Recreation

OVERVIEW

After World War II, rapid gains in economic prosperity, ease of transportation, increasing leisure time, and other social forces enabled dramatic and sustained increases in outdoor recreation activities in the United States. CSREES has built a body of scientific knowledge enhancing our understanding of human behaviors in these activities and contributes to solving a variety of natural resource management issues.

Historically, the attention on outdoor recreation has been given to human behaviors on public lands (forests, national parks, wildness areas, and recreation areas). Research focuses on studying visitor characteristics, the combination of visitor groups present, and characteristics of preferred places to generate theoretical knowledge and then using this knowledge to help build models to manage leisure visitations on public lands. The application of this knowledge was mainly in two areas of recreation management: (1) interpretation, i.e., the communication of natural and cultural history to recreation visitors; and (2) carrying capacity.

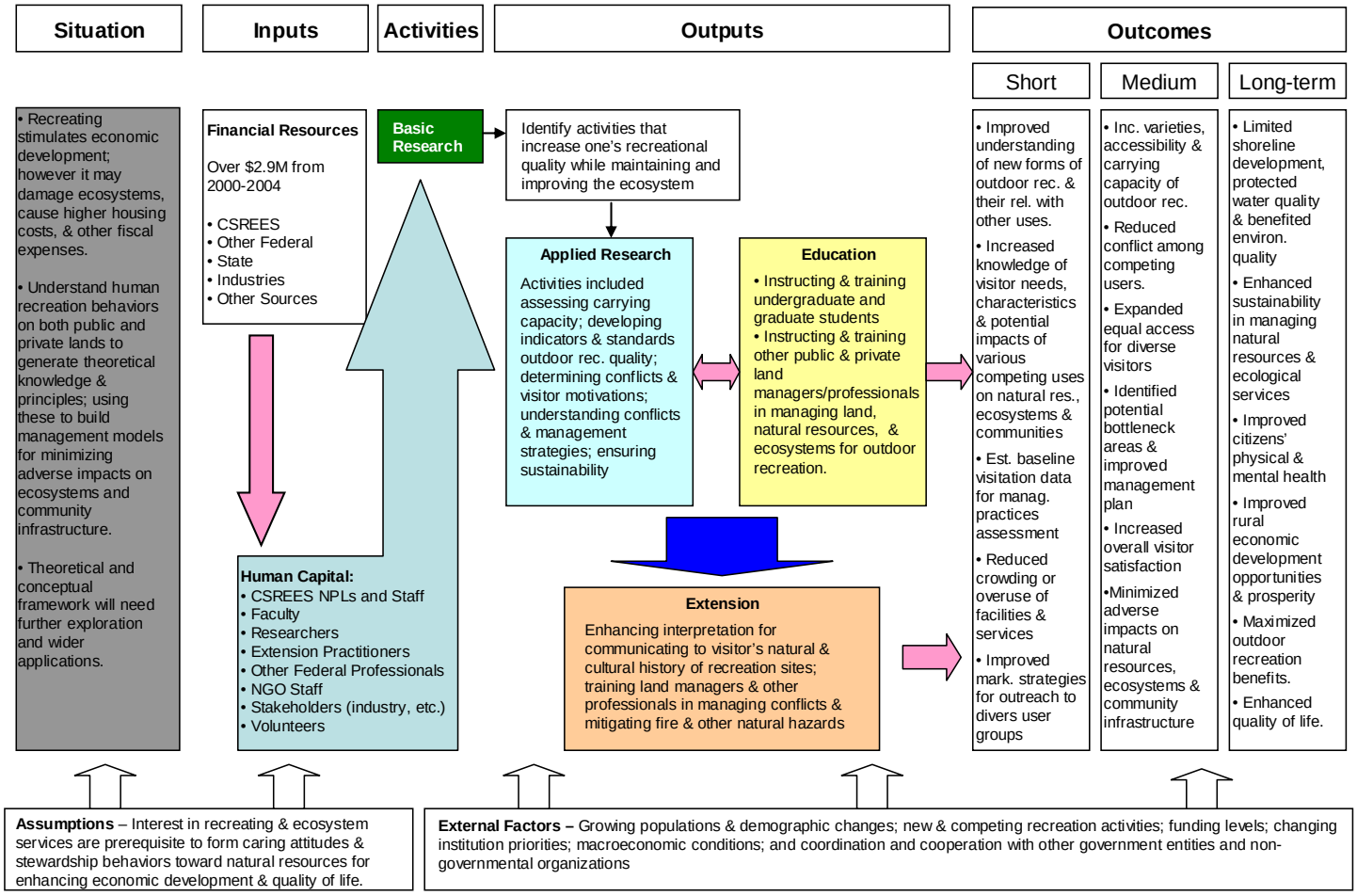
In the last two decades, nature-based outdoor recreation activities, including agro- or eco-tourism established by entrepreneurs on private lands have been growing dramatically. Companies involved with outdoor recreation and related enterprises are interested in outdoor recreation studies, which can provide guidance for increasing profits.

Outdoor recreation and tourism development usually stimulates steady growth in local-, state-, regional-, and national-level leisure travels and other businesses. Outdoor recreation and tourism development in rural communities can attract significant numbers of hotels, restaurants, and other service-oriented businesses. Consequently, they contribute to rural well-being and prosperity, increasing local employment opportunities, wage levels, and income, and reducing poverty. According to the Economic Research Service (Reeder and Brown, *Recreation, Tourism, and Rural Well-Being*, 2005), average population growth in rural recreation counties increased by 20 percent in the 1990s, nearly three times as fast as that of other rural/non-metropolitan counties. However, outdoor recreation and tourism development may also contribute to higher rural housing costs; cause excessive traffic and congestion; increase crime rates and public service costs; cause conflict among user groups or between humans and wildlife, and deplete natural resources, if not managed properly.

In addition to managing and minimizing environmental impacts, scholars also study crowding, conflict, and competing uses among different user groups. Research usually identifies socioeconomic characteristics, attitudes, and preferences. These studies then provide information to help park and outdoor recreation managers develop resource management programs and policies; reduce controversy and conflict; ease the need for restrictive rules, laws, and regulation; and increase visitor satisfaction.

Figure III-6

Portfolio 2.1: Expand Economic Opportunities through Economic and Business Decision-Making
KA 134 Outdoor Recreation



SITUATION

Researchers at the University of Minnesota (Anderson and Schneider, 1993; Schneider, et. al., 1993) studied the U.S. Forest Service (FS) and found that most innovations in outdoor recreation management were derived from research. In addition to the joint effort with the U.S. Forest Service, studies in outdoor recreation are often conducted in collaboration with pubic-land management agencies, such as the U.S. National Park Service (NPS). Machlis and Harvey (1993) documented the effectiveness of NPS' resource management policies based on outdoor recreation research.

CSREES-supported activities in KA 134 through research, education, and extension focus on the management of lands for recreation and the coordination of this use with other land and natural resources. The goals were to discover and transfer knowledge in the management of physical resources, as well as the socio-economic relationships of users with respect to these resources. A few studies address theoretical and conceptual frameworks, which may need further exploration and wider application through education and extension activities.

KA 134 integrates with a wide variety of knowledge areas in the CSREES strategic plan. Particularly, with ongoing research, education, and extension activities in KA 123, management of forestry resources, which addresses forest sustainability by improving biological efficiency of management practices; and with KA 605, natural resource and environmental economics, which supports economic inquiry into efforts for improving the relationships among agricultural production, processing, the environment, and natural resource use.

ASSUMPTIONS

Public interest in outdoor recreation and access to unique ecosystems are prerequisites for citizens and government agencies to form caring attitudes and stewardship behaviors toward natural resources. CSREES and land-grant universities (LGUs) in collaboration with other Federal, state, and local agencies, and non-governmental organizations can leverage funds and maximize available resources in these activities.

EXTERNAL FACTORS

Exogenous factors which may affect the capacity to conduct outdoor recreation research, education, and extension activities include:

- Growing populations and demographic changes;
- New and competing recreation activities;
- Availability of funds and changing priorities at the funding agencies and the institutions;
- Public policies that may affect the management of outdoor recreation resources and facilities; and

- Human capital for coordination and cooperation among various agencies and organizations.

INPUTS

Compared with other knowledge areas, the overall investment in KA 134 is relatively small. Between fiscal year (FY) 2000 and FY2004, as shown in Table III-5, CSREES-funded research accounted for about 16 percent ($4.6 million) of the overall $29 million in KA 134. Other USDA agencies invested $1.5 million (5.3 percent) research funding in KA 134, while other Federal agencies provided $5.7 million (19.8 percent). State investment of about $11 million (38.2 percent) was slightly less than all Federal investment combined ($11.9 million, 41 percent). More than other KAs, KA 134 attracts and requires funding from other sources.

Table III-4 reveals that from FY2000 and FY2004, formula funds (Hatch and McIntire-Stennis) accounted for over two-thirds (69.5 percent) of CSREES research investments in KA 134. Funding from McIntire-Stennis accounted for almost half ($2.2 million, 47.5 percent) of the total CSREES investments in KA 134. No Evans-Allen funds were invested in this KA.

Table III-4 CSREES-based research funding for KA 134

Funding Source	Fiscal Year *(in thousands)*					
	2000 (66)*	2001 (62)*	2002 (67)*	2003 (74)*	2004 (85)*	**Grand Total**
Hatch	191	212	169	253	194	1,019 (22.0)**
McIntire-Stennis	416	445	524	476	343	2,204 (47.5)**
Evans Allen	0	0	0	0	0	0
Animal Health	0	0	0	0	0	0
Special Grants	0	0	0	112	331	443 (9.6)**
NRI Grants	0	0	0	10	0	10 (0.2)**
SBIR Grants	265	0	0	0	80	345 (7.4)**
Other CSREES	57	54	74	218	212	615 (13.3)**
Total CSREES	929	711	767	1,070	1,160	4,637 (100.0)**

* Numbers in the parentheses indicate the number of research projects funded.
** Numbers in the parentheses are the percentage relative to total CSREES funding.

Table III-5 CSREES, Federal, State and other sources of research funding for KA 134

Sources of funding	Fiscal Year *(in thousands)*						
	2000	2001	2002	2003	2004	**Total**	
CSREES	929	711	767	1,070	1,160	4,637	(16.0)*
Other USDA	277	87	190	519	470	1,543	(5.3)*
Other Federal	973	994	1,348	1,207	1,212	5,734	(19.8)*
State Appropriations	2,092	1,962	2,206	2,249	2,573	11,082	(38.2)*
Self Generated	106	75	237	80	206	704	(2.4)*
Independent/GR Agreement	432	365	649	761	584	2,791	(9.4)*
Other Non-Federal	623	570	479	498	349	2,519	(8.7)*
Total KA 134	5,431	4,764	5,877	6,384	6,555	29,011	(100.0)*
CSREES as % of Total	17.1%	14.9%	13.1%	16.8%	17.7%		16.0%

* Numbers in the parentheses are the percentage relative to total KA 134 investments.

The number of CSREES-funded projects for KA 134 fell from 66 and $929,000 in FY2000 to 62 projects and $711,000, respectively, in FY2001. The significant decease was mainly from the termination of a project funded by the Small Business Innovation Research (SBIR) grant, which will be addressed later. CSREES research investments in KA 134 increased to a much higher level in FY2003 with 74 projects and approximately $1.1M. The major funding increase came from two Congressional-mandated special research projects that have KA 134 component. Additionally, two new projects through partnerships with the Department of Defense (DOD) had KA 134 element. More detail will be presented later.

Research projects in KA 134 supported in part with CSREES funds increased slightly to $1.16M for 85 projects in FY2004. While funding from Hatch and McIntire-Stennis decreased substantially this year, increases of CSREES investment in KA 134 were attributed two additional Congressional-mandated projects, a new SBIR project, and another project partnering with the US Army Corps of Engineers (ACE).

National Research Initiative (NRI) and SBIR are both competitive grants. The only NRI-funded activity in KA 134 during this timeframe was an award of $10,000 in FY2003 for a workshop entitled, “Amenities and Rural Community Development: Theory, Methods, and Public Policy.” SBIR awarded $265,000 to a small business company in FY2000 to develop and refine training materials for using trail assessment software, the Universal Trail Assessment Process (UTAP), and conducting train-the-trainers workshops. This project was completed in FY2000. The same company received another SBIR grant of about $80,000 in FY2004 to improve UTAP and create high-efficiency assessment instrument for rural trails. Between FY2001 and FY2003, no SBIR grants for KA 134 were awarded to small businesses. As the private sector continues to expand its investment in outdoor recreation activities, opportunities may exist for CSREES to invest more in SBIR grants.

Special grants for KA 134 increased from zero in FY2002 to $112,000 in FY2003. This captured a small proportion of a few congressionally mandated projects that have KA 134 component. The two projects are to: (1) study tick-borne disease prevention in Rhode Island and (2) develop

aquaculture products and markets in West Virginia. Similarly, the increase of special grants to $331,000 in FY2004 was from additional congressionally mandated projects to: (1) provide Hispanic Leadership program for research on food and agricultural sciences (Texas) and (2) study Argentine Ant integrated pest management (North Carolina).

Through this collaboration with DOD, CSREES awarded LGUs in FY2003 and FY2004 to (1) explore agricultural development opportunities in the American Pacific (Hawaii); (2) evaluate the benefits of recreational uses of the ACE's water resource projects (Minnesota); and (3) develop and transfer knowledge and management schemes for the ACE's multi-purposes water resource projects (Michigan). CSREES will continue the effort to foster partnerships with DOD and other agencies for KA 134.

While there are currently no formalized multi-state research or extension activities in KA 134, multi-state collaborations exist among LGUs and with public-land management agencies, including FS, NPS, and Bureau of Land Management. In summary, demand for research, education, extension and outreach in KA 134 will continue to increase as communities look for opportunities to enhance economic prosperity and the public pursue ways to improve their health, physical well-being, and quality of life. Since no one agency can carry out all aspects of tasks required in KA 134, therefore it is essential that CSREES and LGUs continue to effectively collaboration with other Federal, state, and non-profit organizations to leverage human capital as well as other resources.

MAJOR THEMES

Major themes of CSREES-supported activities in KA 134, Outdoor Recreation, encompass broad and interdisciplinary perspectives that include, but are not limited to:

Determination of Demand and Visitor Preferences for Outdoor Recreation

- Determining the demand for outdoor recreation, in order to better plan and manage the sites and facilities and ensure long term sustainability of natural resources and ecosystems.
- Understanding visitor preferences and attitudes regarding outdoor recreation opportunities. Knowledge gained in this area will help park and recreation managers as well as entrepreneurs develop and market outdoor recreation opportunities.

Development of Management Methods and Systems for Maintaining and Restoring Recreational Sites

- Establishing criteria for selecting sites that will attract and support more recreation use. This will help create additional outdoor recreation facilities; foster economic development opportunities; provide recreation sites to different user groups; and avoid overcrowding and overuse of natural resources at the existing sites.
- Developing practical methods to maintain existing recreation sites and restoring those depleted by heavy use. Without proper maintenance and management of recreation sites,

natural resources and ecosystems may be damaged and resulted in decreasing visitor satisfaction.
- Defining requirements for aesthetic landscapes and means for producing and maintaining them, which will help increase visitor satisfaction.

Preservation and the Minimization of Damage from Human and Natural Hazards
- Establishing methods for the protection, management, and recreational use of wildness-type historical and archeological areas and scenic landscapes, in order to conserve and preserve the outdoor recreation sites and cultural heritage.
- Determining management systems and special equipment and facilities that will minimize dangers from fire, avalanches, and other natural hazards. Knowledge gained will not only protect visitors and the public from potential dangers, but also benefit the society as a whole by reducing negative externalities.

OUTPUTS

Compared with other knowledge areas in the CSREES strategic plan, CSREES investment in KA 134 over the last five-year (FY2000 to FY2004) is considerably small. Nonetheless, the sections below demonstrate examples of outputs produced:

Research

CSREES supported LGUs to discover and enhance knowledge in outdoor recreation through partnerships and collaboration with multi-disciplinary experts in a variety of research projects. Research output that increased knowledge in KA 134 includes publications in peer reviewed journals, technical reports, and book publications. Areas of knowledge enhanced and output examples are listed below:

- To improve understanding and diversifying rural economies in northern Minnesota to link with tourism industry, research conducted by the University of Minnesota resulted in a journal article, "*Attributes and Amenities of MN's Highway Transportation System that Are Important to Tourist,*" (J. of the Transportation Research Board, 2004)
- A Purdue University researcher studied recreation participants' socio-demographic background, trip-related characteristics, and environmental attributes, and published a journal article, "*Developing a Typology for Understanding Visiting Friends and Relatives Markets,*" (J. of Travel Research, 2000)
- To better monitor and manage recreational use in backcountry and wilderness areas, University of Arizona scientists used computer model to simulate detailed levels and patterns of visitor use. Simulation results can be used to identify potential congested sites, schedule maintenance or patrol, and educate visitors about the site conditions. The study result was published in the Journal for Nature Conservation, 2004 entitled, "*Simulating the Complex Interactions Between Human Movement and the Outdoor Recreation Environment.*"

- A Scholar at the University of California at Davis published a book, "*Lifeplace-Bioregional Thought and Practice*," (University of California Press, 2002), which advocates a comprehensive and bioregional approach to land use planning, conservation, and open space protection. The knowledge was developed in part with CSREES funds.
- Supported by CSREES National Research Initiative grants, the University of Wisconsin planned and organized a national conference on the role of amenities in rural development. The conference was held in Madison, Wisconsin in June 2004. Approximately 30 scholars from several disciplines (e.g., sociology, economics, geography, and planning) exchanged knowledge and ideas concerning policy and research related to this issue. Presentations from the conference are published in a book entitled, "*Amenities and Rural Development: Theory, Methods, and Public Policy,"* (Edward Elgar Publishing, 2005). Several participants are collaborating to submit grant proposals on the same topic.

Extension

To support outdoor recreation activities, improve management of recreational sites and facilities, and increase economic development opportunities in rural America, educators at the LGUs and consultants from small business companies develop curricula, fact sheets, other publications, and conduct training workshops to educate and reach out to a variety of clienteles. For example:

- Beneficial Designs, Inc. received SBIR grants to develop and refine a training manual for using trail assessment software, Universal Trail Assessment Process (UTAP); establish a master trainer cadre; and conduct train-the-trainer workshops. UTAP is designed for land managers to determine trail accessibility, monitor environmental impacts, enhance user safety and satisfaction, and plan for trail construction and maintenance. In the two-year period of the project, the number of trainers tripled and spread across the mid-west (Indiana and Minnesota) and the west (N. California and N. Nevada).
- Scientists at the Michigan State University (MSU) are supporting the decision-making process of the U.S. Army Corps of Engineers (ACE) managers for water resources development projects. An Internet-based knowledge management system in outdoor recreation entitled, ACE Natural Resource Management Gateway (www.corpslakes.usace.army.mil), was established and continued to be refined. This management system is accessible to the public. MSU also conducted a workshop in 2004 to transfer the knowledge and train the analytical tools to more than 25 ACE managers.
- In collaboration with CSREES, extension Specialists in community economic development across the nation recognized the important linkage between outdoor recreation and economic development. They established a National Extension Tourism Design Team (NETD) in 1994. The main objective of the team is to enhance extension tourism programs nationally by providing relevant information, useful resources, and networking opportunities for researchers and educators. The NETD has established a listserve (net-national@iastate.edu) to foster communication. Since established, NETD organized more than six biannual conferences (1995, 1998, 2000, 2002, 2004, and upcoming 2006) to exchange knowledge and expand networks. While no proceedings

were published, speakers distributed relevant notebooks to conference participants who could in turn use the information in their research, teaching, and outreach activities. In addition, NETD has also developed framework for tourism education modules. For example, the Western Rural Development Center completed the development and testing of a "Community Tourism Assessment and Development" module.

- CSREES funds have been leveraged for extension and outreach efforts by the Institute for Outdoor Recreation and Tourism (http://extension.usu.edu/cooperative/iort) at the Utah State University. Integrated with the Institute's research and education functions, it publishes a series of informative reports and fact sheets on outdoor recreation and nature-based tourism development. These materials transfer knowledge that will benefit community's social, economic, and environmental systems. The Institute also works with government agencies, non-governmental organizations, and individuals in the private sector by offering consultation and training sessions. In 2004, the Institute offered to mid-level Federal recreation specialists and managers a 3-week intensive training session on effective recreation management procedures and tools to understand trends in recreation uses.
- In an effort to generate additional income, many farm and ranch families are looking for diversification opportunities. Supported in part with CSREES formula funds, extension specialist at the North Dakota (ND) State University conducted two workshops to teach families how to start a recreation business. The workshops leveraged CSREES funds with that of co-sponsors from ND State Department of Tourism, ND West Region Tourism, and Southwest Rural Economic Area Partnership. Eighty-seven farmers and ranchers attended these two workshops. A survey conducted after the workshops showed that 57 percent of the participants said the workshop helped them assess whether to start a recreation business. Twenty-eight participants stated that they were ready to start a business in outdoor recreation. This was in addition to 11 individuals who have already had a recreation-related business. This outreach effort will eventually help improve income and economic well-being of farm and ranch households, and augment rural community economic growth.

Education

Because of a fairly recent development in this scientific field, not all land-grant universities have academic programs in parks, recreation, and leisure studies. Besides, due to the nature of this knowledge area being multidisciplinary and interdisciplinary, education programs in KA 134 may have been in part supported by CSREES funds in a wide array of colleges, schools, institutes, departments, centers, and other academic programs, such as school of natural resources, forestry resources management, environmental studies, geography, landscape architect, or economics.

According to the National Center for Educational Statistics (NCES) Integrated Post-Secondary Education System (IPEDS), 44 land-grant universities have reported offering academic degrees in Parks, Recreation and Leisure Studies, or Parks, Recreation and Leisure Facilities. Table III

shows the number of degrees awarded in these two particular areas between FY2000 and FY2002.

Table III-6 - Degrees Awarded in KA 134 from Land-grant Universities

Grad. year	Degree	Baccalaureate	Masters	Doctorate	Total
1999-2000	Parks, Rec. & Leisure Studies	295	57	13	365
	Parks, Rec. & Leisure Facilities	869	62	17	948
	Subtotal	1,164	119	30	1,313
2000-2001	Parks, Rec. & Leisure Studies	235	49	11	295
	Parks, Rec. & Leisure Facilities	967	55	9	1,031
	Subtotal	1,202	104	20	1,326
2001-2002	Parks, Rec. & Leisure Studies	247	48	9	304
	Parks, Rec. & Leisure Facilities	838	70	12	920
	Subtotal	1,085	118	21	1,224
Total	Parks, Rec. & Leisure Studies	777	154	33	964
	Parks, Rec. & Leisure Facilities	2,674	187	38	2,899
	Grand Total	3,451	341	71	3,863

Source: NCES IPEDS Completion Data *(Note – data for 2003 and 2004 not currently available.)*

Other examples of education programs include:

- Supported in part with CSREES funds, the Department of Community, Agriculture, Recreation and Resource Studies (CARRS) at Michigan State University consists of multidisciplinary faculty members to assist the development of sustainable communities. CARRS addresses critical issues at the interfaces of agriculture, natural resources, recreation, and communities. Through scholarly research, teaching and outreach, the Department seeks to help people understand the dynamic interactions in their communities, ecosystems, and the world, as well as opportunities for sustainable revitalization. The faculty employs holistic and interdisciplinary approaches to understand and address complex and interrelated issues. They strive to help diverse individuals and communities improve their quality of life and the environment, including recreation and tourism activities.
- By leveraging CSREES funds, Recreation, Parks, and Tourism Resources (RPTR) Program under the Division of Forestry at the West Virginia University helps contribute to the 21st century economy and enhancing the quality of life of the citizen and communities. RPTR has established a cooperative agreement with the National Park Service (NPS) to house NPS' West Virginia Field Office of the Rivers, Trails, and Conservation Assistance Program. This program assists the region with community-based conservation planning, such as rails-to trails projects and open space preservation. Many RPTR students serve as interns or volunteer in community service projects. This hands-on experience augments students' academic studies.
- To support the increasing demand for the travel and tourism industry, Oregon State University offers an Outdoor Recreation Leadership and Tourism (ORLT) Program. This

interdisciplinary program integrates students, faculty and curricula; and complements other traditional natural-resource-related programs, such as forestry, rangelands, fisheries and wildlife. The program awards the only bachelor's degree in tourism and outdoor recreation in Oregon. In addition to marketing, business, communication, and leadership skills, students also obtain knowledge in natural resource management and protection, environmental education and interpretation, recreation and tourism management and policy. All students are required to participate in internship for a tourism company or government agency.

Integrated Programs

LGU programs in KA 134 supported in part with CSREES funds, in general, integrate three functions, i.e., research, education, and extension. Examples described above, such as the West Virginia University's RTPR program, Michigan State University's CARRS, or Utah State University's Institute for Outdoor Recreation and Tourism are just a few examples of integrated programs. Success stories in a later section have additional examples of integrated programs.

OUTCOMES

Investment in KA 134 in part with CSREES funds has resulted in significant outcomes. Highlights include application of research results and outreach education to improve visitor satisfaction and the environmental quality in Minnesota, Idaho, Texas, and other states. These outcomes are discussed below according to their short-, medium- and long-term outcomes.

Case 1 - Forest Recreation Trails

In examining conflict among various trail users, researchers at North Carolina State University found that the average level of conflict was generally low. However, a small user group's reckless and obstructing behaviors, i.e., cyclists going too fast or not giving warning when passing others from behind, were of particular concern. The study recommended that trail managers employ a combination of trail design, user education, user involvement, regulations, and enforcement techniques to minimize potential conflict. In addition, the study analyzed the attitudes of landowners adjacent to trails and greenways, and suggested that managers take steps to expand landowner experiences with existing greenways, which may in turn improve their attitudes toward proposed trails and greenways.

Short-Term

The study provided outdoor recreation managers with knowledge to clearly understand conflict among trail users and the attitudes of adjacent landowners toward forest recreational trails and greenways.

Medium-Term

Results of the study helped trail planners and managers develop effective plans and improve trails and greenways management.

Long-Term
With reduced conflict and adjacent landowners' acceptance of trail and greenway proposals, recreation benefits could be maximized and potential negative impacts minimized for managers, trail users, and the community.

Case 2 - Enhancing Rural Economies through Sustainable Systems of Nature-based Tourism in Northern Minnesota

Scientists at the University of Minnesota tested the hypothesis that not all rural regions with lake-destination tourism would require the same kinds of value-added services and marketing schemes to attract visitors while ensuring sustainable development. Researchers used survey, focus groups, and other methods to evaluate travel motivations and needs of stakeholders, including host community residents and shoreline property owners. The study concluded that (1) Involvement and consideration of all stakeholders are critical to sustainable lake-destination development and marketing; (2) Environmental concerns for the lake-destination areas are common among all stakeholders; and (3) Community's investment in market research and establishment of strategic or master plan will augment its tourism development.

Short-Term
The study improved knowledge in visitor travel motivations to the forested and lake areas for community planners in rural northern Minnesota. It enhanced their understanding that paying attention to the needs of host community residents, in particular, shoreline property owners, is equally important for sustainable development in nature-based tourism.

Medium-Term
Results of this study would help tourism industry develop future marketing strategies. It would also help enhance and link a $10 billion tourism industry to rural communities in northern Minnesota by diversifying their struggling and shifting economies.

Long-Term
Diversified rural economic activities and simultaneously promoting sustainable development will increase income and economic likelihood of the household, enhance the viability of rural communities, and strengthen state economy in the long run.

Case 3 - Influences of Natural Resource Recreation on Land Management

To better understand the impact on land use from nature-based outdoor recreation and associated economic activities, Michigan State University scholars explored a variety of methods to assess dispersed and corridor recreation patterns on public and private lands. Results of these assessments were integrated with other ecosystem management data to construct landscape-level ecosystem models for watershed and other landscape-level planning effort. Models developed were validated at a few locations (e.g., Pere Marquette River and upper Manistee River corridor) to examine the perceptions of outdoor recreation participants concerning changes in environmental quality over time.

Short-Term
The project increased government agency and industry managers' understanding of citizen perspectives on land management regarding outdoor recreation opportunities and related output, such as timber, wildlife, agriculture, and environmental quality.

Medium-Term
Information from the study was instrumental for the upper Manistee River being designated as a state natural river in 2003 by the Michigan Natural Resources Commission. In addition, the state made available to residents and others more than 180,000 acres of locally-owned parkland, which exceeded National Recreation and Park Association standards for local park availability.

Long-Term
In the long run, this study will help communities limit shoreline development, protect water quality, benefit environmental quality, and enhance quality of life.

Case 4 - Modeling Recreation Impacts of Visitation in the Forested Wilderness of Northern Idaho

Increasing use of back packers, outfitters, and recreational stock users in the Frank Church Wilderness area could have negative impacts on vegetation, water quality, wildlife habitat, and with the quality of the wilderness experience itself due to increasing number of contacts between user groups. Using computer simulation model, researchers at the University of Arizona conducted this study to quantify, monitor, and analyze visitor flow, patterns, and user attitudes. The study helped identify where and to what extent visitors are using the area; where and to what degree visitors may have impact on the environment; and what the actual and projected peak visitation periods may be.

Short-Term
This study established some baseline visitation data, e.g., on-trail conditions, in northern Idaho wilderness area and enabled land managers to evaluate sustainable management practices.

Medium-Term
Land managers will be able to identify potential bottlenecks or congested sites that can help develop future management plan, such as scheduling maintenance, patrol activities, or educating visitors about the conditions of the environment and other user groups that they may encounter.

Long-Term
The study will enable trail planners and managers to minimize potential negative impacts from conflict among a variety of user groups, mitigate adverse environmental damage, and maximize outdoor recreation benefits.

Case 5 - Effects of Cultural Assimilation on Recreation Participation and Values of Hispanic and Anglo Americans

As the population becoming more ethnically diverse, scientist at the Department of Recreation, Parks, and Tourism, Texas A&M University, studied the effect of demographic trends on outdoor recreation visitation to the national park system.

Short-Term
Managers at the national park system gained knowledge in the socio-demographic diversity of outdoor recreation user groups, which in turn helped improve marketing strategies for outreach to diverse user groups.

Medium-Term
The National Park Service (NPS) will use the study results to help increase variety and accessibility of outdoor recreation for the national park system.

Long-Term
Knowledge gained will benefit NPS, other agencies, and the recreation industry to establish long-term strategy for outdoor recreation and tourism planning and development by incorporating economic, ecological, social, cultural, and visitor data. This will help enhance equitable access for all user groups.

Case 6 - An Ecological Approach to Forest Recreation Management and Planning

To address outdoor recreation carrying capacity, managers use a variety of allocation and planning tools, such as Recreation Opportunity Spectrum or Geographical Information Systems, to divide the recreation areas into zones that represent different physical, social, and managerial settings. However, recreational activities that take place across management zones (e.g., hiking) need vector data to portray their events for management purposes. Researchers at the West Virginia University examined a different approach by collecting both raster and vector data to help identify the type and level of visitor use for forest management and planning purposes.

Short-Term
This study reinforced spatial tools and techniques to better understand visitor uses from different recreational activities.

Medium-Term
Results from this research will help outdoor recreation managers mitigate crowding and other conflict, and develop effective outdoor recreation plan and management schemes that meet different types and levels of visitor use.

Long-Term
In the long-run, effective outdoor recreation management will improve visitor satisfaction and enhance sustainability in managing natural resources and ecological services.

SUCCESS STORIES

Case 7 - Outdoor recreation, involvement and specialization
This study was undertaken to examine the use of historical sites in the U.S. Results from this research provided a template for natural resource organizations to develop new approaches for examining their visitors and potential markets. The study found that bird-watching is one of the fastest growing outdoor recreational activities in the U.S. and the population of bird-watchers is diverse and their needs vary.

Results from this study have been used by the adventure travel industry to develop new marketing programs tailored to a variety of visitors' needs. The U.S. Forest Service and Indiana Department of Natural Resources have also used these results to develop new policies for forest resource management.

Additionally, these results are used by the US Department of Commerce International Trade Administration Tourism Group to develop new marketing programs for international visitors.

Case 8 - Enhancing rural economies through sustainable systems of nature-based tourism
While this study was limited to one year, the findings were nonetheless significant. Results indicated that increased economic activities for rural communities in northern Minnesota could be attributed to increased visitation to the forest and lake natural areas. Increases in tourism would likely link the $10 billion tourism industry to these rural areas that might help revitalize these struggling rural communities.

Case 9 - Influence of natural resource recreation on land management
To gauge the impact of recreation on a wider variety of land uses, research was conducted in Michigan to evaluate how recreation uses and activity patterns influence natural resource management.

Research concerning the attitudes of landowners and recreational users were instrumental in the designation of upper Manistee River as a state river in 2003. This designation is of significance because it not only provides exceptional protection for water quality, but also designates the river as vital for outdoor recreation. Moreover, this designation prohibits development on the shoreline that safeguards the ecological values of the relatively pristine and free flowing river segment.

Case 10 - Understanding the benefits of nature-based tourism and recreation in Florida
This study was conducted to determine the extent to which the growing nature-based and recreation industry in Florida could be sustained and to determine the number of people who use hiking trails throughout Florida. The authors indicated that for the first time they succeeded in accurately estimating the number of people as well as the kinds of hikers who use the trail throughout Florida. Knowledge gained from this study has served as a basis for an in-depth study on a sustainable tourism development plan in Jackson County, Florida.

Case 11 - Public Access, Open Space, and Regenerative Planning in the Sacramento Valley Bioregion

In their efforts to catalogue sustainable land management and development patterns for the Sacramento Valley region, researchers from the University of California at Davis generated a full manuscript and created a volunteer non-profit bioregional organization. This bioregional non-profit organization succeeded in securing a Packard Grant to fund a comprehensive conservation framework for 800,000 acres of wild lands in the upper Putah and Cache Creek watersheds. The full and long-term impacts of this project on natural resources, ecosystems, and communities have yet to be entirely realized and quantified.

Case 12 - Valuing the Loss of Rock Climbing Access in Wilderness Areas

University of Nevada economists conducted this study to determine the effect and economic impact of implementing a proposed policy by the U.S. Forest Service (FS) to restrict the way that rock climbers could recreate in wilderness areas. This is the first study to use the repeated nested random utility model to estimate demand for rock climbing and to estimate the economic losses associated with loss of access to climbing sites. The results indicated that at a minimum, the economic loss due to this proposed policy would amount to $92 million annually. This study provided useful knowledge for public land management agencies, such as FS, National Park Service, Bureau of Land Management, in their efforts to balance climbing with other uses of the public land. In addition, the study provided alternative options for improving management plans, which would help balance recreational activities and protect wilderness areas.

Case 13 - Off-Road Vehicle Impact Studies

Pubic land managers face several challenges with the increasing popularity of off-road vehicles (ORVs) on recreation sites. These challenges include increased crowding and conflicts over uses of the trails, runoff in the streams, adverse ecological impacts on the forest, and maintenance costs of keeping trail systems open. Scientists at Auburn University initiated two studies to compare stream sediment amounts both with and without ORV traffic on the trail. Preliminary results showed that an acrylic polymer used in stabilizing soils has positive effects in reducing concentration of sediment in runoff from trails. Knowledge gained from this study was extended on a site in the Kentucky ORV area of the Talladega National Forest to measure stream sediment amounts. Results of the studies will help foster a recreational enterprise with improved management plans to protect soils, water, and other natural resources.

Case 14 - Training Program for Trail Assessment Process Trainers

In order to help managers streamline trail assessment, Beneficial Designs, Inc. received several SBIR grants, including that of FY2000 and FY2004, to develop, refine, and provide train-the-trainer workshops on trail assessment software, Universal Trail Assessment Process (UTAP). UTAP is designed for land managers to determine trail accessibility, monitor environmental impacts, enhance user safety and satisfaction, and plan for trail construction and maintenance. In the two-year period of this project, a master trainer cadre was established and the number of trainers tripled and spread across the mid-west (Indiana and Minnesota) and the west (N. California and N. Nevada). In the long run, this project will help develop trail management plan strategically, and so enhance visitor satisfaction and sustain natural resources.

NEW DIRECTIONS

Outdoor recreation, tourism, and ag-tourism have grown to become significant factors in rural economic development – particularly as traditional resource extractive industries have declined. Many rural communities are looking to the development of tourism to remain solvent. In some instances tourism has obviously contributed to the local economic base, in other instances it has detracted from it. More knowledge is needed on the development of successful tourism activities in rural communities and the effects of tourism development on community coherence and sustainability.

With emerging emphasis on ecosystem management, there is growing attention to research at the landscape scale where the theme is a broader natural resource management and planning agenda. The research community must combine their studies in outdoor recreation behaviors with rural development and resource management and planning tools. Expansion to multi-dimensional effort at macro- and micro-scales is recommended. Regional recreation and tourism surveys examining social dimensions of public lands in the context of land use at a landscape scale must be linked to rural economic development at the gateway communities.

The study of outdoor recreation will benefit from greater interdisciplinary approach with broader understanding of the environment, ecology, natural resources, human behaviors, history, culture, demography, and their interactions and interrelationships. Only with enhanced understanding of these complex and interrelated issues, can outdoor recreation be integrated into sustainable natural resources management plan.

We need to establish long-term recreation monitoring sites on both public and private lands, and from rural and urban outdoor recreation activities. Such data are essential for scientific research to accurately assess visitor demand and their impacts on natural resources and ecosystems; to develop effective facilities planning; to properly estimate budget and calculate economic contributions from tourism; and to assess economic value of the recreation experience to the visitors.

Outdoor recreation is an important cultural phenomenon in the 21st Century. It should be one in which a broad range of people have opportunity to experience, share, cherish, and also become stewards of natural resources and ecosystems. The mission of outdoor recreation will only remain viable through efforts in marketing and promoting equitable and effective recreation opportunities for groups varying in age, gender, race, ethnicity, education, income, and disability status. We need to develop and implement innovative marketing strategies for promoting outreach to diverse groups with varieties of recreation opportunities.

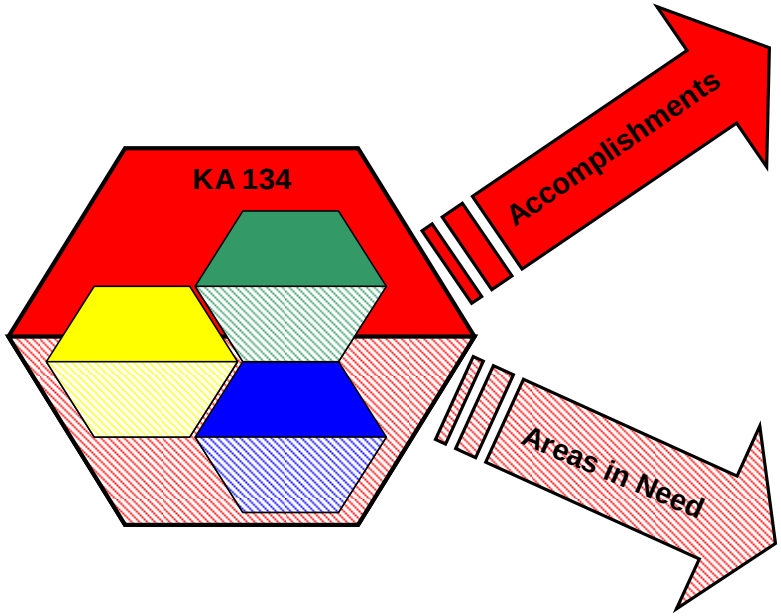
In addition, researchers and educators need to collaborate with government agencies to evaluate their policies and institutional settings that may be barriers for access to outdoor recreation services and recommend alternative policies to enhance equitable access for all user groups.

It is critical to enhance our knowledge in the context of management strategies for the ever-increasing conflict between new and traditional forms of outdoor recreation, among different demographic user groups, or with adjacent landowners. Systematically studying conflict will provide long-term benefits for outdoor recreation customers, land management organizations, scientific community, as well as community economic growth.

It is also incumbent upon CSREES to provide strong leadership in articulating and handling the tensions from the changing relationship between citizens and the country's natural resources.

Figure III-7

Knowledge Area 134: Outdoor Recreation



KA 134 - Major Themes

- Determination of Demand & Visitor Preferences for Outdoor Recreation
- Development of Management Methods & Systems for Maintaining & Restoring Recreational Sites
- Preservation and the Minimization of Damage from Human & Natural Hazards

- Developed new methodologies for examining visitors and markets. E.g., "Repeated Nested Random Utility" model to estimate change in demand due to loss of access to recreational site.
- Completed studies in four states that identified the links between Nature-based tourism and economic benefits for land management & rural development in surrounding areas.
- Created a volunteer non-profit bioregional organization for sustainable land management in the Sacramento Valley.
- Completed studies on the impacts of off-road vehicles and loss of access to rock climbing.

- Studies combining outdoor recreation behaviors, rural development, and resource management & planning tools. Expansion of these studies to multi-dimensional efforts at both the macro- and micro-scales.
- Regional recreation and tourism surveys that link examinations of social dimensions of public lands and land use to rural economic development at the gateway communities.
- Research at the landscape scale in ecosystem management that is part of a broader natural resource management and planning agenda.
- Additional knowledge on development of successful tourism activities and the effects of tourism development on community coherence and sustainability.
- More studies needed that account for damage to recreational areas and local communities from natural hazards.

Knowledge Area 602: Business Management, Finance and Taxation

OVERVIEW

Decision-making in the areas of Business Management, Finance and Taxation involve some of the most important aspects of expanding economic opportunities in rural America. There are substantial benefits to be gained from the improvements in the decision-making by farmers, agricultural business and related enterprise owners while they plan and manage a large number of financial and operational risks.

In this KA, CSREES funds are allocated through a broad range of research, education and extension activities. Between 2000 and 2004, a total of $8.3 million from CSREES was leveraged with other USDA, Federal, and State appropriations for a total of $38.8 million directed toward advancing this knowledge area. The degree of CSREES' participation in the total effort declined from 25.2% to 18.1%, over a 25% decline, but averaged 21.1% over the entire time. Over this same period, State level appropriations increased from $3.6 million to $4.1 million, reflecting the increased interest in this work.

The research activities involved the investigation of risk behavior in financial markets; the improvement of lending protocols; how farms and agribusiness owners handle crop risk and insurance decisions. How human resource management affects farm profitability and financial performance was also studied. In addition, work on the impact of various taxes, tax policies and tax codes upon both macro-level entities (States and regions) and micro-level entities (businesses, farms, etc.) was examined.

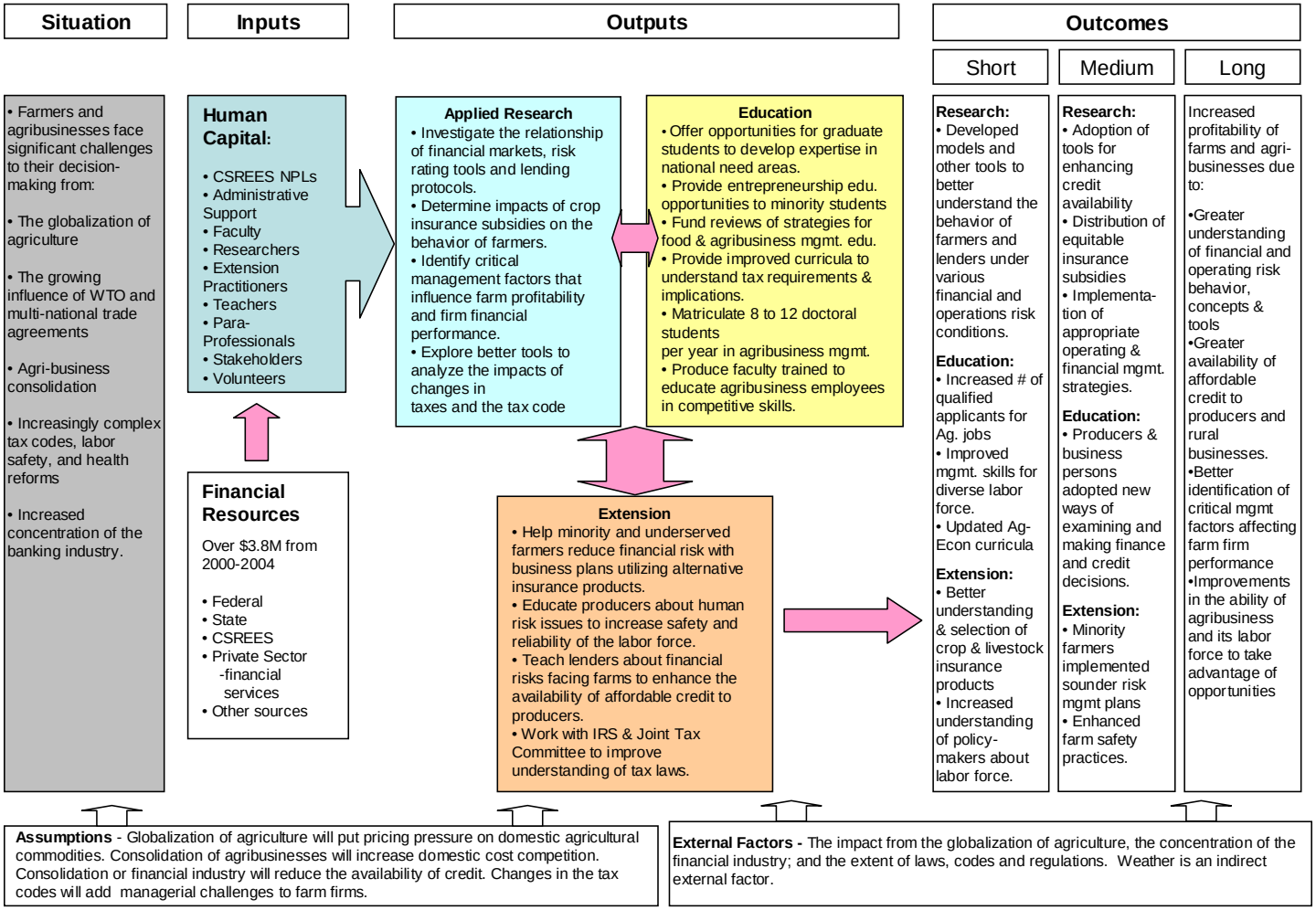
The educational activities were aimed at improving the incentives for doctoral and masters candidates to develop experience and knowledge in agricultural arenas that have been deemed to be national priorities, such as agribusiness management, markets and trade policy, and information systems specific to agricultural challenges. Furthermore, educational programs were redesigned to provide opportunities for minority students to build relationships with faculty and to enter entrepreneurship tracks in MBA programs. While most educational aspects of taxes and tax law are often handled in the business schools of our universities, a number of institutions have in place business related programs in the colleges of agriculture.

Many extension activities were also directed toward outreach to minority groups and underserved/entrepreneurs and sought to help them reduce financial risk when they developed business plans, especially when these plans involved the development of easier credit, or the use of crop and livestock insurance products. The Tax Extension Committee provides input to both the IRS and the Joint Congressional Tax Committee thereby providing U.S. producers a better understanding of new tax requirements as well as their impacts.

The principle initiatives of these programmatic activities are illustrated in the following logic model for this KA.

Figure III-8

Portfolio 2.1: Expand Economic Opportunities through Economic and Business Decision-Making
KA 602 – Business Management, Finance and Taxation



SITUATION

A number of significant trends point toward greater competition in agricultural management and a need for farmers and agribusinesses to fully understand and adopt the most effective financial and human resource strategies, information technologies and risk mitigation alternatives. On the positive side, in aggregate, producers face declining average costs. However, they also face the continuing prospect of declining real prices for what they produce. Together these trends continue to put pressure on the average farmer's profitability. Due to changes within the structure of the U.S. agricultural sector, as micro-economic theory suggests, the average long run cost curve continues to decline, but due to the slope of this curve, it also means the minimum efficient scale of operation must increase. The average farm must increase its scale or be challenged by ever shrinking margins of profitability. Since this is not always immediately possible, it is imperative that farmers and agribusinesses personnel fully understand and adopt appropriate decision enhancing financial management strategies, information technologies, risk mitigation alternatives, and human resource management tools in order to enhance their profits. These same competitive effects have had impacts on academic institutions necessitating significant changes in their recruitment, curricula, teaching methods and programs.

ASSUMPTIONS

The globalization of agriculture vis-à-vis the WTO and the various multi-national trade agreements will continue to put significant pricing pressure on American agricultural commodities and products. Likewise, the consolidation of agribusinesses implies that increased domestic cost competition will have the greatest effect on the smaller scale farm operations that constitute the majority of U.S. farms by number. Additional regulations and changes in the tax codes are expected to add substantial managerial challenges to the operations of farm firms, so a farmer/operator will face increased demands on his or her time as well as tougher operating conditions. Together these influences decrease the likelihood a farmer can maximize his or her profits, as well as lower the margin of error for the successful application of risk management tools.

The above assumptions imply that even the status quo ex ante cannot be maintained and that these efforts are not discretionary but mandatory.

EXTERNAL FACTORS

In the short-run, all factors are exogenous to a program. For the average farmer and thus for this program many factors may remain exogenous in the longer term. In any case, some of the more significant external factors affecting the agricultural sector include the following:

- Globalization of agriculture in general;

- Growing influence of the WTO and the increased number of multi-national trade agreements;
- Continuation of agribusiness consolidation both here and abroad;
- Increasingly complex tax codes, labor safety and health reforms;
- Increased concentration of the banking industry;
- Federal commodity programs; and
- State and Federal environmental regulations.

Individually, farmers are unlikely to be able to influence the globalization of agriculture, the concentration of the financial industry or the extent of tax laws, codes and regulations. The global dynamics of trade policy are probably the factors that are under the least control, with the possible exception of weather. However, various economic conditions might halt the consolidation of the financial industry limiting or reducing the degree of market power lenders may hold over the extension of credit. Similarly, the changes in laws and the tax code may also be exogenous, although lobbying by affected members and their organizations may be able to change these factors at least in the medium and long run. Weather is an indirect factor in the success of this KA. While weather obviously has an impact on farmers' profitability, the programs in this KA are directed toward improving the decision-making process that hopefully, at least in the longer run, optimally accommodates its variability.

These external factors all contribute to declining margins in agriculture. In order to maximize profits in an era of decreasing margins, farmers, agribusinesses, and policy makers need to understand the implications of these factors, and to understand the set of alternatives available on how to successfully counter their negative impacts on profitability. This Knowledge Area provides the means by which producers and agribusinesses can assess their financial situation, identify potential alternatives, and understand the implications of those alternatives on farm and business profitability.

INPUTS

Table III-7 CSREES-based funding for KA 602

Funding Source	Fiscal Year *(in thousands)*					
	2000	2001	2002	2003	2004	**Grand Total**
Hatch	1,002	1,005	1,161	875	650	4,693
McIntire-Stennis	3	24	59	114	127	327
Evans Allen	36	39	30	30	45	180
Animal Health	0	0	0	0	0	0
Special Grants	120	55	130	455	364	1,124
NRI Grants	135	201	0	51	0	387
SBIR Grants	0	271	0	0	0	271
Other CSREES	511	423	0	111	289	1,334
Total CSREES	1,808	2,018	1,379	1,636	1,476	8,317

Table III-8 CSREES, Federal, State and other sources of funding for KA 602

Sources of funding	Fiscal Year *(in thousands)*					
	2000	2001	2002	2003	2004	**Total**
CSREES	1,808	2,018	1,379	1,636	1,476	8,317
Other USDA	528	406	283	550	571	2,338
Other Federal	90	520	244	310	461	1,625
State Appropriations	3,598	3,396	4,735	3,962	4,118	19,809
Self Generated	333	332	300	219	296	1,480
Independent/GR Agreement	135	115	303	210	379	1,142
Other Non-Federal	674	658	965	957	859	4,113
Total KA 602	7,167	7,445	8,209	7,845	8,159	38,825
CSREES as % of Total	25.2%	27.1%	16.8%	20.9%	18.1%	21.4%

Total CSREES funding between fiscal years 2000 and 2004, initially rose to a peak in 2002 and fell slightly to plateau around $1.5 million dollars per year. Hatch funding fell significantly from $1.1 million to about $0.8 million between FY 2002 and FY 2003, but this difference was compensated by an increase in Special Grants that continued to the end of the period. This compensation pattern of funding creates challenges for national leadership.

DEVELOPMENT AND ADOPTION OF DECISION-ENHANCING TOOLS AND TECHNIQUES TO IMPROVE THE COMPETITIVENESS OF FARMERS AND AGRIBUSINESS

The development of decision-enhancing managerial tools covers many applications. The program covering the broadest spectrum of them is the multistate project, “Financing Agricultural and Rural America: Issues of Policy, Structure & Technical Change.” Sixteen universities were involved between the time it began in 1998 and the time it finished it in 2003. The project investigated the impacts of federal and state policies on the financial and economic performance of farms, rural nonfarm businesses and rural financial markets. It also identified and measured the costs and benefits of structural changes to these institutions.

These efforts took the form of research on the policy impacts on financial and commodities markets, risk management, and credit availability. Many of these activities were research-based in nature, but many others involved outreach as the knowledge gained from the research was disseminated to agibusinesses, farm firms at large, as well as minority and underserved farmers. This knowledge Area is composed of all three land grant functions of research, education and extension. However, rather than differentiate between the three functions, it appears to be reasonable to present the activities, outputs and outcomes in an integrated manner since the line that differentiates these functions are often times blurred. Indeed, this KA is driven by the demand for practical applied management challenges.

OUTPUTS

The **activities** associated with research, education, and extension within Knowledge Area 602 address the development of decision-making tools, a greater understanding of the implications of certain situations and conditions that affect profitability, and the identification of alternatives to either counter the negative aspects of conditions or to take advantage of them. These activities include:

- Investigation of financial markets, risk-rating tools and lending protocols
- Determination of the impacts of crop insurance subsidies on farmers
- Identification of the critical management factors influencing farm profitability and firm financial performance
- Education and outreach to minority and underserved farmers and entrepreneurs concerning the mitigation of financial risk through the development and implementation of business plans. This includes the development of financial plans and the communication of alternative crop, livestock and other insurance products.
- Education for producers that may improve their knowledge of human risk issues to increase safety and reliability of the labor force.
- Education for lenders about farm financial risks that may enhance the availability of affordable credit to producers.

OUTCOMES

Short-Term

- Creation of new knowledge that is useful to farmers and lenders in better understanding the financial conditions and associated risks in making credit decisions, borrowing and lending.
- Models that provide insurance policy makers and insurance product developers greater knowledge of the effects of various subsidy characteristics on farmer insurance choices.
- Provided dairy farmers with tools to better understand farm and financial management factors that influence firm profitability and financial performance.
- Curricula and presentations to farmers that increased their knowledge of business and financial planning options and insurance products.
- Promulgated information policies and regulations pertaining to the employment of human labor, such that producers gained a greater appreciation of the risks facing their labor force.
- Provided software and other tools that assisted lenders gain a better understanding of the lending risks pertaining to farms.

Medium-Term

- Both farmers and lenders adopted improved tools that enhanced decision-making in the application for and the consideration of credit.
- Policy makers promulgated more equitable insurance subsidies that optimized farmer's crop insurance decisions, and modified various insurance products to make them more amenable to producers.
- Farmers implemented appropriate strategic farm and financial management plans for the purpose of enhancing long-run profitability.
- Producers, including minority and underserved farmers, developed and implemented sound business and financial plans and increased participated in crop insurance and other appropriate insurance programs.
- Producers and their labor force adopted enhanced safety practices to minimize injuries, illnesses, and lost wages.
- Farmers and lenders adopted and applied improved analytical techniques and gained a better understanding of the implications for alternative sources, conditions, and relative risks of credit.
- Producers employed the use of modern analytical tools, invested in cost-saving technologies and adopted improved managerial practices to improve profitability.

Long-Term

- The profitability of agricultural firms and agribusinesses continues to improve.
- Farmers participate in greater numbers in crop and livestock insurance programs making insurance products more affordable, effective and equitable thereby decreasing risk, enhancing farm income and profitability.
- Enhanced farmer employer-labor relationships that resulted in decreased costs, enhanced quality of product, and greater returns.
- Improved credit products and more affordable credit are readily available to producers.

DISCUSSION OF SPECIFIC EXAMPLES

Introduction: Farm and agribusiness management involve many choices in trying to attain optimum profitability. These choices involve the development and implementation of various business plans, finance plans, farm plans, decision-making processes and methods. It would be impossible to present all the research, extension and higher education efforts that would address this gamut of management issues in this area. However, examples of efforts that deal primarily with farm and agribusiness financial planning, specifically with regard to farm credit, crop and livestock insurance, and some aspects of farm financial management issues are provided. Improved decision-making capabilities for farmers, lenders, and agribusinesses are critical inputs to their business.

Improved profitability requires managers to make decisions; planning and monitoring helps inform decision-makers about appropriate alternatives; and improved analytical tools and their application assists in predicting how actions will affect firm profitability.

Credit education and risk: In the short-term, faculty from the University of Arkansas examined the knowledge gap between poultry contract growers in four states and their contractors (commonly referred to as "integrators" or poultry integrated firms). They developed a data collection method and an improved set of analytical tools to assess such things as annual net farm income, cash flow, returns to management and equity capital. This new knowledge assisted growers and integrators in contract negotiations. It provided them with a consistent baseline of comparison for use by lending institutions, and a more precise tool to evaluate loan applications for enterprise establishment or expansion. Additionally, the broiler producers and the integrators can utilize these new tools to better compare costs and returns and evaluate the future state of the existing industry and opportunities for expansion.

Another study conducted by faculty at Cornell University examined real-world determinants of credit risk, and found that lender risk ratings are more stable than those ratings based on credit scores estimated from financial statements, thus highlighting the importance that non-financial factors such as management capacity, character, and collateral play in the assessment of credit risk. Relative to the medium term, a University of Georgia study, conducted as part of a multiple-State Hatch Project (NC-221), introduced a "credit risk migration" framework to evaluate farm credit that differentiated between smaller farms and larger farm business growth strategies, debt management and the management of risk. This work resulted in the Farm Credit System institutions utilizing the credit migration framework to more precisely analyze their loan portfolios. In the long term, this framework will partially determine the regulatory requirements for economic capital held by financial institutions as mandated under the proposed New Basel Accord. This framework provides richer and broader information on the risk stability and quality of a lender's loan portfolio.

A great deal of research has been conducted that has short, medium and long-term outcomes for insurance product use. Developing actuarially sound crop insurance premium rates is particularly challenging for specialty crops or new crops where there is a minimal amount of history on which to base actuarial tables. Thus, another study utilized an econometric approach that resulted in a set of three parametric probability distribution functions so that models can accommodate any theoretically possible mean, variance, skewness, and kurtosis levels. As a set, they can precisely replicate the probability distribution of any random variable up to its fourth moment, providing a very useful tool for simulation and risk analysis. The researchers have tested and validated the models with Gauss Programs. This "real-world" simulation permits a more realistic representation of the yield and price distribution, which will result in a more actuarially sound crop insurance premium rates. This has significant implications for specialty crops and production methods that result in premium prices being received by producers.

Historically, rates have been set at average yield and price relationships that did not take into account premium prices actually received for higher valued sub-sets of crops (enhanced seed varieties, organically grown, naturally grown, etc.), a major criticism of crop insurance products. This new knowledge certainly has medium term and long-term implications as it provides for better products with more equitable premiums and thus provides producers with a better risk mitigation tool.

An Iowa State University researcher developed various crop and livestock insurance product rating techniques. Using a method that relies on a truncated normal distribution, they developed a new method for rating crop insurance products. The benefit of the new rating technique is that it does not rely on a formula and can be consistently applied to all unit structures. More importantly, they applied it to situations where adverse selection had altered the claims/premium relationship. As a result, an insurance product that was not existed because of adverse selection was now available to livestock producers. This is a classic example of a long-term outcome because the underlying conditions were changed by the research.

Faculty at North Carolina State University addressed a significant problem for farmers who grow new crops are subject to very high prices for insurance. The idea then was to determine if farmers who have a good history in growing one crop should receive premium discounts when producing another crop for the first time. The results, provided to the Risk Management Agency, suggested that, indeed, reduced premiums for such farmers were warranted and thus this approach permitted more accurate insurance rates and improved the operation of crop insurance programs.

Many issues in the formulation of insurance products and the setting of premiums for crops and livestock have been successfully addressed using new theoretical approaches in agricultural economics and econometrics. These developments have improved the understanding (short term outcome) of agricultural risks so that insurance providers are able to set insurance premiums (medium term outcome) more accurately. This in turn has assisted these insurance providers in providing better and more affordable (long term outcome) products that reduce the production, price, and revenue risks to farmers.

Industrialization: A study at Purdue University examined the implications of the industrialization of agriculture. Successful farm business managers were encouraged to better understand agricultural profitability and develop a long term or strategic farm management plan. One of the primary purposes of the project was to help producers understand the impacts of different production, pricing, cost management and investment decisions on their farms' financial performance. The DuPont profitability model was employed to facilitate the determination of the financial health of farm businesses. An objective of the modeling was to determine a farm's optimum level of debt. The project provided the underlying principles for managing debt in concert with equity. Critical to producers understanding these concepts are educational tools. Both formal and informal

ones assisted in establishing an appropriate debt-equity basis as part of the farm strategic or long-term farm financial plan.

Technology: The Center for Farm Financial Management at the University of Minnesota provides farmers and educators with expert farm financial management software and instruction. Likewise software programs at the University of Illinois, Iowa State University, Penn State University and many more have developed various analytical tools, record keeping systems, and other resources to assist farmers mitigate risk, much of it farm financial risk. The Western, Southern and North Central regions also have very active farm management Extension committees operating to ensure that the latest innovations and discoveries are discussed and passed on to other educators, farmers, agribusinesses and practitioners. These committees are made up of farm management specialists and experts.

Tax Implications: Another committee that was established in the late 1940's and continues to meet annually is the Extension Tax committee. This committee composed of agricultural tax experts from around the country works closely with the Internal Revenue Service in editing and recommending changes to IRS Publication 225, tax instructions for farmers and farm businesses. This committee provides valuable help on annual basis to the IRS in recommending changes to the publication for purposes of minimizing ambiguity. After spending a day with the IRS authors of the various sections of the publication, the committee then meets with the Congressional Joint Tax Committee staff to exchange thoughts and ideas regarding taxes specific to farmers and farm businesses. Additionally, work at the University of Wisconsin resulted in the development of new curricula for use by experienced income tax return preparers regarding the changes in income tax law. This new text was used in 24 States to teach 2-day tax schools for approximately 25,000 practitioners who prepare about 7.5 million income tax returns.

A study at the University of Minnesota examined the impacts of a "consumption tax" in a paper entitled, *Toward a Consumption Tax and Beyond*. This study contributed importantly to the knowledge of various policy makers as they weighed changing tax code and understanding what the costs and benefits of such a decision might be.

Work in Arkansas continues on the development of a tax model, which provides insight to State and local leaders on the consequences to business and residents of various tax policies and programs on revenue-generating capacity. There is a body of work dealing with alternative tax policies implications on how forestland owners manage their parcels. Such work is key in achieving the larger public goals of meeting environmental regulations that, for instance, help in the restoration of the Chesapeake Bay.

Risk Management: The CSREES Extension Risk Management Education (RME) Program, carried out through four regional Risk Management Education Centers provided competitive RME grants that address financial risk management issues. The

Program has as its primary goal the development of educational materials to help producers better manage their farm financial risk. The Agricultural risk Protection Act, establishing the CSREES' RME Program notes that funds provided are to be used "…*for the purpose of educating agricultural producers about the full range of risk management activities, including futures, options, agricultural trade options, crop insurance, cash forward contracting, debt reduction, production diversification, farm resources risk reduction, and other risk management strategies."*

From the onset of the RME Program, stakeholders and the four regional directors understood the importance of having a user-friendly way of dispersing results of funded projects. As a result, the Agricultural Risk Library was established through the CSREES RME Competitive Grants Program at the University of Minnesota. All materials developed with RME regional grants are available in the library. Subsequently, the Digital Center for Risk Management Education was established through a competitive grant to provide electronic support to the four regional centers. What has resulted is a sophisticated electronic center that provides access to all the regional Requests for Applications (RFA). All proposals are submitted through the Digital center electronically and from there, distributed to the regional centers and reviewers.

Perhaps most significant has been the development of a results verification system. The system takes materials submitted in proposals, and automatically creates a reporting template for every funded project based on this information. This reporting template is user-friendly and is used by the grantee to prepare progress reports (2 annually) and the final report that measures impacts against project objectives. This verification system puts in practice an underlying principle of the RME Program, namely that the centers fund projects and the return on that investment is the enhanced ability of producers to manage risk. This is documented by the verification system.

During its first year, RME grants wnt to public and private organizations located in 49 States and the Virgin Islands. A total of 120 projects were funded and began in the spring 2002 and winter 2002-2003. Between 120-150 projects of varying amounts have been funded annually with the exception of FY 2002 (when funds were reduced by the Congress).

SUCCESS STORIES

There are many projects pertinent to Knowledge Area 602. Projects used various methods of analysis to develop more precise ways to measure costs and returns to agribusiness, provided improved information to growers, integrators, and the farm lending community. Such information had a positive impact upon decision-making and credit availability. Other work resulted in an alternative to assess the state of lender loan portfolios that assisted them in more precisely understanding various ratios, thereby

permitting them to improve the state of their portfolios. The "credit risk migration" framework is one that is being adopted by the Farm Credit System as an improved portfolio assessment tool. Economic and econometric theory was utilized to better understand more completely underlying conditions in the insurance industry and insurance products. This led to the development of new analytical methods that have resulted in improved crop and livestock insurance products. As a result, the partnership made significant contributions in improving crop and livestock insurance products by identifying new methods to assess premiums, and this in turn, led to enhancing the profitability of producers and insurance providers.

The National Agricultural Risk Education Library has been highly successful. This Digital Center for Risk Management Education was first established in 2003 with funds provided competitively by CSREES. In addition, the Center also provides a web site that has become the focal point of risk management conferences involving academic research and cooperative extension efforts.

NEW DIRECTIONS

Research, extension and higher education activities in the future will continue to be directed toward a greater understanding of and the development of enhanced decision-making tools for use by producers, agribusiness leaders, and policy makers that will incorporate the ever-increasing complex relationships between government, farmers, agribusinesses, consumers and the external factors.

TRANSITION OF EDUCATIONAL RESOURCES TO MEET THE CHANGING NEEDS OF AGRICULTURAL MANAGEMENT

In 1987, the USDA provided a Challenge Grant to the Lincoln Institute of Land Policy to manage the Agribusiness Education Development Project. As a result, the National Agribusiness Education Commission published a report in 1989 setting directions for agribusiness education. More recently, CSREES has funded comprehensive reviews and development of strategies for food and agribusiness management education in the United States. Over the strategic period of interest, FY 2000 to 2004, educators of agricultural management have continued to transition their curricula in a manner to more effectively address the needs of future agricultural professionals. Efforts were made to improve the curricula and teaching of financial and risk management skills, as well as to encourage entrepreneurship and business leadership skills.

CSREES has also modified its programs to reflect the growing needs of the agricultural and business communities by adding a new NRI program dealing with Small Farms. In addition, the SBIR Program was modified to include a new program area dealing with small and mid-size farms with emphasis on development of new agricultural enterprises, new management tools,

more efficient use of resources, and new educational tools to help farmers gain the information they need to operate their farms on a sustainable and profitable basis. In collaboration with land-grant universities and other partners, CSREES also helps rural entrepreneurs capitalize on local opportunities in three specific ways: (1) providing educational opportunities to improve business skills; (2) helping entrepreneurs acquire sufficient assets to invest in new enterprises; and, (3) identifying, through research, specific areas where rural entrepreneurs need the most assistance. For example, the percentage of agricultural economics programs requiring agribusiness management courses increased from 25.9% in 1985 to 64.9% in 2003.

John Hall, a visionary Extension agent in Kent County, Maryland, wanted to identify alternatives that would help farmers receive higher prices and greater profitability. He realized there was a greater potential for achieving these aims by developing new products and markets for Peninsula farmers, so he started Chesapeake Fields, a set of non-profit and business organizations for local farmers, businessmen, economic developers, and others. Closely involved in this effort was a large farming operation in Eastern Virginia that realized growing commodities resulted in "lowest denominator prices" but products received premium prices.

Over time, three organizations were formed:

1) The Chesapeake Fields Institute, a 501[c] 3 organization for the purposes of researching agronomic and economic questions, and developing an education entity, The National Center for Agricultural Education;
2) Chesapeake Fields Farmer, LLC, the product development and marketing arm for Chesapeake Fields; and
3) Chesapeake Fields Farmers Cooperative, a cooperative formed by farmers participating in the Chesapeake Fields business and management activities.

Chesapeake Fields Farmers LLC owners, include the Chesapeake Fields Institute, Chesapeake Fields Farmers Cooperative and the public, each owning 1/3 of the LLC. The Institute, working with Montigue Farms of Virginia, has been growing a human-consumable soybean variety (Natto variety), all of which is exported to Japan. This has required on-farm segregated storage to meet strict quality and harvesting timing standards, required new practices that must be strictly adhered to by farmers, and on-farm investment in on-farm storage facilities. In addition, as a result of various research projects sponsored by the Chesapeake Fields Institute, a particular wheat variety has been identified and marketing opportunities for specialty par-baked breads, a bakery is in the works to process and produce par-baked bread for high-end restaurants and stores.

OUTPUTS

- Determined the state of agribusinesses and farm management to identify new skill and knowledge needs to successfully compete in a global economy

- Identified barriers to entrepreneurial development and agribusiness and farm management
- Identified potential profitable marketing opportunities and developed relevant market information to take advantage of those markets.
- Specified the appropriate educational needs of target audiences (producers, in-service extension personnel, agribusiness, and agribusiness related businesses) in order to develop and teach the skill sets necessary to take advantage of new and potential marketing opportunities.
- Determined new skill sets required of research, education and extension personnel to maintain relevance to the business and managerial needs of producers and related agribusinesses as related to rural community development and well-being.
- Developed new models of production and marketing application of new models to take advantage of marketing opportunities, and identified training and demonstration needs of producers.
- Identified new and articulated farm worker skill sets necessary to meet labor needs of new value-added production systems and agribusiness.
- Offered opportunities for doctoral and masters students to develop an expertise in disciplines identified as a national need area, e.g. agribusiness management, marketing, markets and trade policy and information systems.
- Provided entrepreneurship education opportunities to minority students by initiating faculty development activities, and developing new courses and tracks in entrepreneurship within MBA/MS programs.
- Developed needed directions for agribusiness, food and agribusiness management education.
- Produced new faculty and transitioned existing faculty qualified to teach entrepreneurship.
- Matriculated 8-12 doctoral students per year trained in agribusiness management, marketing, and related fields.
- Provided diversified and skilled management and administrative techniques to the agricultural labor force.
- Increased number of qualified applicants available for employment in agribusiness firms, academic institutions, and other public and private organizations.

OUTCOMES

Short-Term

- Academic leaders gained a greater awareness for and appreciation of new curricula needs to train future academicians, agribusiness and small business entrepreneurs.

- Business leaders gained better skills and knowledge required to better cope with increased competition in the agricultural and agribusiness sectors.
- Improved the understanding and knowledge of agribusiness leaders, educators and policy makers about the state of agribusiness education and the challenges to creating the skilled labor force needed by the industry.
- Enhanced the understanding of agribusiness leaders, educators, and education policy leaders the importance of diversification of markets to lessen risks associated with only one major market.
- Agribusiness labor force has greater ability to meet new challenges and take advantage of opportunities offered in agricultural and agribusiness.

Medium Term

- Revamped the agricultural economics education to better meet the needs of the industry and government.
- Farmers adopted new ways to approach marketing, development of higher quality products, and changes in various practices to achieve greater profitability.
- Farmers and agribusiness managers adopted improved business management and planning strategies to achieve greater profitability.

Long-Term

- Farms, agribusiness and other businesses make more effective decision-making thereby enhancing profitability.
- Producers and agribusinesses serve new markets, gain premium prices and greater profitability.

DISCUSSION OF SPECIFIC EXAMPLES

In 1999, the University of Minnesota received a National Needs Fellowships grant to develop expertise in firm, market and international issues related to the supply chains for agricultural producers. The University appointed three National Needs Fellows (two females) who received rigorous training in economic theory and quantitative techniques and specialized training in the production and managerial economics, consumption and marketing economics, and trade and development. One Fellow has graduated and is employed at a Land-Grant University. The remaining two Fellows will be graduating within the next twelve months, thus increasing the number of qualified applicants available for employment.

A Capacity Building Grant provided in 2004 is helping South Carolina State University enhance its general curriculum in agribusiness by developing a graduate track in agribusiness entrepreneurship and an Agribusiness Enterprise Development Center.

South Carolina State University has one of the few MBA in Agribusiness programs in the country that is housed in an AACSB accredited College of Business. From a short term perspective, the grant has helped to develop a new curriculum and an MBA program in agribusiness/entrepreneurship has been developed. Four faculty members have attended entrepreneurship seminars at Case Western Reserve University and Syracuse University. The first group of MBA students was admitted to the program in August 2005. Most of the students are from South Carolina and the Southern states. In a longer term perspective, when the students graduate in two years, their training in agribusiness and entrepreneurship will help to enhance the profitability of farms and small business.

To follow-up on the work conducted by the Lincoln Institute of Land Policy through a USDA Challenge grant provided in 1987, Kansas State University received a Challenge Grant in 2002. As a result the "National Food and Agribusiness Management Education Commission" (NFAMEC) was established to conduct a comprehensive review the state of the food and agribusiness management education in the United States. The Commission, comprised of several agribusiness leaders in academic institutions, industry and the USDA organized a pre-conference at the August 2004 annual meetings of the American Agricultural Economics Association and has brought forward recommendations for the next 15 years. The Commission provided various faculty teaching aids and resources for teaching the increased number of agribusiness courses being offered at land-grant universities, developed a summary of the executive education programs, and a summary of the agribusiness curriculums. A follow-up symposium on implementing the recommendations, with participation from CSREES, is scheduled for August 2006 annual meetings of the American Agricultural Economics Association. In the long run, the recommendations for improvements in teaching in agribusiness management degree programs and executive management programs should enhance effective decision making in producer and agribusiness organizations. While the outcomes of this effort cannot yet be quantified, the effort was initiated within the realm of the time frame of this portfolio analysis, and was thought to be significant enough to incorporate the effort in this portfolio description.

Another project that examined the needs of entrepreneurs and small business owners involved a group of universities in a multistate Hatch research project entitled "Family Business Viability in Economically Vulnerable Communities." The idea was to determine the economic contribution of small and family businesses to local economies, and to develop relevant continuing education materials for business owners and operators, farmers, political leaders and others to either develop new business skills or enhance those in existence. From a short-term perspective, the project has provided academicians, business owners and their families' key information pertaining to success and failure of small, family owned businesses. From a longer term perspective, small business owners and producers are adopting new technologies and business practices thereby enhancing their profitability.

A final discussion deals with transitioning business operations to adopt new practices and adhere to higher product standards to take advantage of niche markets and international trade opportunities. Chesapeake Fields Institute undertook the research to figure out the practices that producers would need to adopt in planting, harvesting, storing and segregating product to satisfy higher quality standards to enter restricted markets. Chesapeake Fields looked only those commodities that participating farmers could produce using the equipment currently used in a grain agricultural economy. As a result, capital investments are minimal relative to the potential for farmers receiving premium prices. So the educational effort concentrates on handling new varieties keeping them segregated from other seeds, harvesting on a time schedule to maximize quality attributes demanded by individual buyers, investing in on-farm storage to maintain segregation in storage, and such things as thoroughly cleaning combines prior to harvesting specialty grains.

SUCCESS STORIES

Thirteen land-grant institutions participated in the "Family Business Viability in Economically Vulnerable Communities" a multi-state project headquartered in the Northeast but involving 11 universities located around the continental United States, Hawaii and Alaska. The project undertook detailed studies of 794 family businesses since 1987, and documented that more than 18 million U.S. households (almost 14 percent of the total) own at least one business and together represent about half of both the nation's gross domestic product and total wages. The studies carried out as part of this project evaluated not only the economic impact of family businesses, but also the relationships among the family, the business, and the community. In 2001, the Project received the Northeast Regional Agricultural experiment Station Directors Research Award for Excellence. Primarily for quantifying the economic and social contributions of family businesses to their local, state and national economies and communities; for developing state extension materials for business owners, their families and policy makers; and for producing numerous academic publications on family functioning, management and business viability. As a result, of what was originally deemed a research project to create new knowledge about what makes some businesses more successful than others, the expansion of the project to a national perspective has resulted in new knowledge, and from an education curriculum has been produced to help participants improve their operations.

The realistic yet challenging vision of John Hall and farmers participating with Chesapeake Fields LLC is becoming a reality due to careful planning, and the involvement of key business, farming, and economic development leaders in the region. More emphasis is being placed on the actual needs of farmers as opposed to the perceived needs, and consequently more relevant and pertinent research, education and extension programs are being developed and implemented. While not the equivalent of a radical

new theory, it is nevertheless an innovative shift in resource allocation to practical and timely solutions for current agribusiness and agricultural problems.

The University of Florida is representative of a number of universities that have strengthened their educational programs by providing greater emphasis to train Masters-level students in agribusiness management and marketing management topic areas. The University's Food and Resource Economics Department has designed a program to graduate 4 National Needs Fellows each year. Another example is a program at Cornell University in cooperation with the 1890 universities that deals with successful entrepreneurship. The 1890 Entrepreneurial Outreach Initiative to provide business training and education to rural entrepreneurs in those communities that have the most economic need. The program develops and assists businesses and future entrepreneurs in underserved, targeted rural communities in the South. Other such programs involve community colleges in many areas of the country that have and are developing programs specifically to assist small business owners and entrepreneurs.

The Trade Adjustment Assistance Program provides technical assistance to farmers and fishermen on how to successfully adjust to import competition. The development and delivery of this technical assistance is coordinated by the regional Risk Management Education centers. As part of the technical assistance workshops provided for all eligible applicants, the participants were asked if they desired additional, more intensive technical assistance "customized" for their business or farming operation. The idea was to follow up to the more general options presented in the workshops, and to assist farm and business operator to actually develop and implement business, financial, and other plans that would better enable those participating to successfully adjust to import competition, and in doing so, enhance the profitability of their businesses. Sixty percent of those attending the original workshops expressed interest in receiving more intensive technical assistance.

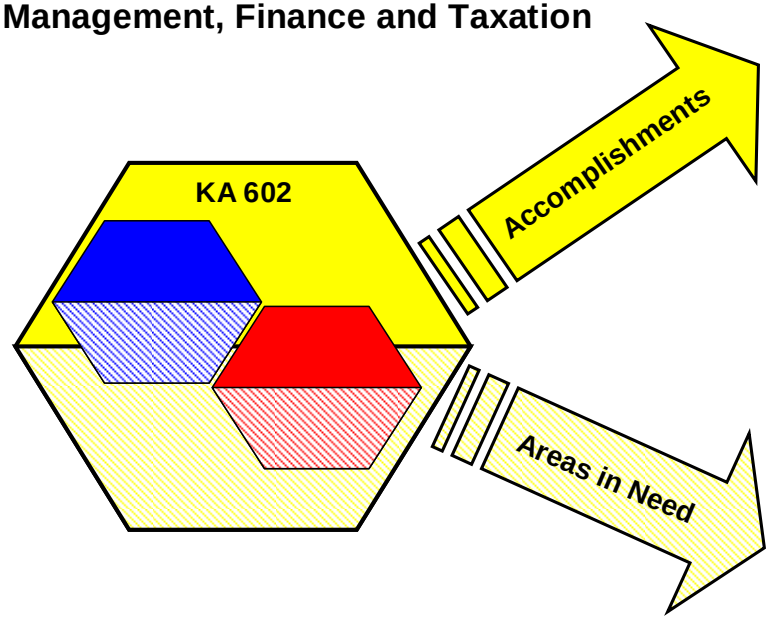
As a result, an Intensive Technical Assistance (ITA) Program was developed as Phase II technical assistance under the Trade Adjustment Assistance Program. The ITA Program has been initially funded at $6 million ($3 million in FY 2005 and another $3 million in FY 2006), and will provide farmers and fishermen business planning products and implementation assistance, specific to their business. All information of a non-proprietary or non-confidential nature will be archived at the Digital Center for Risk Management Education for use by all interested parties. The Digital Center has been charged with coordinating the ITA Program, which will be carried out through the four regional Risk Management Education centers. The materials produced will be available to all interested parties through the Digital Center.

NEW DIRECTIONS

CSREES and the partnership is placing greater emphasis on being more directly involved in understanding the business management needs of farmers and agribusinesses, particularly as a number of external factors continue to create uncertainty, not only within the agricultural sector but as importantly, within the political institutions at the local, State and Federal levels as well. Thus new directions must involve the understanding of the sources of uncertainty; develop meaningful models to estimate the "what ifs"; and to develop the educational curricula to transfer this knowledge. It must develop models to provide quick yet realistic implications of alternative developments, and Extension efforts to convey information needed by producers and business to adjust their production and marketing strategies to take advantage of any opportunities presented. Skill in the use of management techniques, yet flexibility in operating farm or agribusinesses will be required to take advantage of these types of opportunities in the future. In addition, these business opportunities may increasingly involve collaboration with non-traditional federal, state and local partners.

Figure III-9

Knowledge Area 602: Business Management, Finance and Taxation



KA 602 - Major Themes

Development and Adoption of Decision-Enhancing Tools and Techniques to Improve the Competitiveness of Farmers and Agribusinesses

Transition of Educational Resources to Meet the Changing Needs of Agricultural Management

- Family Business Viability in Vulnerable Communities project – a detailed study of 794 family businesses that documented the economic impact as well as the relationship between the family, business & community.
- The encouragement of new agricultural business models like that of Chesapeake Fields LLC.
- A U. of FL. program was developed to train Masters-level students in agribusiness mgmt. and marketing management.
- Another U. of FL. program was developed to graduate four National Needs Fellows each year.
- A Cornell U. program in cooperation with 1890s universities provided business training & education to rural entrepreneurs in communities with the most economic need.
- The Intensive Technical Assistance Program (Phase II) has been funded at $3 million in FY 2005 and $3 million in FY 2006
- Development of programs and methods to analyze the effects of uncertainty & risk on production & marketing strategies.
- Creation of educational curricula that can educate future producers and businesspersons models and strategies to address uncertainty, alternative developments in management that provide firm yet flexible methods for operating a farm or agribusiness.

Knowledge Area 609: Economic Theory and Methods

OVERVIEW

The most important methodological issue concerning economics involves the simplification, idealization, and abstraction that characterize economic theory and consequent doubts whether theory is well supported. If claims are not universal generalizations, what is their logical form? How can claims and generalizations be tested and confirmed or rejected? These problems challenge theoretical and applied economists (see Philosophy of Economics, http://plato.stanford.edu/entries/economics/).

CSREES-funded work in Knowledge Area 609, Economic Theory and Methods, is exclusively research based, and includes the development of economic theory and quantitative methodologies to improve the fundamental knowledge base in a variety of economics-related topics, exclusive of applied economics. The focus of the research work is to further and refine the understanding of the theoretical basis of economic behavior at both the macro (aggregate) and micro (farm, firm, and family) levels.

Economic theory and methods research is usually conducted in consort with other, more applied work, primarily focusing on economics. This in not unexpected given the mission of CSREES and its funding authorities, and the highly applied nature of agricultural and resource economics as a sub-discipline of economics. Economic theory and methods research is also conducted in collaboration with the plant and animal sciences, forestry, natural resources, consumer and family sciences, engineering, food manufacturing, nutrition and food safety, youth, and communities.

An eloquent description of the integration of theoretic and applied economics is provided by the world renowned economist Wassily Leontief:

> An exceptional example of a healthy balance between theoretical and empirical analysis and of the readiness of professional economists to cooperate with experts in the neighboring disciplines is offered by Agricultural Economics as it developed in this country over the last fifty years. A unique combination of social and political forces has secured for this area unusually strong organizational and generous financial support. Official agricultural statistics are more complete, reliable, and systematic than those pertaining to any other major sector of the economy. Close collaboration with agronomists provided agricultural economists with direct access to information of a technological kind. When they speak of crop rotation, fertilizer, or alternative harvesting techniques, they usually know, sometimes from personal experience, what they are talking about. Preoccupation with the standard of living of the rural population has lead agricultural economists into collaboration with home economists and sociologists, that is, with social scientists of the "softer" kind. While centering their interest only on one part of

> the economic system, agricultural economists demonstrated the effectiveness of a systematic combination of theoretical approach with detailed factual; analysis. They also were the first among economists to make use of the advanced methods of mathematical statistics. However, in their hands, statistical inference became a complement to, not a substitute for, empirical research" (see Theoretical Assumptions and Nonobserved Facts, *American Economic Review* 61 (1971): 1-7).

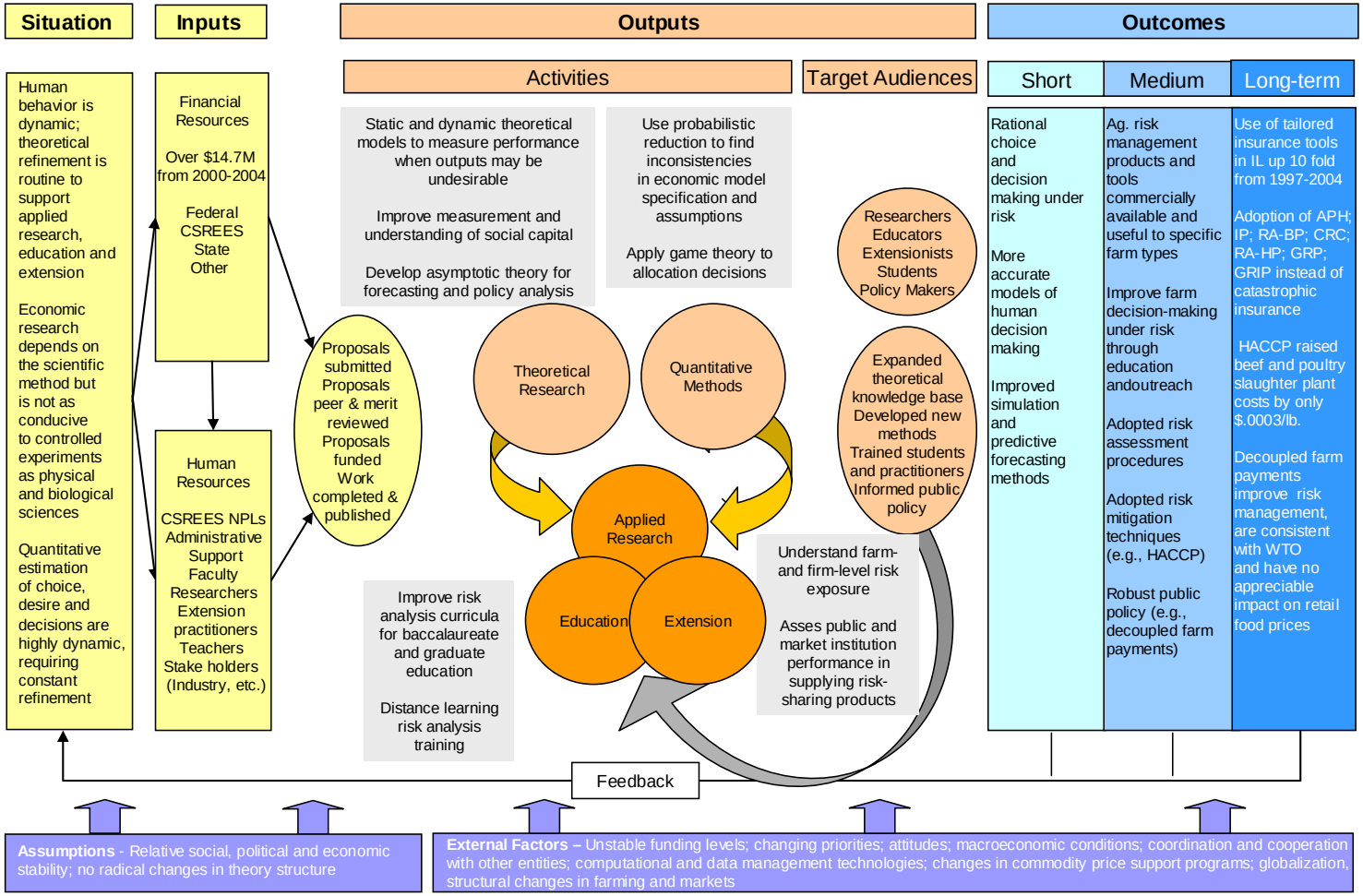
Broad areas of CSREES-supported economic theory and methods work include, but are not limited to:

- Property rights, including intellectual property rights
- Public choice
- Labor economics
- Welfare economics
- Location and decision theory
- Trade adjustment alternatives
- Econometrics and simulation
- Mathematics and statistics for economic research
- Data collection and research methodology for economic research
- Economic history and philosophy

About 10 per cent of the work currently reported under KA 609 is fully and exclusively theoretical discovery research and methods development. Agency sponsored work is typically funded through the competitive National Research Initiative, and from merit reviewed Hatch Act projects and special research grants from Agricultural Experiment Stations at land grant universities. The remaining research, funded from a variety of sources, is cross listed with other more applied Knowledge Areas, integrating other economic topics (600 Series KAs) as well as broader mission-oriented agricultural topics including natural resources, the plant and animal sciences, food processing and food safety, and human, rural and community development. The latter work often includes a theory component to assure that applied research is conceptually appropriate, and that appropriate and cutting-edge quantitative methods are employed. This applied research directly supports higher education and extension functions.

Figure III-10

Portfolio 2.1: Expand Economic Opportunities through Economic and Business Decision-Making
KA 609 – Economic Theory and Methods



SITUATION

Economics research depends on the scientific method and research protocols but, like the other social sciences, it is not as conducive to controlled experimentation as are the physical and biological sciences. Specifically, in all but the most extreme cases it is impossible to conduct fully controlled social science experiments on people by isolating control and treatment groups from exogenous influences and interventions. Consequently, applied economics depends very heavily on complex simulation, sophisticated mathematical estimation and predictive forecasting. Economic experiments are sometimes used as an effective interactive classroom teaching tool, but true experimental economic work is still somewhat limited in application.

Theoretical refinement is routine to support applied research, higher education, and extension, especially as pertains to the quantitative estimation of human choice, desire and decision-making as these are highly dynamic and personal activities that resist qualitative categorization, generalization, testing and confirmation. As a result, both macroeconomic and microeconomic theory and analytic methods are under constant improvement to better describe and more fully understand human behavior regarding choices.

The outputs of economic theory work are juried and peer reviewed articles published in international, national, and regional scholarly journals. Outcomes result when targeted audiences incorporate the knowledge in their classrooms and investigations, or it is interpreted and properly communicated to policy makers who then use it as a basis for making decisions. Thus, the ultimate beneficiaries are the recipients of education and extension and those who are impacted by applied research and development, but time lags and diffusion effects make direct linkages difficult to track, since social science research typically does not result in patentable products or services directly traceable to the initial research activities.

ASSUMPTIONS

While there a number of theoretical approaches to economic and mathematical thinking, and similar perspectives about human and institutional behavior, relative social, political and economic stability, and no radical changes in theory structure of such a scale that would render contemporary work obsolete are assumed for the foreseeable future.

EXTERNAL FACTORS

A number of exogenous factors impact the capacity to conduct fundamentally theoretical work. These include funding levels; changing priorities; attitudes; macroeconomic conditions; coordination and cooperation with other entities; computational and data management technologies; changes in commodity price support programs; globalization; and structural changes in farming methods and techniques and markets.

INPUTS

Funding from all sources fluctuated but generally grew over the review period, reflecting funding availability, changing needs, and priorities. State appropriations accounted for about 59 per cent of the total, and represent the fastest growing component of this research funding stream. Other USDA funding includes Forest Service, Risk Management Agency, and Rural Development; other federal includes National Science Foundation, and Department of Energy; and other non-federal includes private foundations, industry, and farm, commodity or similar organizations.

Table III-9

Sources of Funding, KA 609, Economic Theory and Methods, FY 2000 - 2004						
Funding Source	Fiscal Year *(in $ thousands)*					
	2000	2001	2002	2003	2004	Total
CSREES	354	572	461	929	646	2,962
Other USDA	30	44	152	75	230	531
Other Federal	242	394	47	369	237	1,289
State Appropriations	700	1,561	1,960	2,010	2,457	8,688
Self Generated	6	39	21	98	38	202
Independent/GR Agreement	30	59	271	88	149	597
Other Non-Federal	118	62	149	96	96	521
Total KA 609	1,480	2,731	3,062	3,665	3,852	14,790
CSREES % of Total	23.9	20.9	15.1	25.3	16.8	20.0

Source: CRIS and FHIST databases.

CSREES invested a total of $2.292 million for KA 609 from fiscal year 2000 through 2004, an average of $592,400 per year. The CSREES contribution is about 20 per cent of the total of $14.70 million from all sources over the 5 year-span. The majority of CSREES support for this KA is Hatch Act funds allocated directly by State Agricultural Experiment Stations. Hatch funding doubled over the review period, to $508,000 in 2004. National Research Initiative funding varied, averaging about 21 percent of the CSREES total investment (approximately $125,000 annually). The variation in NRI funding is primarily due to the allocation of dedicated funding, and the number and quality of proposals received and recommended for funding.

Table III-10

CSREES Funding, KA 609, Economic Theory and Methods, FY 2000 - 2004						
Funding Source	Fiscal Year *(in $ thousands)*					
	2000	2001	2002	2003	2004	Total
Hatch	250	391	394	503	508	2,046
McIntire-Stennis	14	11	12	1	1	39
Evans Allen	0	0	0	0	0	0
Animal Health	0	0	0	0	0	0
Special Grants	0	0	0	40	36	76
NRI Grants	90	106	44	281	101	622
SBIR Grants	0	0	0	0	0	0
Other CSREES	0	64	11	104	0	179
Total	354	572	461	929	646	2,962

Source: CRIS and FHIST databases.

There were approximately 160 active economic theory and methods related projects reported in CRIS during the 2000 – 2004 portfolio review period, of which 10 per cent are exclusively coded as Knowledge Area (CRIS Research Problem Area) 609. No multi-state research committees currently focus exclusively on economic theory and methods.

As might reasonably be expected, the majority of the cross-listed economic theory and methods research projects reported in CRIS include other related areas of economics, but approximately 10 per cent of the cross-listed projects are also linked directly with other knowledge areas outside of the discipline of economics.

Table III-11

KA 609 Research Cross Listed with Other Knowledge Areas, and Theoretical Theme or Topic		
KA	Title	Theme or Topic
102	Soil, Plant, Water, Nutrient Relationships	Statistical estimation methods
111	Conservation and Efficient Use of Water	Game theory; Optimal control modeling
112	Watershed Protection and Management	Policy effects simulation; Impact modeling
131	Alternative Uses of Land	Willingness to pay; Valuation
133	Pollution Prevention and Mitigation	Game theory; Optimal control
135	Aquatic and Terrestrial Wildlife	Valuation; Fee systems
216	Integrated Pest Management Systems	Value of research; Population distribution of benefits
401	Structures, Facilities, General Purpose Farm Supplies	Valuation of non-destructive technology
404	Instrumentation and Control Systems	Valuation of non-destructive technology
501	New and Improved Food Processing Technologies	Competition
503	Quality Maintenance in Storing and Marketing Food Products	Modeling optimization; Organizational structure; forecasting
601	Economics of Agricultural Production and Farm Management	Institutional structure; Simulation; Risk assessment; Input modeling
602	Business Management, Finance, and Taxation	Structural modeling; Price variability; Decision variability under uncertainty
603	Market Economics	Productivity modeling; Performance simulation; Policy impacts model; Predictive Methodologies; Economic model refinement
604	Marketing and Distribution Practices	Model relationship of economic, demographic & consumer factors; Vertical & horizontal structural models; Market access
605	Natural Resource and Environmental Economics	Natural resource pricing performance; Policy simulation; Pest risk decision simulation; Invasive species as trade barriers; Decision strategies; Policy decisions under uncertainty
606	International Trade and Development	Policy decisions under uncertainty; Industrial organization; Transactions costs; Trade restraints
607	Consumer Economics	Welfare economics; Model temporal aspects of consumer choice; Health and food stamp correlations; Error correction in modeling; Demand attributes
608	Community Resource Planning and Development	Spatial dispersion; Migration modeling; Policy simulation; Predictors of public value; Cluster analysis
610	Domestic Policy Analysis	Consumer perceptions; Improved equation systems; Employment modeling and forecasting

611	Foreign Policy and Programs	Trade modeling; Economic/Hydrologic models; Trade performance; Measure producer & consumer surplus (trade costs & benefits)
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	Risk analysis; Curriculum development; Economic agroterrorism model; Competitiveness
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	Risk analysis; Curriculum development; Economic agroterrorism model; Supply chain management
802	Human Development and Family Well-Being	Activity structures (youth, education)
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	Population out-migration modeling; Property rights; social capital; Labor compensation; Labor market efficiency
805	Community Institutions, Health, and Social Services	Economic, social & fiscal impact modeling; Activity structures (youth, education)
901	Program and Project Design, and Statistics	Predictive modeling; Modeling causal systems; Forecasting performance; Temporal market modeling (continuous-time)
902	Administration of Projects and Programs	Research impacts; Spatial & temporal distribution of benefits; Economic gains; Public research incentives; Public-private relationships; Game theory
903	Communication, Education, and Information Delivery	Risk analysis; Education

Source: CRIS

Baccalaureate and graduate degrees in economics are awarded by hundreds of public and private colleges and universities. The more applied Agricultural Economics and Agribusiness degrees are awarded by public institutions (primarily, but not exclusively Land Grant) in the United States. Approximately 45 of them offer graduate degrees. All economics curricula include a fundamental emphasis on economic theory and methods, which progressively increases at the graduate degree levels.

Table III-12

Degrees Awarded in Agricultural Economics, 1992 - 2004				
Graduation Year	Baccalaureate	Masters	Doctorate	Total
1991-1992	1,487	449	139	2,075
92-93	1,566	425	144	2,135
93-94	1,368	454	166	1,988
94-95	1,346	433	169	1,948
95-96	1,155	425	193	1,773
96-97	1,074	359	137	1,570
97-98	1,120	402	178	1,700
1999-2000	934	337	150	1,421
00-01	900	346	165	1,411
01-02	860	316	135	1,311
02-03	817	168	85	1,070
03-04	670	244	72	986
04-05	754	265	74	1,093

Source: Food and Agriculture Education Information System

The trend all of these degrees is down, although there are some indications that this may have bottomed out. By-the-same-token, agricultural business degree awards, particularly baccalaureate and master's degree awards appears to have remained steady, although there is insufficient data to claim any trend. These curricula also include an economic theory component. To an extent, interest in this degree may be displacing some students from traditional agricultural economics degrees, but it has also greatly expanded overall enrollment in the more broadly defined management sciences in a time when career opportunities are projected to continue expanding.

Table III-13

Degrees Awarded in Agricultural Management and Business* 2002 - 2004					
Graduation Year	Associate	Baccalaureate	Masters	Doctorate	Total
2002-2003	37	2,667	332	108	3,144
03-04	23	3,103	458	101	3,691
04-05	85	2,598	369	81	3,133

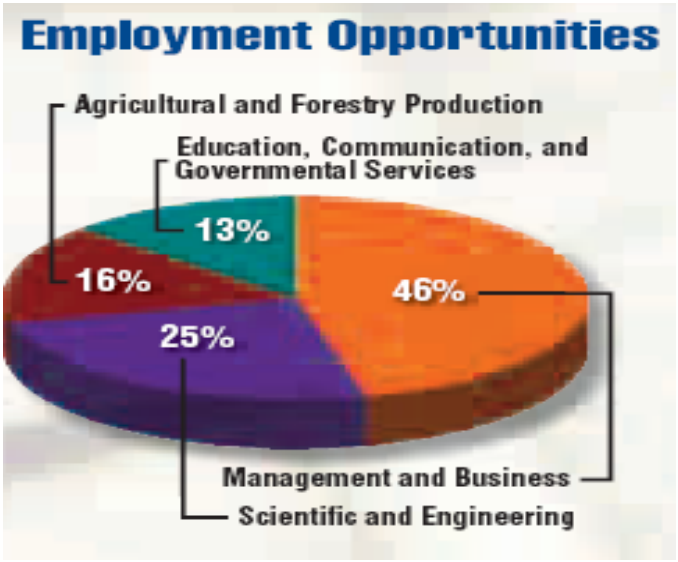
* Includes Agricultural Business & Management, Agribusiness/Agricultural Business Operations, Agricultural Economics, Farm & Ranch Management, Agricultural/Farm Supplies Retailing & Wholesaling, Agricultural Business Technology, and Other Agricultural Business & Management.
Source: Food and Agriculture Education Information System

Employment Opportunities in Food and Agricultural Management and Business

An expected 24,000 annual job openings in food and agricultural management and business are projected during the period 2005-2010. Of all projected jobs for college

graduates in the food, agricultural, and natural resources system, just under half (46 percent) are in the food and agricultural management and business occupations. During the same period about 22,000 graduates with expertise in the areas of management and business (including, but not limited to, Agricultural Economics, Farm and Ranch Management, Agricultural/Farm Supplies Retailing and Wholesaling, Agricultural Business Technology, Agribusiness/Agricultural Business Operations, and other Agricultural Business and Management) are projected. Source: http://www.csrees.usda.gov/newsroom/news/csrees_news/USDA_05_Report2.pdf

Figure III-10 - Employment Opportunities in Food & Agriculture



Source: http://www.csrees.usda.gov/newsroom/news/csrees_news/USDA_05_Report2.pdf

OUTPUTS

The primary output of theoretical research is juried, peer reviewed articles in recognized scientific journals. During the review period research projects exclusively coded as Economic Theory and Methods averaged 9.3 juried articles in recognized journals per project. While, a careful literature search has not been done, it appears many works that actually belong in this KA were cross-listed with other topics of economics in other KAs and portfolios. Consequently, other Knowledge Areas seem to have a larger number of referred articles due to their being directed toward broader audiences, as well as more opportunities to publish in the more applied scientific journals.

The CSREES reporting system does not currently support bibliometric citation searches making it difficult to monitor the progression of Agency-supported research through the literature. It is similarly difficult to directly trace research integration into undergraduate and graduate curricula, and to extension audiences. However, since the majority of land grant college of agriculture faculty hold joint academic appointments (research/teaching, research/extension, occasionally teaching/extension, and, more rarely, three-way

teaching/research/extension appointments) the connection between the researcher and the classroom and the extension audience is historically a strong one.

UNDERSTANDING RISK

The media frequently reports scientific findings about risks to human well being and to the environment. During any given week, there may be reports about risks of climate change, breathing polluted air, crop failures, or eating contaminated food. Risks that concern the government (USDA, Environmental Protection Agency, and other agencies) are often based on risk assessments, but it is not easy to understand what this is, how it is conducted, and what individuals and communities can do to mitigate them. Coping with risk can be complex and controversial. Government and industry have devoted considerable resources to developing and applying techniques of risk analysis and risk characterization to make better informed decisions about hazards to human health, welfare, and the environment, yet the methods sometimes fail to meet expectations that they can improve decision making. One reason lies in inadequacies in the techniques available for analyzing risks. A second is the fundamental and continuing uncertainty in information about risks. Another, less appreciated reason is a basic misconception of risk characterization, often perceived as a summary or translation of results of technical analysis for the use of a decision or policy maker. Risk characterization may fail for two reasons: it may portray scientific and technical information in a way that leads to unwise decisions, or it may provide such information in a way that is not useful for the decision maker. Although failures do occur, an overlooked danger to risk decision-making is misconceptions about how risk characterization should relate to the overall process of comprehending and dealing with risk (from National Academy of Science Commission on Behavioral and Social Sciences and Education, 1996: Understanding Risk: Informing Decisions in a Democratic Society; National Academies Press http://www.nap.edu/books/030905396X/html/1.html).

CSREES-sponsored research on risk covers a variety of topics including agricultural production and prices, health and food safety, environmental issues, and risk assessment. Much of this work is conducted in collaboration with other departments, agencies, industry and other affected parties.

OUTPUTS

Over 40 insurance related journal articles, monographs have been prepared, peer reviewed and made available to researchers, the insurance industry, and government policy, regulatory and compliance agencies, including the USDA Risk Management Agency (see below). Much of the research work on crop insurance dealt with reducing moral hazard (the risk that a party to a transaction has not entered into the contract in good faith, provided misleading information about its assets, liabilities or credit capacity, or has incentive to take unusual risks in a desperate attempt to earn a profit before the contract settles), and adverse

selection (a situation where the people who actually take out insurance policies are more likely to make a claim than the hypothetical population of people used by the insurers to establish their rates).

When theoretical work on risk is integrated with extension work, or gets involved with farmer safety, it begins to overlap with KA 602 or KA 723. However, some of the extension work for KA 609 projects did focus on providing accurate information on the complex crop yield and price insurance products available to producers, how to make the optimal selection of insurance products based on expected yields and prices, risk perceptions, amount of coverage, and the cost of risk protection (including self-insurance). Risk protection products and opportunities vary greatly in price and availability by crop, geographic location, and perceived risk, requiring tailored extension programs and information throughout the nation.

Risk assessments were also conducted, for example in Montana the assessment of alternative crops (malting barley) and agricultural water use on reservation tribal lands helped Native American farmers choose whether to produce malting barley under contract.

Hazard Analysis Critical Control Point (HACCP) training was provided to food preparers, handlers, and workers in smaller firms, institutions like schools, hospitals, and restaurants that often do not benefit from the training provided to larger firma and institutions.

The Joint Institute for Food Safety and Applied Nutrition offers online distance learning in Food Safety Risk Analysis to interact with food safety professionals from around the world. Courses include Food Safety Risk Communication, Assessment and Management (see http://www.jifsan.umd.edu/sip2004/jifsanprogram.html). University of Maryland produced the Food Safety Risk Analysis E-learning Program and Food Safety Risk Analysis Distance Training which is becoming available for practitioners, paraprofessionals, and the work force.

OUTCOMES

Short-Term

Theoretical refinement and development of knowledge about risk preferences, perceptions and attitudes has laid the groundwork for increased understanding by farmers. Moreover, it has improved the chances of enhancing rational expectations, and ultimately improving decision making under conditions of risk and uncertainty.

The USDA Risk Management Agency has been routinely provided with university prepared documents sent directly to the government agency that sets crop insurance policy. The results provided information for evaluating current policies and suggestions to help guide future policy making.

Medium-Term

Farmers' participation in crop insurance and government programs has been enhanced. For example, the use of specialized insurance products has increased participation ten-fold in Illinois between 1997 and 2004.

New agricultural risk management products and tools are now commercially available and being used by some types of Cornbelt farms. Farm characteristics indicate the types of farms for which each particular specialized function insurance product is most advantageous. They include Catastrophic; Actual Production History; Income Protection; Revenue Assurance-Base Price; Crop Revenue Coverage; Revenue Assurance-Harvest Price; Group Risk Plan; Group Risk Income Plan. One of the innovative features of specialized products in the unique combination of both yield and price or revenue that the producer can choose, depending on risk preferences, overall insurance costs, and risk conditions facing the producer in any specific growing season (see http://www.farmdoc.uiuc.edu/cropins/products.html).

Long Term

More efficient and cost effective risk management strategies, procedures, and commercial products and services have and will be adopted while keeping public costs (e.g., insurance subsidies), consumer prices (e.g., retail food costs), and costs to participants (e.g., farmers and ranchers, food handlers, and preparers) at reasonable levels by reducing fraud, eliminating hazardous practices, and encouraging knowledgeable risk management decisions.

SUCCESS STORIES

FarmDoc

The University of Illinois Farm Decision Outreach Central (FarmDoc) improves microeconomic (farm level) decision-making under risk through extensive education and research. The Farmdoc website (see http://www.farmdoc.uiuc.edu/about/) provides Cornbelt farmers with highly comprehensive, integrated risk management information and analysis. Publications, decision tools and databases related to a variety of risk management issues are found throughout the site and are updated weekly. Subject matter sections cover finance, marketing and outlook, management, law and taxation, and policy. Specialty sections of the web site are devoted to the Agricultural Market Advisory Services (AgMAS Project; see

http://www.farmdoc.uiuc.edu/agmas/), crop insurance, farmland ownership, prices and weather, and agricultural web resources. This comprehensive activity won the national 2004 Outstanding Extension Program award of the American Agricultural Economics Association. The use of specialized insurance products (including Catastrophic, Actual Production History, Income Protection, Revenue Assurance-Base Price, Crop Revenue Coverage, Revenue Assurance-Harvest Price, Group Risk, and Group Risk Income) in Illinois increased ten-fold from 1997 to 2004.

A federally subsidized whole farm insurance plan covers most farm-raised crops, animals and animal products and is available for growers throughout the Pacific Northwest. The CSREES-sponsored Western Center for Risk Management Education at Washington State University worked with the USDA Risk Management Agency to gain approval to expand this innovative insurance program to Alaska, Idaho, Oregon and Washington for the 2005 crop year. Maximum coverage of $1 million for 2006 was approved by the Federal Crop Insurance Corporation Board.

Risk Assessment

There has been considerable interagency and university research collaboration in this area. In particular, the Office of Risk Assessment and Cost-Benefit Analysis (ORACBA), which was established by the Federal Crop Insurance Reform and Department of Agriculture Reorganization Act of 1994 (P.L. 103-354) in USDA's Office of the Chief Economist plays an important part in motivating risk assessments. ORACBA's primary role is to ensure that major regulations proposed by USDA are based on sound scientific and economic analysis. However, the Reorganization Act requires USDA to conduct a thorough analysis that makes clear the nature of the risk, alternative ways of reducing it, the reasoning that justifies the proposed rule, and a comparison of the likely costs and benefits of reducing the risk.

ORACBA provides guidance and technical assistance, coordinates risk analysis, and certifies statutory requirements. Risk assessments and cost-benefit analyses are based on sound scientific, technical, economic, and other data. Analysis provides understanding of hazards being addressed, probability of occurrence, and associated uncertainty. The costs associated with proposed regulation and reasonable alternatives are compared to benefits, including those related to the reduction or prevention of risk. In short, the analysis should communicate to policy officials and the public what is known and not known about the risk. ORACBA plans several key functions to carry out its mission: Education and Training; Coordination; Guidance; Regulatory Review; Risk Information. (See http://www.usda.gov/agency/oce/oracba/.)

Risk Management

Statistical procedures for identifying potential fraud within the Federal Crop Insurance program were improved and modified by economists at Montana State

University. Similar work conducted at Penn State focused on reducing *moral hazard*, the problem of having insureds behave in riskier ways when covered by insurance. While the University of Arizona performed simulations of *adverse selection*, the problem of an insurer knowing less about the risk behavior of the insured than the insured knows about his own behavior and so accidentally adding bad risks to an insurance pool. Both of these efforts led to a better understanding of and response to these problems.

Washington State University studied crop insurance solutions for Pacific Northwest specialty crops and simulated using a recursive utility model. This type of work supported development of a federally subsidized insurance plan called Adjusted Gross Revenue Lite (AGR-Lite) covers most farm-raised crops, animals and animal products and is now available for growers throughout the Pacific Northwest.

Research at Ohio State University on risk allocation focused on institutional structures, including commodity markets, private and public insurance providers, and financial institutions, to determine the dispersion of risk over affected parties, and the costs to them.

NEW DIRECTIONS

The creation of more complex risk management tools, products and assessment methods is expected to accelerate in scope and scale. A primary motivator of additional research and extension work will be the policy implications, impacts, and continuing issues related to moral hazard and adverse selection (neither are stable, one-solution problems). As wells as a continuously changing risk environment, especially for regionally diverse, minor or niche crops that define entrepreneurial opportunities in rural communities and for small and limited resource farmers transitioning from crops like tobacco.

UNDERSTANDING RESOURCE ALLOCATION DECISIONS

Economics is the study of how human beings allocate scarce resources to produce various commodities and how those commodities are distributed for consumption among the people in society. The essence of economics lies in the fact that resources are scarce, and that not all human needs and desires can be met. How to distribute resources in the most efficient and equitable way is a principal concern of economists. The field has undergone a remarkable expansion in the 20th century as the world economy has grown increasingly large and complex.

OUTPUTS

Conflicts Utah State University theoretical analyses suggest that rights-based management systems endogenize the future consequences of current harvest decisions and eliminate the incentive to adopt cost increasing harvest technologies. This project explored the practicality of transition to rights-based management, the economic gains that resulted from the adoption of rights-based management, and the consequences of alternative specifications of ownership rights.

Game Theory models for resolving disputes over how much water should be allocated to the protection of threatened and endangered species, who should supply it and who should pay for it, is contributing to the widespread use of "best management practices" and improved water quality policy.

Allocation Decisions Purdue University research estimated the key parameters of resource allocation decisions under conditions of uncertainty using continuous and discrete decision variables modeled dynamically, and emphasizing decision making in a stochastic setting. The project focuses on improving decision making at the farm-level regarding use of soils, water, and forests.

Penn State University economists model the economic behavior of food firms transitioning toward efficient input allocation decisions and the forces influencing the transitions. Firms that successfully capitalize on growth opportunities in foreign markets indicate organizational structures and philosophies that emphasize technological innovations, adaptability and responsiveness to local consumer preferences. Domestic policies may also play an important role in helping/hindering successful growth and expansion of particular industries. Corporate alliances with retail outlets, increasingly multinational in nature, often determine a firm's entry into a new market. Finally, the ownership of brands, patents, and other licenses are important factors influencing the global food industry landscape.

OUTCOMES

Short-Term

Research on resource allocation under uncertainty has improved understanding of the specific policy linkages that exist between economic forces and the decisions that land and resource managers make, specifically farm-level decision making regarding use of soils, water, and forests. This work has both domestic and global implications.

Medium-Term

Performance when outputs or outcomes may be negative or poorly distributed helps inform public policy, regulation and compliance agencies of the impacts and costs in terms of public resources (subsidies) and industry (indemnity payouts) of undesirable behaviors like fraudulent claims, adverse selection, and moral hazard.

Long-Term

Applying game theory to resource allocation has shown that competition between groups of resource users leads to them responding to actions of their competitors and reacting in their resource use as if they were playing a dynamic Nash Equilibrium game in an empirical application to a controversial water problem in Butte County that started between three districts in 1994. The solution suggests that the current resource allocation solution is suboptimal.

SUCCESS STORIES

As a result of research conducted at Purdue University, Bangladesh has demonstrated that technology and knowledge transfer, specifically access to Integrated Pest Management methods, can play an important role in shifting production towards vegetables. The work identifies the factors associated with forest clearing and forest degradation and addresses gaps in knowledge regarding possible policy interventions to slow rates of environmental degradation.

Microeconomic (farm-level) economic and environmental implications of alternative resource-conserving irrigation technology and water management systems at University of Nebraska helps resolve competing agricultural and environmental water demands. Both the amount of nitrogen and the amount of water applied to crops has been decreasing in the major irrigated areas where water quality has been a problem. The auction and bargaining models developed and applied to the Platte Basin identify the terms of a water allocation agreement which are most likely to be acceptable to all major parties, including Colorado, Nebraska, and the U.S. Department of Interior.

NEW DIRECTIONS

Dynamic models that endogenize positive and negative factors (including policy, macroeconomic factors, technology, etc.) influencing resource allocation decisions.

FORECASTING AND PREDICTIVE ESTIMATION

Economic research depends on the scientific method and research protocols but it is not as conducive to controlled experimentation as are the physical and biological sciences. It is very difficult to conduct controlled economics and policy experiments by isolating control and treatment groups from exogenous influences and interventions. Consequently, most applied economics research depends heavily on complex simulation, sophisticated mathematical estimation and forecasting. A considerable volume of inquiry into the predictive capabilities of exchange traded commodity futures contracts and other forward pricing mechanisms. This theoretical basis of this work is the efficient market hypothesis, i.e., actual prices reflect the effects of information based both on events that have already occurred and on events which the market currently expects to take place in the future.

OUTCOMES

Short-Term

Development and refinement of economic techniques for simulation and estimation that ultimately lead to more comprehensive and more accurate models, simulation and forecasting. The latter are critical in the development of actuarially sound insurance products, policies and procedures designed to mitigate adverse selection and moral hazard, allocation decisions, and institutional performance.

Medium-Term

Measures of trade restrictiveness capable of evaluating the consequences of multilateral trade liberalization help to predict *ex ante* the potential impact of future liberalization attempts by the U.S., other nations and international organizations.

Long-Term

Decoupled farm payments have been found to improve farmer risk management, be consistent with the World Trade Agreement, and to have had no appreciable impact on retail food prices to consumers (see ERS, The 2002 Farm Act: Provisions and Implications for Commodity Markets; http://www.ers.usda.gov/publications/aib778/).

SUCCESS STORIES

Research at Virginia Polytechnic Institute and State University to estimate the benefits to the poor of research programs in agriculture can help justify

expenditures on the programs that have been suffering reduced budgets and also help in resource allocation decisions within research programs. Agencies funding the specific programs addressed by the impact assessment have asked for this research.

Quantitative models developed at Cornell University of measures of trade restrictiveness are capable of evaluating the consequences of multilateral trade liberalization. This policy support research helps predict the potential impact of future liberalization efforts.

Economists have played a dominant role in determining the benefits of publicly funded agricultural research and extension. Studies have consistently documented high rates of return on publicly funded research and extension (see Huffman and Evenson, New Econometric Evidence on Agricultural Total Factor Productivity Determinants: Impact of Funding Composition; http://ideas.repec.org/p/isu/genres/11176.html; Alston, et al., A Meta-analysis of Rates of Return to Agricultural R&D: Ex Pede Herculem? International Food Policy Research Institute; http://www.ifpri.org/pubs/abstract/136/rr136ref.pdf.

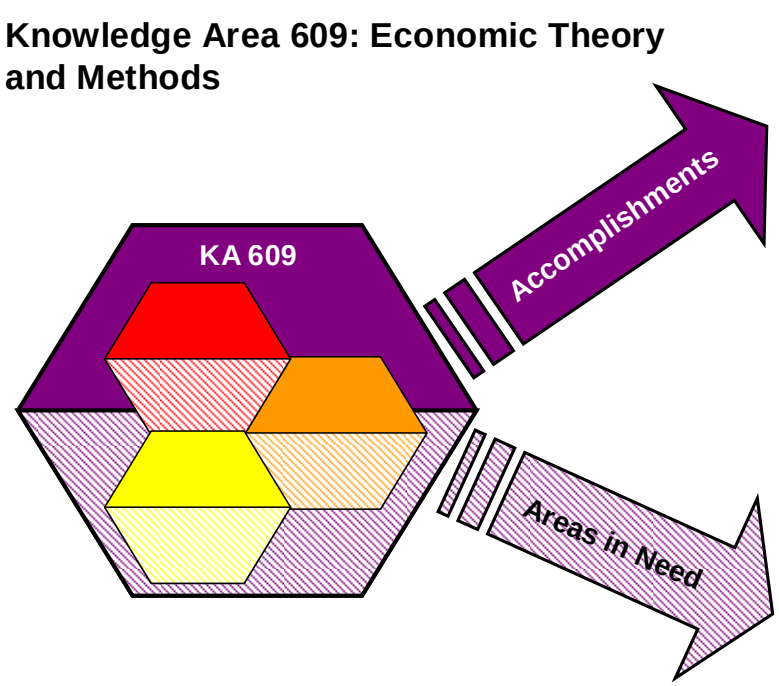
The effects of a particular investment can persist over many future production periods, perhaps forever. The effects of other research and development (R&D) may be short-lived or non-existent. Estimating the parameters that characterize this overall dynamic research–development–adoption–disadoption process is the most challenging empirical problem in evaluating R&D. In the evaluation of individual process innovations it is sometimes possible to obtain good information on the timing of events. More often (and inevitably in the case of aggregative analysis across programs and commodities), however, the information is not directly accessible and must be either estimated as a part of the analysis, or imposed on it. (See Alston and Pardey, Attribution and Other Problems in Assessing the Returns to Agricultural R&D, *Agricultural Economics*, 25, 2-3 (Sep. 2001):141-152; http://www.sciencedirect.com/science?_ob=JournalURL&_cdi=4956&_auth=y&_acct=C000052423&_version=1&_urlVersion=0&_userid=1355690&md5=97b99c4dfd28d154af6462aeb9995929.)

Work on valuing public and private resources, technology, and innovation is conducted by economists and depends heavily on theoretical constructs. Recent books on the topic include Pardey and Smith, Eds., What's Economics Worth, 2004, International Food Policy Research Institute; Kalaitzandonakes, Ed., The Economic and Environmental Impacts of Agbiotech: A Global Perspective, 2003, Kluwer Academic; Committee on Assessing and Valuing the Services of Aquatic and Related Terrestrial Ecosystems, Valuing Ecosystem Services, National Research Council, 2005.

NEW DIRECTIONS

The development of more complex and comprehensive forecasting and prediction models and methods will continue, especially the simulation of policy impacts, and dispersal of costs and benefits of policy and regulation induced changes. Additional work will focus on reducing inconsistencies in economic model specification and assumptions, and endogenize external factors to reduce error terms and increase the predictive value of simulations and forecasts.

Figure III-11



- Farm Decision Outreach Central (FarmDoc) is a website designed to help farmers work through decision-making under uncertainty.
- Agricultural Market Advisory Services (AgMAS) is a website devoted to crop insurance products, markets, prices, weather, farmland ownership, and other Ag. Resources.
- Whole Farm Insurance Plan for growers in the NW.

- Filled gaps in knowledge regarding the effect of Integrated Pest Management on shifting production to vegetables in Bangladesh

- Estimated the benefits to the poor of research programs in agriculture.
- Measured the consequences of multi-lateral trade liberalization.
- Evaluated individual process innovations.

- Complex risk management tools, products and assessment methods.
- Investigate moral hazard and adverse selection issues due to constantly changing risk for regionally diverse, minor or niche crops that define entrepreneurial opportunities in rural communities.

- Dynamic models must be developed that endogenize positive and negative factors (policy, macroeconomic factors, technology, etc.) that influence resource allocation decisions.

- Simulation of policy impacts, and dispersal of costs and benefits of policy and regulation induced changes.
- Reduction of inconsistencies in economic model specification and assumptions, and endogenize external factors to reduce error terms and increase the predictive value of simulations and forecasts.

Knowledge Area 901: Program and Project Design, and Statistics

OVERVIEW

Knowledge Area (KA) 901 focuses on program and project design and evaluation, surveys, sampling and statistical analyses across all agency functions. This KA is better perceived as providing tools for the different fields of investigation in agricultural, forest, natural, health, social and biological sciences, and as a discipline in itself (statistics) or as a component of emerging fields such bioinformatics and geo-statistics. The use, availability, and development of modern statistical analyses, experimental designs, and sophisticated modeling techniques are crucial in the acquisition of new knowledge in agriculture, natural resource, life, and other sciences. It is also a critical tool in efficiently carrying out investigations ranging from fixed effect experiments to random effect studies as well as in massive scale surveys and various modeling approaches. More importantly, it is an indispensable tool in providing intelligibility to, and summarizing, small and large scale data sets from the molecular to the landscape levels of organizational integration.

The program design and statistical techniques encompassed by KA 901 are closely related to KA 902 and KA 903, Administration of Projects and Programs and Communication, Education, and Information Delivery, respectively. The 900 series of knowledge areas ensure that projects and programs are properly planned and evaluated, communicated to peers and the public, and that educational aspects and curriculum development are carried out in the academic community.

The 900 series of knowledge areas in general, and KA 901 in particular, contributes indirectly, yet integrally, to Portfolio 2.1 “Expanding Economic Opportunities through Economic and Business Decision Making.” In the broadest sense, program planning, administration, and evaluation lays the framework for developing and communicating valid and reliable knowledge to pertinent audiences. In turn, audiences and recipients of results use the information to make sound decisions, thus expanding economic opportunity. The statistical methods developed and used as part of KA 901 contribute to the reliability and validity of the research, education and outreach performed. Computer simulations of crop growth and pest infestation modeling software programs allow agricultural producers to effectively manage their crops or livestock.

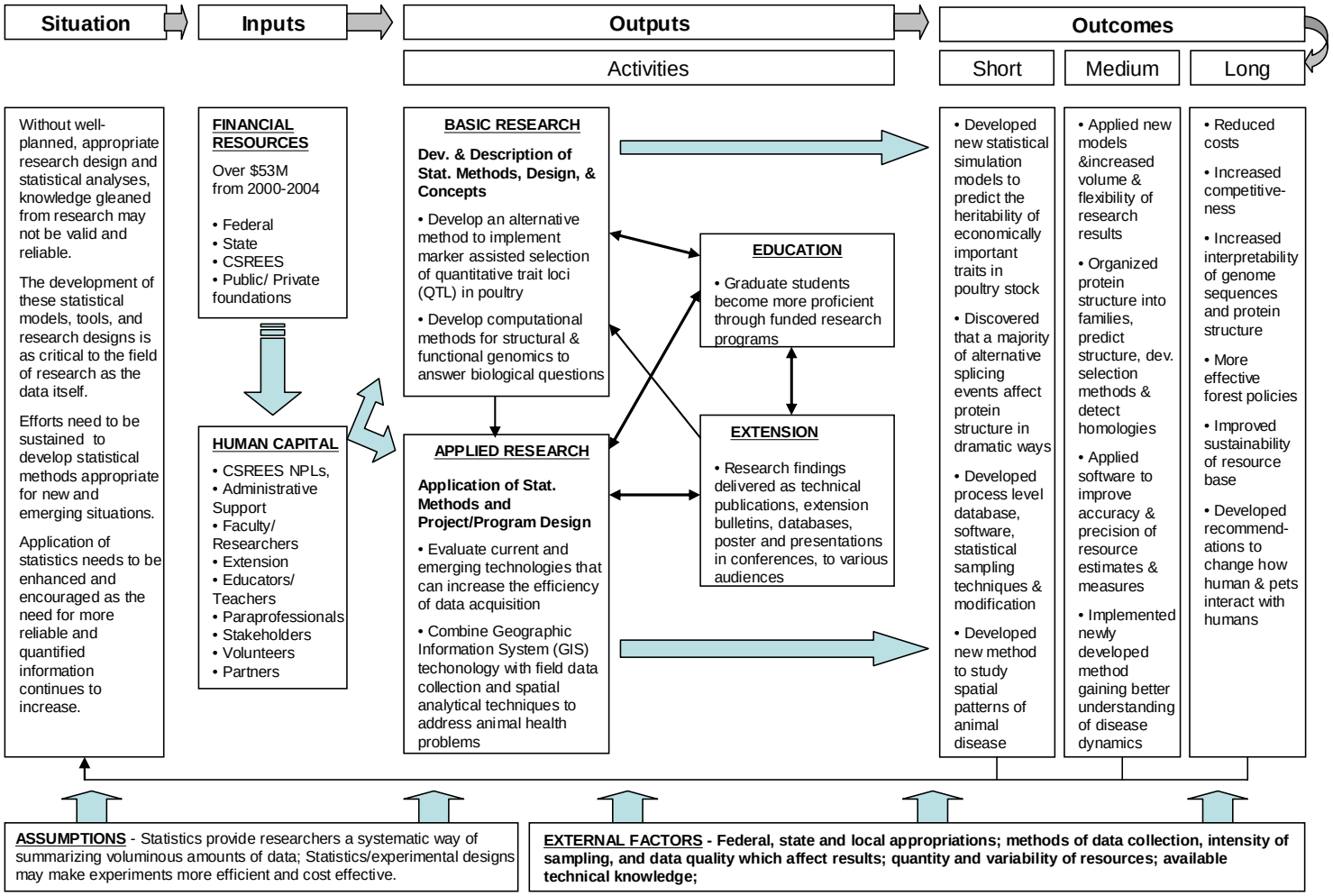
It is difficult to incorporate KA 901 into a single portfolio, as the development of statistical methods and tools and sound project design can be identified throughout CSREES funded programs and not solely coded into a single knowledge area.

KA 901 is a challenging knowledge area to report for varied reasons. First, as a KA it does not have a single source of dedicated funding. Second, although it is being used in just about every area of investigation, it is not identified as an area of priority, except perhaps in the field of bio-informatics. Thus its funding follows no specific pattern.

Third, no single national program leader is assigned to coordinate and provide leadership in research, extension and education in this knowledge area. Fourth, projects that involve some statistical analysis of data or specific experimental design are coded KA 901 for a range of percentages, despite the fact that statistics nor experimental designs are not the actual object of the investigation. Investigations can be coded from 10% to 100% KA 901 by the principal investigator (PI), but at times, the reason behind this designation is ambiguous. And fifth, there is a lack of stringent guidelines in designating or classifying work as a particular KA. Thus, every effort was made to be as inclusive as possible in developing this report for KA 901 although some may not seem to fit perfectly into this knowledge area.

Figure III-12

Portfolio 2.1: Expand Economic Opportunities through Economic and Business Decision-Making
KA 901: Program and Project Design, and Statistics



SITUATION

A cursory look at what has been done for the last five years indicates that, as a discipline, Statistics continues to push its frontiers in descriptive statistics, relational statistics, probability, geo-spatial statistics, forecasting/predictive statistics, experimental designs, hypothesis testing/inferences, database development, survey and inventory statistics and other related statistical methodologies. There are many areas covered, including evaluating various sensitivities and specificities of disease organisms and prevalence, development of process level databases for modeling and simulation work in crop production, and stochastic dynamics simulation of large- and small-scale processes. KA 901 addresses research at one of its most basic levels. Without well-planned, appropriate research design and statistical analyses, knowledge gleaned from research may not be valid and reliable. It is necessary to further develop and utilize tools such as modeling and other simulations to strengthen research. The development of these statistical models, tools, and research designs is as critical to the field of research as the actual data itself. Despite all these efforts, there is still a strong need to sustain efforts in developing statistical methods appropriate for new and emerging situations. Application of statistics in many areas of agriculture, natural resources and biological sciences needs to be enhanced and encouraged as the need for more reliable and quantified information continues to increase.

The overarching themes are:

- Development and description of statistical methods, design, and concepts
- Application of statistics and project/program designs

These themes are a result of addressing the current needs for large scale genomic mapping and data acquisition and landscape pattern analysis of natural and managed systems.

ASSUMPTIONS

Statistics provide researchers a systematic way of summarizing voluminous amounts of data, in more detail than merely a means of testing for significance of treatment effects. They also clarify interactions and relationships between and among experimental variables and optimize sampling intensity through sample variance estimates, thus strengthening experimental procedures.

Statistics/experimental designs may make experiments more efficient and cost effective. Further, statistics provide a means for predicting or forecasting conditions or situations.

EXTERNAL FACTORS

Factors directly affecting the extent and type of project/program designs, statistical investigations and statistical/design applications and results in research include:

1. Federal, state and local appropriations - Funds have stagnated in the last five years and are limited to addressing a narrower range of issues and needs. Hence, progress in developing new statistical concepts and methods is limited
2. Parameter and sample estimation - Statistics, being a science of estimation, is continually searching for more accurate techniques of gathering information. Any effort to increase accuracy of estimates requires corresponding increases in sampling intensity and therefore increases in fiscal resources.
3. Application of collected data - The intended use of data dictates the methods of data collection, intensity of sampling, and data quality which affect results.
4. Complexity of resource - Large population of a resource and the degree of variability of that resource affect the measurements, number of measurements, and even the time of measurement and effort used.
5. Available technical knowledge - Lack of available knowledge and measurement technology can hinder the implementation of projects addressing the needs and issues under this knowledge area.

INPUTS

Program inputs to this Knowledge Area (KA 901) for the last five years (2000-2004) consists of program funds in the amount of $5.4 M (Table III-14), personnel, partners' time and expertise, matching funds, and graduate students' effort. On a yearly basis, the funding for this knowledge area has been very consistent (approximately $1.2 M/year) except for 2002 where the funding was below $1 M. This lower funding was due to fewer projects submitted and funded despite the increased participation of 1890 institutions. Hatch Funds provided the largest share of stable funding for each year, although other CSREES Programs had contributed significantly. This is due to the fact that Hatch funds have fewer restrictions in their uses as opposed to the other program funds. For example, McIntire Stennis funding is restricted to forestry research. Other CSREES funds (e.g., funding through Cooperative Appointments, IFAFS, SERD, and Other Integrated Programs) including NRI supported this knowledge area especially in the fields of genomics and bio-informatics. Special grants are increasingly becoming important in supporting this knowledge area as a result of the rapidly moving frontiers of genetic engineering and geostatistics. Although it is clear from the data that Animal Health is not the primary funding source for this KA there are projects classified under KA 901 under this funding line. Animal Health funds are appropriated for projects relating to animal protection, animal health and zoonosis. Therefore, the funding that is reflected in this data table is likely a result of projects relating primarily to the aforementioned areas but with some portion relating to KA 901. This relates to the discussion in the overview of the challenges with this KA. Matching funds contributed immensely to the overall funding because Hatch, McIntire-Stennis, Evans-Allen and

other funds require at least 100% matching, thereby at least doubling the effective funds. McIntire-Stennis alone generates on the average 420% match for the last five years. The yearly stable number of projects (78) indicates that research capacity and expertise have not changed.

The difficulty in discussing the trends in the funding for KA 901 is that dedicated funding for this KA is a part of other KAs. Additionally, it is dependent on the presence or absence of proposals for competitive programs and therefore it is difficult to describe its fluctuations.

Table III-14: Funding from All Sources for KA 901 during 2000-2004

Funding Source	Fiscal Year *(in thousands)*					
	2000	2001	2002	2003	2004	**Total**
CSREES	$ 1,319	$ 1,282	$ 939	$ 1,213	$ 1,653	$ 6,406
Other USDA	$ 85	$ 47	$ 74	$ 256	$ 444	$ 906
Other Federal	$ 1,988	$ 3,172	$ 3,443	$ 3,823	$ 5,612	$18,038
State Appropriations	$ 4,857	$ 3,882	$ 3,367	$ 3,517	$ 3,718	$19,341
Self Generated	$ 550	$ 379	$ 587	$ 1,044	$ 514	$ 3,074
Independent Grant Agreement	$ 246	$ 718	$ 653	$ 769	$ 2,264	$ 4,650
Other Non-Federal	$ 615	$ 349	$ 117	$ 291	$ 210	$ 1,582
Total All Sources	**$ 9,660**	**$ 9,829**	**$ 9,180**	**$ 10,914**	**$ 14,415**	**$53,998**
CSREES as a % of the Total	**14%**	**13%**	**10%**	**11%**	**11%**	**12%**

Table III-15: CSREES Funding for KA 901 by Source during 2000-2004

Funding Source	Fiscal Year *(in thousands)*					
	2000	2001	2002	2003	2004	**Total**
Hatch	$ 659	$ 580	$ 507	$ 612	$ 770	$ 3,128
Mc-Stn	$ 63	$ 88	$ 34	$ 49	$ 94	$ 328
Evans Allen	$ -	$ -	$ 52	$ 49	$ 41	$ 142
Animal Health	$ -	$ 3	$ 4	$ -	$ -	$ 7
Special Grants	$ -	$ 61	$ 97	$ 159	$ 88	$ 405
NRI Grants	$ 137	$ 25	$ 115	$ 225	$ 15	$ 517
SBIR Grants	$ 125	$ -	$ -	$ -	$ 40	$ 165
Other CSREES	$ 335	$ 524	$ 130	$ 119	$ 605	$ 1,713
Total CSREES	**$ 1,319**	**$ 1,282**	**$ 939**	**$ 1,213**	**$ 1,653**	**$ 6,406**

DEVELOPMENT AND DESCRIPTION OF STATISTICAL METHODS, DESIGNS AND CONCEPTS

The characterization of non-normal distribution, parameter estimation, goodness of fit and spatial statistics dominated the statistical methods, design, and concepts theme. This characterization is

expected to provide more appropriate and sensitive ways to provide intelligibility to collected information.

OUTPUTS

Outputs for this KA are primarily research based. Outputs are new knowledge in statistics, design and statistical/design methods. Some specific examples of this are:

1. Statistical properties of analytical methods for data from non-normal distributions
2. Estimation of variance of a re-sampling method and establishment of confidence intervals for the slope estimator in censored quantile regression model
3. Appropriateness and validity of statistical designs and analyses
4. Proper blending of measured data with predicted data by computer models
5. Identified procedures and conceptual models for reducing measurement error in self-administered mail surveys and interviews

In addition, there are other indirect outputs resulting from the research. Some examples of these include:

6. Graduate students become more proficient through funded research programs
7. Research findings delivered as technical publications, extension bulletins, databases, poster and presentations in conferences, to various audiences;

OUTCOMES

Short Term – New knowledge is created that improves sensitivity and reliability of data analyses.

Medium Term – Researchers use new procedures to design and analyze experiments and investigation.

Long Term – Experiments are conducted with improved sampling efficiency (more economical) and with greater ability to isolate subtle changes and effects.

DISCUSSION OF SPECIFIC EXAMPLES

Case 1

A multistate project entitled "**Advanced Technologies for the Genetic Improvement of Poultry**" (NC-1008) addressed research, education and extension aspects of genetic-based differences in experimental and commercial lines (strains) of poultry. The participating station (Indiana) has examined the utilization of marker assisted selection programs in poultry to improve the efficiency of economically important traits that in

standard breeding practices are of low heritability. Genetic markers (commonly known as Quantitative Trait Loci – QTL) are a useful tool in associating animal health and productivity traits with a given genotype of animals. It is therefore extremely important to formulate experimental studies that utilize optimal design and methods of detecting QTLs for incorporating molecular information in breeding programs. Such QTLs are found by statistical estimation and hypothesis testing based upon similar data breeders would use to make selection decisions.

An alternative method to implement marker assisted selection has been developed which uses multiple genetic markers to maximize the accuracy of prediction. The method is based on Bayesian framework and requires a prior estimate of the amount of variation due to genetic causes. Simulations were used to examining the efficiency of the method. Results showed remarkable predictive ability with the relative efficiency actually increasing as the heritability decreases. These results show that it is possible to overcome current limitation of marker assisted selection and realize the power of the technology.

Short Term - These new statistical simulation models have been created and shared with researchers who can immediately apply the models to predict the heritability of economically important genetic traits in poultry stocks.

Medium Term - The application of these new models increases the volume and flexibility of research results, and valuable information to advance the work of various scientists under this multistate project.

Long Term - Proper use of molecular genetic information in breeding programs is critical to optimum genetic gain with economic constraints and has the potential to both save breeding companies millions of dollars in cost and make the US poultry breeding companies more competitive in the international market place.

Case 2

The causal relationship between genotypes and phenotypes in crops plants is of fundamental importance to our understanding of the genetic basis of quantitative traits and many practical applications including plant breeding. This relationship is traditionally estimated by mapping quantitative trait loci (QTL), such as yield, in a designed experiment using genome-wide molecular markers. In mapping QTL, scientists try to establish significant associations between phenotypes and some specific genomic locations and, through this mapping, to study the effects and interaction of individual QTL. This project has enhanced QTL analysis by developing computational tools to efficiently analyze and interpret microarray gene “expression” data.

The project has upgraded the functions and capability of QTL Cartographer and Windows QTL Cartographer software and continues to maintain interaction with the user community. It has produced a user-friendly manual that provides easy-to-follow descriptions about the software developed, procedures, function inputs and outputs for

mapping QTL. The manual is extremely helpful for novice users to understand the software, navigate through the computer program, understand different analysis methods and functions, and to interpret output results.

Short Term - This study created new knowledge that enabled development of publicly available statistical tools to efficiently interpret the basis of "expression" QTL (eQTL) from thousands or potentially tens of thousands of data points to enhance our understanding of quantitative inheritance for crop improvement.

Medium Term – Use of statistical models to enhance QTL analysis results in better understanding of the basis of gene expression of quantitative traits, such as yield.

Long Term – The analysis tools and procedures provide scientists the means to efficiently manage and interpret the increasing amounts of genomic data being generated on crops of economic importance improving the value of research.

Case 3

The principal aim of this project is to develop computational methods for structural and functional genomics, using the genome both as a base for investigation and as a resource to help answer biological questions. Structural genomics projects attempt to provide an experimental structure or a good theoretical model for every protein in all completed genomes. This work organizes proteins into families according to homology, predicts structure from homology and constructs coordinate models, maintains an information resource for structural genomics, develops methods for selection of proteins for experimental characterization, and analyzes solved structures to detect homologies and functional information. The computational functional genomics aspect of this project primarily involves moving beyond pairwise sequence comparison in order to achieve reliable functional annotation of complete genomes. This includes the use of gene genealogies to trace gene histories and functional divergences, non-homology approaches for functional characterization (such as Rosetta Stone and Phylogenetic Profiles), and "reverse genomics" comparison of multiple complete genomes to locate genes associated with characterized cellular or biochemical functions. By quantitatively combining sequence comparison with expression and other experimental functional data improve computational molecular and cellular functional characterization.

Short Term – It was discovered that a majority of alternative splicing events affect protein structure in dramatic ways.

Medium Term – New knowledge helped to organize proteins into families according to homology, predict structure from homology and construct coordinate models, develop methods for selection of proteins for experimental characterization, and analyze solved structures to detect homologies and functional information.

Long Term - The completed and ongoing research directly aids the interpretation of genome sequences and protein structure. Applications of this information include understanding of the roles of molecular functions of genes and proteins for use in genetic analysis and engineering for medicine, agriculture, and biotechnology.

Case 4

Currently there exists no method for full multipoint Linkage Disequilibrium Mapping. The development of a full multipoint Linkage Disequilibrium Mapping method will greatly increase mapping power and should find applications in the agricultural sciences and in other genetics studies.

This project developed a genetic mapping method that includes demographic as well as genealogical information on multiple linked genetic markers.

Short Term - This project created a genetic mapping method able to incorporate single nucleotide polymorphisms.

Medium Term – Application of this method will advance our body of knowledge about gene mapping in plants and other organisms.

Long Term - Improved gene mapping techniques will lead to development and selection of plants with specific desirable traits, improving nutritional, pharmaceutical, and economic value and food and fiber crops.

Case 5

An Animal Health Formula Fund project, "**Brucellosis Serology in Yellowstone Bison (*Bison bison*)**" (01 OCT 2000 – 30 SEP 2005), supported work at the University of California – Davis to develop new statistical methodology to compare the degree of correlation among four traditional brucellosis serological tests in Yellowstone bison and chronically infected herds of cattle and water buffalo.

Short Term **-** Statistical methodology was developed to analyze the correlations among four traditional brucellosis serological tests.

Medium Term – Application of the methodology confirmed the appropriateness of using BPAT for screening cattle and water buffalo of Trinidad for brucellosis.

Long Term – Confidence in screening precision and accuracy will contribute to better management of brucellosis in free-ranging wildlife populations in the United States.

Case 6

Bio-informatics tools for analysis of animal genomic data are lacking. This project attempts to develop statistical and computational methods for analyzing gene expression data generated through microarray technology, with a view towards application in animal

agriculture. This will make use of the available biological data sets of microarray gene expression research and make it more meaningful to biological interpretation.

Compared to a classical mixed liner model, this project has developed a Bayesian mixed linear model using gene microarray expression data generated by several scientists at Animal and Dairy Science and USDA scientists at the University of Georgia.

The tools and programs developed in this project are useful to animal scientists generating microarray data. The expertise developed in the area of Bioinformatics is opening doors for collaboration with other groups at UGA and across the country. This technology has led to the development of an NIH proposal. These efforts of dealing with potential misclassification of disease subtype have the potential of greatly improving the accuracy of complex diseases diagnosis based on gene expression profiling.

Short Term - This new model has proven superior in detecting differentially expressed genes and more importantly in ranking those genes into their correct significance level. This has significantly reduced both false negative and false positive rates.

Medium Term – Application of the statistical technology and expertise generated through this project is enabling genomics scientists to better understand the impact of gene expression on biological processes in animals.

Long Term – Better knowledge related to gene expression will result in better science and technological advancements.

Case 7

The goal of this project is to develop more realistic statistical models that can be used to more precisely predict the occurrence and spread of exotic, invasive species. The discrete-time, continuous-state framework being developed explicitly incorporates both spatial extent of the invasion, and the biological and physical aspects of the environment. The unique aspect of this research is the link between local and more regional processes through a nonlinear kernel that contains both biological and physical processes that underlie local dynamics, and larger scale processes involving dispersal and spread. Pairing model predictions in one time period with observations in another allows the fitting of unknown parameters using maximum likelihood, and the calculation of confidence limits for future spread.

Short Term – Researchers developed a model using cord grass, Spartina.

Medium Term – Generalize the model beyond Spartina; begin to generate estimates of future spread with confidence limits.

Long Term – Development of methods for predicting where invasive species are likely to occur in the future enabling the efficient implementation of early detection-rapid

response efforts. Focusing control efforts on the early stages of invasion should necessarily be more cost-effective than when they are well-established saving, potentially, millions of dollars. Showing that delays in control early-on can have very large later economic costs could help inform policy on invasive species management and control.

Case 8

Dairy farmers depend to a large extent on accurate forecast of milk prices for their profitability. However, forecasting of milk prices is a difficult task to accomplish with high degree of accuracy. This project proposes to develop a Bayesian Conditional Forecasting Model capable of forecasting milk market prices and other dairy products prices with high degree of accuracy.

Short Term – A Bayesian Vector Auto-regression (VAR) Statistical Model has been developed. The model allows for both conditional and unconditional forecasts.

Medium Term – Initial tests of the model have provided accurate forecasts on variables of interest to the U.S. Dairy Industry.

Long Term – With improvement and extended use of this model, reliable market information that impacts the dairy industry can be readily generated, thus insuring the vitality of the dairy industry. Wide acceptance of the model will lead to its long-term use in public programs such as the Milk Income Loss Contract program and by policy makers concerned with U.S. dairy policy

Case 9

Animal breeders wish to be able to select traits that are desirable in their livestock. These traits, however, may be due to multiple alleles. It is now possible to locate these traits and their genetic markers using statistics. This project was initiated to produce a statistical package or sampler that would overcome the limitations of those produced in the early 1990s which would only produce reliable results in limited populations.

Short Term – "Coarse" mapping of traits was improved by introducing new individuals into the livestock pedigrees being studied. As mating practices in livestock result in complex pedigrees, smaller values of heritability must be used for genetic evaluation as more markers are mapped. The new sampling strategy dramatically improves the efficiency of the statistical program.

Medium Term – The sampler was used to select traits and improve the carcass quality of Angus beef cattle.

Long Term – The new statistical package can be used for fine mapping genes using multi-generation livestock pedigrees.

SUCCESS STORIES

Case 10: Development of a Gradient-Based Landscape Pattern Analysis Methodology

The principal investigator and his colleagues created a computer software program designed to compute a wide variety of landscape metrics for categorical map patterns. The program is called FRAGSTATS and was designed as a spatial pattern analysis program which quantifies the areal extent and spatial configuration of patches within a landscape. For a given landscape mosaic, FRAGSTATS computes several metrics for: (1) each patch in the mosaic; (2) each patch type (class) in the mosaic; and (3) the landscape mosaic as a whole. In addition, FRAGSTATS computes the adjacency matrix (i.e., tally of the number of cell adjacencies between each pairwise combination of patch types, including like-adjacencies between cells of the same class), which is used in the computation of several class- and landscape-level metrics. Landscape metrics are algorithms that quantify specific spatial characteristics of patches, classes of patches, or entire landscape mosaics. These metrics fall into two general categories: those that quantify the composition of the map without reference to spatial attributes, and those that quantify the spatial configuration of the map, requiring spatial information for their calculation. FRAGSTATS computes several statistics for each patch and class (patch type) in the landscape and for the landscape as a whole. At the class and landscape level, some of the metrics quantify landscape composition, while others quantify landscape configuration. FRAGSTAT metrics include Area/density/edge metrics, Shape metrics, Core area metrics, Isolation/proximity metrics, Contrast metrics, Contagion/interspersion metrics, Connectivity metrics, and Diversity metrics. Within each of these groups, metrics are further grouped into patch, class, and landscape metrics. The major mechanism for software distribution and technical documentation and support is the FRAGSTATS website which is run and supported by the PI: (www.umass.edu/landeco/research/fragstats/fragstats.html).

Short Term - FRAGSTATS has become the world's leading software package for the calculation of landscape metrics and has greatly facilitated landscape level approaches to the understanding and management of natural resources. The project has developed new methods and numerous metrics to quantify landscape patterns, which is considered a prerequisite to the study of pattern-process relationships. The project has developed a conceptual framework for incorporating surface pattern analysis into the FRAGSTATS software. This involves careful consideration of all data input/output requirements that is important for the development of a suitable graphical user interface for parameterizing FRAGSTATS to analyze a continuous grid. The project has also developed a suite of surface pattern metrics and has developed the computer algorithms needed to compute each selected metric. All surface pattern metrics were tested for accuracy, consistency, and desired performance under a wide range of test scenarios. This has resulted in the development of literally hundreds of indices of landscape patterns. The success of the

program has clearly motivated the project scientist to continue the work and develop the future potential of the software for basic and applied research.

Medium Term – Knowledge gained from this project was used to: (1) Establish a FRAGSTATS website (www.umass.edu/landeco/research/fragstats/fragstats.html) which serves as the major mechanism for software distribution and technical documentation and support. The FRAGSTATS website has enabled hundreds of scientists and professionals from all over the world access to our software. (2) Establish a FRAGSTATS listserve for the dissemination of information on FRAGSTATS and to facilitate information sharing and communication among FRAGSTATS users all over the world. The listserve has been quite effective, even its early stages, at addressing problems confronted by FRAGSTATS users who otherwise don't have any means of gaining assistance in the use of FRAGSTATS. (3) Conduct several FRAGSTATS training workshops for professionals and academics on landscape pattern analysis using FRAGSTATS. These workshops have been a resounding success and have helped to training dozens of experts in the use of the software which, over time, through networking will substantially increase the distribution and effective use of FRAGSTATS. The ease of use of the software and efficient access to technical assistance has allowed landscape-level research and management activities to progress at a much faster rate than would be otherwise possible.

Long Term - FRAGSTATS is being developed to include several surface pattern metrics as a complement to the existing categorical map pattern metrics. To this end, FRAGSTATS will eventually have the capacity to analyze continuous surface patterns, specifically, allow for continuous surface grids in a variety of popular formats (e.g., ArcInfo, ERDAS, IDRIS, binary, ASCII). This will greatly increase the capability of the program for use by a wider community including decision makers and land use managers. FRAGSTATS will then develop a suite of surface pattern metrics for implementation which will draw upon the field of surface metrology to devise a suite of relevant metrics for application in landscape ecological studies. This will greatly benefit the academic and extension community by laying the foundation for future predictive studies.

Impact - As evidenced by the listserve membership demographics (several hundreds worldwide) and the frequency of use in scientific publications in the field of landscape ecology (it is estimated that 10-20% of the papers published in the discipline's leading journal, Landscape Ecology over the last 5 years used FRAGSTATS), it is clear that FRAGSTATS is being used by hundreds of scientists, managers, and conservationists from academia, agencies, industry, and NGO's from around the world. There is no question that FRAGSTATS has had a major impact on the field of quantitative landscape ecology and has led to significant disciplinary progress and stimulated new directions in the state-of-the-art of landscape pattern analysis. FRAGSTATS has become the world's leading software package for the calculation of landscape metrics and has greatly facilitated landscape level approaches to the understanding and management of natural resource

Case 11

A multi-state committee (NCCC 170) which deals with the research advances in agriculture statistics has developed educational materials for agricultural and natural resources scientists and fellow statisticians. The workshops are given to professional societies on mixed modeling and spatial variability.

Other biological sciences-related projects have resulted in identifying novel mechanisms of telomere regulation and function (Telomerase RNP structure and function; performing station = Texas); identification of genetic linkage and association with diseases such as mastitis in cows, risk factors associated with the resistance and/or susceptibility to gastrointestinal parasites infection in lambs, and breeding efficiencies of pigs (Estimation of genetic effects on longitudinal and time-to-event livestock data; performing station = Illinois). Furthermore, new statistical models have been applied to biological research problems which may have unavoidable unknown join points and small sample size, thereby enabling the researchers to draw meaningful statistical inferences (Applications of segmented regression models; performing station = Arkansas)

Short term - Animal scientists have been able to benefit from statisticians to draw immediate conclusions based on statistical merit and soundness of experimental design.

Medium term - Animal scientists have been able to develop collaborations with the statisticians and other scientists to improve the quality of their research.

Long term - Animal scientists have been able to benefit from new models and experimental designs through cooperative research and multi-state activities.

Case 12

The **Center for Innovative Food Technology** (CIFT) has funded proposals which have resulted in development of software which uses artificial intelligence to control package weights in high-volume operations such as snack foods; development of techniques to apply flavorings to substrates while minimizing airborne dust; development of an index and methodology to quantify the sensory phenomenon of crispness—the first of its kind; and product development work to use a composite starch/oil material developed by the Agricultural Research Service as a fat substitute for the meat processing and bakery industries. All of these projects have contributed significantly to increased food safety, enhanced food quality, or a reduction in processing costs. The CIFT encourages innovation by leveraging private sector funding to underwrite projects designed to assess the feasibility of emerging technologies and practices in food processing applications. The work has resulted in numerous publications.

NEW DIRECTIONS

1) The NPLs in the Animal Systems – will continue to critically monitor and ensure that the experimental design and relevant statistical competencies exist in projects submitted for review and funding.

2) The United States Department of Agriculture (USDA) National Agricultural Statistics Service (NASS) provides estimates of winter wheat yield on a monthly basis in the Great Plains beginning in May and extending through harvest. The goal is to supplement this information by providing yield estimates one to two months earlier than the USDA and by making estimates on a timelier basis throughout the growing season. Satellite imagery and modeling will be used to determine potential winter wheat yields for the Midwest. Pre-harvest estimates would allow county-level extension officers and individual farmers to assess the success of their crops in comparison to other areas, as well as to other years. The ability to identify over and under yielding winter wheat producing areas early in the growing season will have many potential impacts on storage providers, insurance providers, farm input providers and individual producers. State and federal agencies will be able to assess total production early in the growing season, which could affect policies and programs established to deal with surplus or deficit areas.

3) Consumers and environmentalists remain wary of the safety of biotechnology in agriculture. To help alleviate this concern researchers seek to develop a Risk Assessment model whose predictions will be tested using replicated fish populations in secure, simple ecosystems. This will enhance methods of examining risks and hazards associated with agricultural biotechnology, and will give the regulatory agencies an important statistical decision-making tool.

APPLICATION OF STATISTICS AND PROJECT/PROGRAM DESIGNS

Database development for modeling work, resource inventory/monitoring and genomic data analysis dominated the application theme. With large scale acquisition of data and the current explosion of information, the need for specialized databases will continue to escalate to serve specific modeling efforts and resource inventories. Massive genomic data can only be catalogued systematically via bioinformatics and sophisticated database structures.

OUTPUTS

As stated under the Development and Description of Statistical Methods/Design Concepts section, the Outputs for this KA are primarily research based. Some specific examples for this major theme are:

1. Appropriate use of segmented regression to agricultural and biological research problems
2. Use of statistics in planning, design and analysis of experimental results
3. Application of appropriate statistical methodology for analyzing recurrent data and large genomic information
4. Use of practical inference methods for accurate approximation techniques
5. Use of developed parameter estimation methods
6. Use of complex statistical models in the study of pharmacokinetics, disease dynamics, and survival
7. Application of statistically sound methods for prediction of protein secondary structure

Also similar to the previous theme, there are other indirect outputs that result from the research including:

8. Graduate students become more proficient through funded research programs
9. Research findings delivered as technical publications, extension bulletins, databases, poster and presentations in conferences, to various audiences;

OUTCOMES

Short Term – New knowledge generated using appropriate statistical methods are scientifically valid and numerically acceptable. Estimates are made at defined levels of confidence.

Medium Term – Application of those new information and results will lead to more effective policy and management decisions.

Long Term – Management and policy decisions will lead to socially and environmentally acceptable actions by producers, consumers, regulators and stakeholders.

DISCUSSION OF SPECIFIC EXAMPLES

Case 1

A Federal Administration Research Project (01 SEP 2004 – 31 AUG 2005) supported the **Center for Innovative Food Technology**, a not for profit organization whose mission is technology-based economic development in the food processing industry. Activities address industry goals such as the improvement of food safety, improvement of food quality, and improvement of profitability through a reduction in processing costs. Fiscal year 2004 projects focused on renewable energy solutions for food processors, development and marketing of "functional foods," development of a food safety program designed to increase the safety of prepared food products, and an applied "problem solving" research program to design novel processing equipment.

Short Term - New methods of supporting industry goals are developed as well as a new method of coating snack foods.

Medium Term - The implemented food processing methods, particularly the electrostatic coating of snack foods, reduced processing costs.

Long Term - Within the Center for Innovative Food Technology project, improved methods of food processing leads to reductions in processing expenses, increased shelf life of certain items, and improved consistency of Swiss cheese. These items translate into consumer benefits and industry advances.

Case 2

A McIntire-Stennis project by the University of Minnesota on "**Measurement, Modeling, and Information system tools for forest ecosystem management**" was conducted to evaluate current and emerging technologies that can increase the efficiency of data acquisition and to implement forest growth modeling methodologies that address the current and projected needs for silvicultural evaluation. The investigation demonstrated that a new high-end GPS receiver that runs the Windows CE operating system improved efficiency of data collection significantly. Also, two growth models (PnET-II and 3-PG) implemented, showed that temperature input has the largest impact on change in predicted net primary productivity (NPP) for which climate change can have far reaching implications.

Short term: Developed process level database, software, statistical sampling techniques and modifications

Medium term: Application of these software sampling techniques and modifications led to improved accuracy and precision of resource estimates and measures, and vastly improved databases.

Long term: More effective forest policies, continuous resource inventory and monitoring will lead to a sustainable resource base.

Case 3

Coded as 100% KA 901, "Synergism **in Veterinary Medical Research Through Statistical Collaboration and Consulting,**" an Animal Health Formula Fund project at Mississippi State University (01 JUL 2000 – 30 JUN 2006), is most appropriately described as a KA 901 success story. Starting in July 2000, this project's approach was to 1) participate in all phases of the research process including experimental design, data collection, and organization, data analysis, interpretation of results, and preparation of results for publication; 2) educate researchers through the consulting process, courses, seminars, and manuscript and proposal reviews; and 3) extend existing theory and methods to address statistical issues related to specific research projects, adapting

existing methods to unsolved problems in new areas. This was to be done through the achievement of the following objectives: a) engage in collaborative research in the veterinary medical sciences and related disciplines, b) promote the use of efficient experimental designs and modern statistical techniques, and c) develop new and/or improved statistical techniques in conjunction with specific research projects.

Short Term **-** Collaborations are formed between statisticians and biomedical researchers and communication is established/improved and researchers are being more educated in statistical sciences.

Medium Term **-** The more prudent application of statistical experimental design and analysis techniques will ensure that animals are not being wasted and that research is being conducted efficiently and in a scientifically rigorous manner.

Long Term **-** Veterinary medical research will be statistically valid, humane, cost-effective, and timely in order to benefit food animals, companion animals, wildlife, and human health and well-being in Mississippi and the nation.

Impact **-** The research collaborations between the statisticians and the biomedical researchers during 2004 led to 2 papers published in refereed journals, 2 papers accepted for publication, 1 abstract presented, and 2 grants awarded. This project encompassed 35 scientists and 26 students, and integrated research with education and extension activities.

Case 4

A HATCH Formula Fund project (01 JUL 2000 – 30 JUN 2005) supported work at the University of Nebraska ("Geospatial Analysis and Animal Disease") to combine geographic information system (GIS) technology with field data collection and spatial analytical techniques to address animal health problems which impact Nebraska and the global community.

Short Term **-** A new method to study spatial patterns of animal disease was developed.

Medium Term **-** The newly developed method to study spatial patterns of animal disease was implemented and provided better pictures of disease dynamics.

Long Term **-** A better understanding of spatial patterns of animal disease led to recommendations for changes in how humans and pets interact with urban wildlife; and the development of regional guidelines for disease control in cattle.

SUCCESS STORIES

Case 5

Scientists use statistical analyses to make sound interpretation of their research results. **The Statistics and Biometrics Consulting Service at Cornell University** provides statistical assistance to the Cornell researcher community. They provide guidance to researchers from a broad variety of disciplines across the biological, physical, and social sciences in designing experiments, collecting and analyzing data, and drawing appropriate conclusions from the results of their studies. This is important in order to provide meaningful results in an efficient and effective manner. They also work to develop and refine new tools to advance the science of statistics.

Short Term – The Cornell University Statistical Consulting Service assists researchers with the selection of appropriate experimental design and direction for analysis of results for their research projects. This allows researchers to assess the probability that apparent differences that are observed in the data are the result of real differences as opposed to accidental variation or artifact. New tools are also developed and refined.

Medium Term – Statistical advice from consultants is used by researchers to direct analysis of data, to ensure correct interpretation of results, and to maximize retrieval of data for research efforts. This is important because depending on how the data is handled unintended results can arise. Also, the statistical staff may use the experimental data derived to refine statistical methods.

Long Term – This project has resulted in new and refined statistical approaches that results in more efficient and effective experiments and provide conclusions that are accurate and appropriate, both of which increase the quality of the research projects.

This refinement and modification of existing statistical tools, and where necessary development of new tools, help address the needs of the individual researcher and at the same time improves research methodology.

Impact – The extensive list of publications (54 reported between the years of 1996-2003) by Cornell Agricultural Biometric Services demonstrates that the program is serving the Cornel research community very effectively. In fact, Cornell University was one of the pioneers in Agricultural Statistics and as evidenced by their report they still play an important role in actively advancing statistical science. New and improved tools they have developed are used by scientists nationally. Some examples of these projects include: Cornell plant scientists in collaboration with statistical staff developed regression analysis techniques to differentiate between resistant and susceptible tomato genotypes for multiple strains of pathogenic fungi. Another example is the development of a standardized donor selection (SDR); a tool for evaluating and improving organ procurement in the United States (see evidentiary materials for other examples).

Case 6

Product quality in wood composite manufacturing relies heavily on periodic destructive test for its assessment. Increase in the number or frequency of tests to determine the physical properties (measure of quality) of wood composites can enormously increase the cost of production and can slow production as well. This study attempts to provide an alternative to destructive tests through predictive modeling. Using advanced statistical and computational algorithms, different algorithmic solutions (models) were derived.

Short term Outcome: A new knowledge on how to test wood composite quality nondestructively was developed. This knowledge is embodied in new algorithmic systems which incorporate time lags and statistical estimates of 285 critical process parameters with data quality verifications.

Mid-Term Outcome: Application of one of these genetic algorithms in a medium density fiberboard (MDF) resulted in a cost saving of $700,000 over a six-month period through its reduced resin usage.

Long-term Outcomes: With continuous refinement and increased sensitivity of this GA system, this will lead to a lower rate of rejected panels, faster throughput, effective identification of sources of product variability, lower wood usage, and improved wood yield, which ultimately lead to increased profitability and manufacturing stability.

Case 7

The determination of the rate of telomere shortening which happens in a very narrow window during the age of a cell is a breakthrough in knowledge. This finding is important since telomere shortening is associated with the normal aging process that is altered by telomere "stability" leading to cancers in humans and animals. In other cross-cutting projects, this KA has enabled researchers to predict the stage of lactation in Holstein cows which is most prone to developing mastitis and related infections. Furthermore, longevity analysis was used to determine genetic heritabilities of dam-related diseases in lambs and pigs. In addition, statistical models that combine phenotypic and molecular genetic records (for example, chromosomal markers associated with milk production in cows) have been helpful in selection decisions to alter the persistency of milk production or the somatic cell score fluctuations during lactation and for further fine genome mapping studies. These findings provide opportunities to change management and selection practices to improve economic returns for live stock industry. The bio-economical characterization of factors associated with the livestock longevity will assist in identifying bottlenecks and improve production, economic efficiency and well-being of breeding populations.

NEW DIRECTIONS

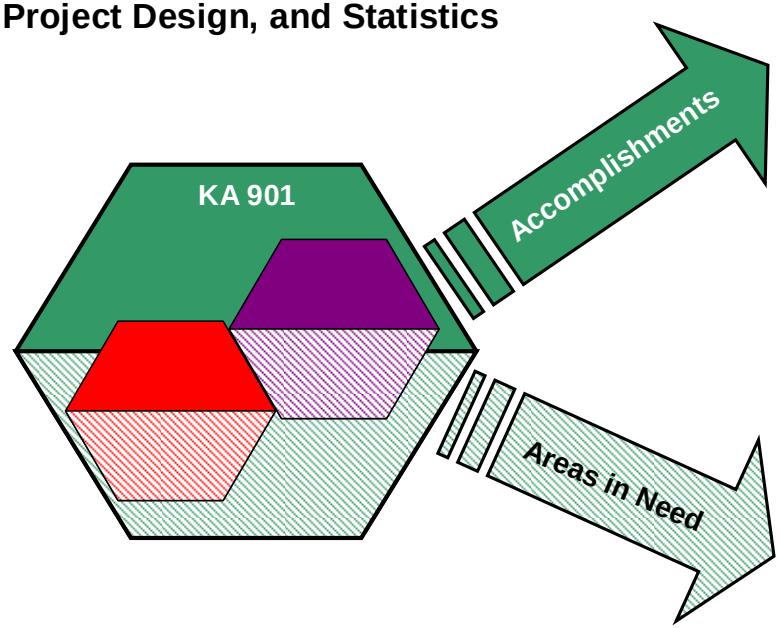
1) The development and use of innovative food technologies will continue to be an integral part of the bioprocess and food technology/food safety fields. CSREES NPLs will have to make thoughtful assessments of the national need for support of these topics.

2) The development and use of current and modern statistical analyses, experimental designs, and sophisticated modeling techniques will continue to be important in Animal Health and Disease related fields, including plant animal genomics and geostatistics. CSREES NPLs will have to carefully assess the national need for support in this area if this is to grow and become a robust tool in the sciences.

3) As an overall new direction for both themes under this KA, there currently is no National Program Leader working under this knowledge area. A NPL needs to be designated at the earliest possible time to coordinate efforts and initiatives in this knowledge area. The agency could benefit from a program evaluator/statistician type of National Program Leader who could reside under ISTM and provide expertise and assist with the management of projects in this KA or could reside under the Planning and Accountability Office to assume additional responsibilities.

Figure III-13

Knowledge Area 901: Program and Project Design, and Statistics



KA 901 - Major Themes

- Development and Description of Statistical Methods/Design Concepts
- Application of Statistical Methods and Project/Program Design

- •FRAGSTATS, a computer software program, has become the world's leading software package for the calculation of landscape metrics. It is estimated that 10-20% of the papers published in the discipline's leading journal, Landscape Ecology over the last 5 years used FRAGSTATS.
- •Cornell University was one of the pioneers in Ag. Statistics. Their Statistics and Biometrics Consulting Service had developed new and improved tools that are used by scientists nationally on projects in a broad variety of disciplines.

- •Experimental designs and relevant statistical competencies will continue to be critically investigated
- •Development and use of current and modern statistical analyses and experimental designs

Knowledge Area 902: Administration of Projects and Programs

OVERVIEW

Knowledge Area (KA) 902, "Administration of Projects and Programs," is focused on efficiency and effectiveness of research, education, and extension activities. Included in this KA is work on maximizing researcher, faculty, and facility productivity, and on better coordinating research, education, and extension efforts among scientists and educators throughout the nation.

Work is usually classified entirely or largely in KA902 when the effectiveness and efficiency of the research and/or education and/or extension undertaken is itself the goal of the project, or is intertwined with the administration of a program or project. Most of this work can be characterized by three general themes:

- **Programs** in new/emerging areas of knowledge/application and/or broad areas of knowledge/application where the administrative management functions such as priority setting, project solicitation, peer review, oversight of projects/subawards, etc. are a significant share of the funded activity and are carried out by regional centers or host institutions in collaboration with CSREES;
- **Projects** in which the focus is on the effectiveness of research, education and/or extension in general or in a particular area of research, such as biotechnology;
- **Activities** that contribute to more efficient and effective research, education and/or extension management through improved procedures

From 2000-2004, the majority of the funding from CSREES in KA902 (89% of the funding tracked in CRIS) was in one program in the first theme: the Sustainable Agriculture Research and Education (SARE) program.

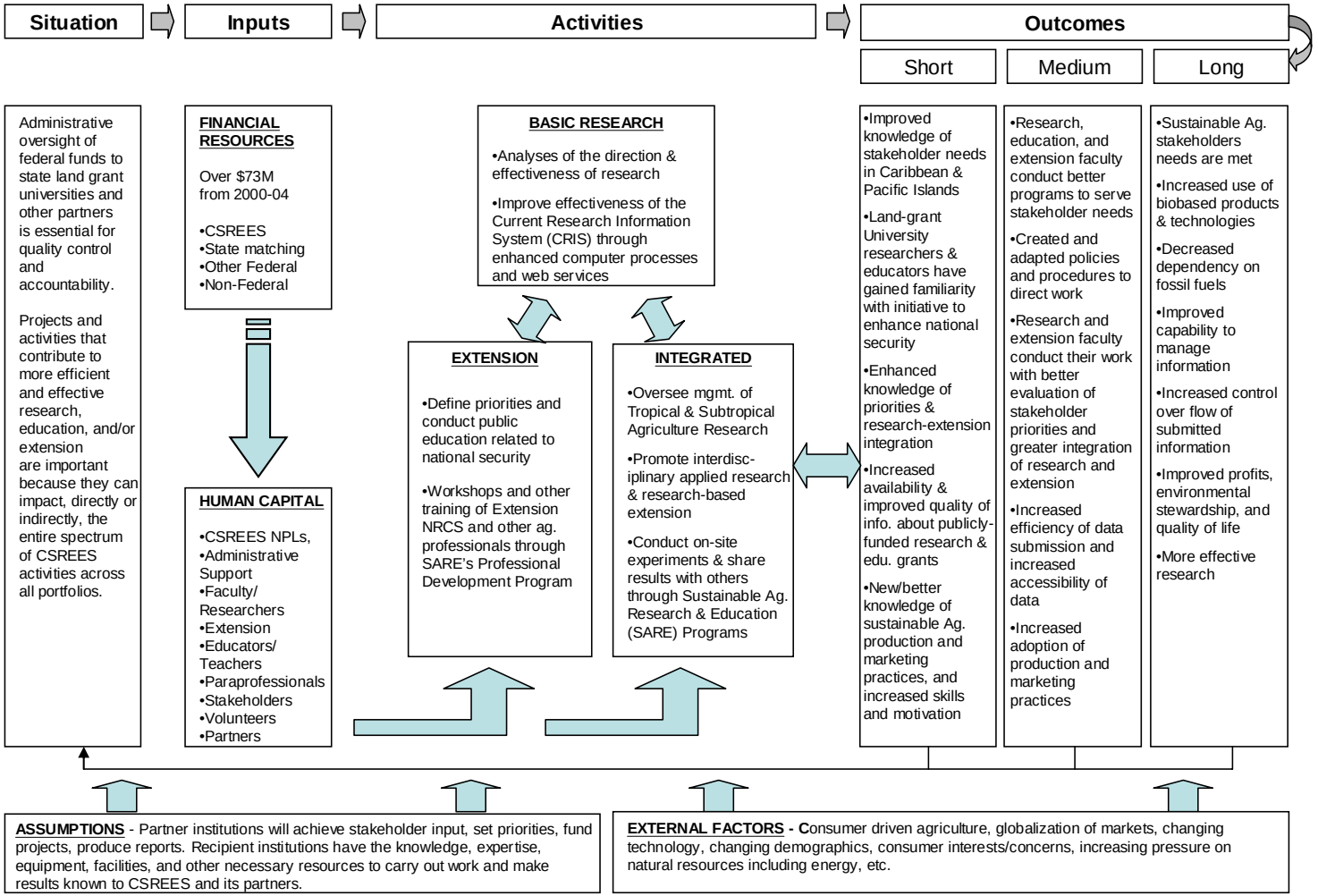
KA902 also includes some additional projects that provide administrative support or complement broader efforts reported in the portfolios that address goals appropriate to those subjects. An example of these includes decision support, facilitation, and special projects for Integrated Pest Management (coded partially in KA 902) which contribute to accomplishments previously described in the CSREES Plant Protection Portfolio.

KA 902, Administration of Projects and Programs, contributes to many CSREES goals and so could arguably be included in every CSREES Portfolio. It is discussed in Portfolio 2.1, because to "support increased economic opportunities and improved quality of life," is a broad societal goal to which other strategic goals of CSREES contribute. For example, SARE supports considerable research on plant and animal production and protection, but in the context of broader program goals that emphasize economic prosperity and quality of life outcomes.

The examples and success stories below describe in more detail how each program addresses specific outcomes that contribute to CSREES Goal 2 and Objective 2.1.

Figure III-14

Portfolio 2.1: Expand Economic Opportunities through Economic and Business Decision-Making
KA 902: Administration of Projects and Programs



SITUATION

Administrative oversight of federal funds to state land grant universities and other partners is an integral part of every project approved by CSREES and is essential for quality control and accountability. In many situations the administrative costs are built into individual project budgets. Although often not specifically identified, this cost is nonetheless considered part of the project activity. In other situations, the administrative costs may be represented as an explicit but small part of the activity coded in the CRIS. Here we will describe only those activities for which KA 902 is a central and major focus.

Projects and activities that contribute to more efficient and effective research, education, and/or extension, while a small part of the CSREES portfolio, are important because they can impact, directly or indirectly, the entire spectrum of CSREES activities across all portfolios.

Programs like Sustainable Agriculture Research and Education (SARE), where the administration of the program is a shared responsibility of CSREES and regional partners, are valuable because their regional structure puts both stakeholder input and the delivery of program impacts "closer to the ground" where stakeholders can more easily interact and identify with the program. Involving land-grant universities and other partners and stakeholders in shared leadership of regional programs also helps all parties understand and appreciate each others' contributions, thereby building more understanding and support for the entire partnership. Regionally structured programs, however, put administrative responsibilities and costs on the regional partners, and require appropriate leadership at the national level to ensure that national goals are met and cross-regional coordination is achieved.

ASSUMPTIONS

These projects are awarded to the recipient institutions with the assumption that the recipients can perform the required administrative functions effectively and efficiently. For example, programs with a regional administrative structure which award competitive grants as subawards (e.g., SARE, T-STAR, Sun Grant) are expected to take stakeholder input and follow review and selection processes that produce projects focused on the highest priority issues with the highest quality science. The institutions are expected to provide financial and programmatic oversight to ongoing projects including appropriate progress and termination reports. CSREES participation and oversight of these projects assures that such assumptions are met.

Other assumptions underlying all projects (determined through project selection procedures and monitored through ongoing post-award management) are that recipient institutions have the knowledge and expertise, equipment, facilities, and other necessary resources to carry out the work and make the results known to CSREES and its partners.

EXTERNAL FACTORS

The limited pool of funds and the many concerns of stakeholders put a great deal of pressure on the research community to focus on the very highest priorities and manage those resources for maximum efficiency. There is a need to coordinate across programs and funding sources to avoid duplication or gaps in coverage.

Some of the factors affecting the content and priorities of research, education and extension in KA902 include: consumer-driven agriculture, globalization of markets, changing technology (e.g., biotechnology, information technology), changing demographics in agriculture and rural communities, increasing consumer interest in environmental and community impacts of agriculture and food systems as well as nutrition, taste, and other traditional characteristics of food, and increasing pressure on natural resources including energy.

INPUTS

The financial inputs include CSREES funding, required matching state funds (in some cases), and may include other federal and non-federal funds. As shown in the tables below (which reflect only the funds that are tracked in CRIS) the majority of the funds in this knowledge area are supplied by federal sources administered by CSREES (78% from 2000 through 2004), with the second largest share supplied by state appropriations. The dominance of federal funds in this KA, in contrast to the average of 52% from CSREES across all KAs in Goal 2.1, may be due to two reasons. First, it is logical that the federal agency has a particular interest in the effectiveness of the research/education/extension endeavor itself, whereas other funding sources are more likely to be targeted instead at specific problems in production, marketing, communities, etc. Secondly, the largest program in KA 902 (SARE), does not require matching funds, although there is considerable leveraging in SARE that does not appear in the CRIS tables, for example, host institution support (since SARE pays no indirect expenses) and volunteer time contributed by members of the regional Administrative Councils and review panels.

Of the funds supplied by CSREES, the largest share is in the “Other CSREES” category which includes the Research and Education funds of the SARE program, which accounts for 89% of the CSREES funds from 2000-2004. Next largest is Special Grants, which include the T-STAR and Sun Grant programs. KA 902 is not a central focus of research projects in NRI programs, and therefore expenditure levels for KA 902 in the NRI are small and occasional. Because the productivity of agricultural research investments can impinge on our ability to “improve the performance and competitiveness of U.S. food, fiber, and bio-based products in domestic and foreign markets,” the intent of the Markets and Trade program, the NRI periodically funds meritorious proposals to conduct research on resource allocation, policy design, incentive structures, intellectual property, and other productivity constraints—all aspects of KA 902, the administration of projects and programs. In the 15 year history of the Markets and Trade program, such research projects have been funded approximately every five years; indeed,

funding table III-17 below indicates just one major NRI investment in KA902 during the five year span of review.

The funds in CRIS for KA 902 grew moderately from 2000 to 2002, and then leveled off or slightly declined. Most of this change was due to changes in appropriations by Congress for SARE's Research and Education funding line, which Congress increased steadily from 2000 to 2003 and then reduced by 10% in 2004 along with many other CSREES programs (the cut was not targeted at SARE or KA 902). Over the same period, state appropriations gradually declined, and special grants gradually increased. Both of these trends are general trends in funding rather than specific to KA 902.

The funds reported in these tables represent only those projects that are in the CRIS database, which does not currently include Extension activities, so extension activities are severely under-reported in these financial tables. For example, the Extension funding line for SARE's Professional Development Program added another $3-4 million per year during 2000-2004 that is not reflected in these tables. CSREES is working to incorporate all research, extension and education funding lines into its database in future years.

Table III-16: Funding from All Sources for KA 902 during 2000-2004

	Fiscal Year *(in thousands)*					
Funding Source	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-2004**
CSREES	$8,145	$9,575	$12,142	$13,974	$13,203	$57,039
Other USDA	$506	$1,163	$1,346	$1,007	$245	$4,267
Other Federal	$112	$120	$1,355	$183	$182	$1,952
State Appropriations	$3,161	$2,382	$2,322	$513	$663	$9,041
Self Generated	$3	$2	$54	$70	$114	$243
Independent Grant Agreement	$112	$105	$83	$111	$47	$458
Other Non-Federal	$23	$25	$57	$146	$12	$263
Total All Sources	**$12,062**	**$13,372**	**$17,359**	**$16,004**	**$14,466**	**$73,263**
CSREES as a % of the Total	68%	72%	70%	87%	91%	78%

Table III-17: CSREES Funding for KA 902 by Source during 2000-2004

Funding Source	Fiscal Year *(in thousands)*					
	2000	**2001**	**2002**	**2003**	**2004**	**Total 2000-2004**
Hatch	$442	$454	$294	$224	$307	$1721
Mc-Stn	$2	$2	$22	$14	$23	$63
Evans Allen	$0	$0	$0	$0	$413	$413
Animal Health	$0	$0	$0	$0	$0	$0
Special Grants	$121	$50	$813	$867	$1,027	$2878
NRI Grants	$0	$3	$6	$1	$395	$405
SBIR Grants	$0	$0	$0	$0	$0	$0
Other CSREES	$7,580	$9,066	$11,007	$12,868	$11,038	$51,559
Total CSREES	**$8,145**	**$9,575**	**12,142**	**$13,974**	**$13,203**	**$57,039**

Human resource inputs include CSREES National Program Leaders, as well as administrators, researchers, extension specialists, support staff, volunteers and stakeholders.

OUTPUTS

Project management results in peer-reviewed proposals and all necessary record keeping including financials records, annual reports and final termination reports. In addition to requiring publication of research results in appropriate media, administrative functions may provide for the evaluation and/or development of innovations and improvements in the management of research. See individual project/program write-ups for examples of specific outputs.

OUTCOMES

Short Term

The shared leadership of regionally structured programs results in knowledge and skills to conduct effective and efficient programs that conform to high standards of accountability. Another outcome is the new scientific and practical knowledge that is gained from the projects that these programs fund. For programs/projects that are applied/integrated (e.g., SARE), knowledge gained by Extension and other agricultural professionals, and even by producers and other clientele, can be a short-term outcome.

Medium Term

Action outcomes include projects that incorporate fundamental policies such as stakeholder input, non-discrimination, and fiscal responsibility, and address the program goals. Outputs include the dissemination of project results, which influence the actions of other scientists, agricultural professionals, farmers, ranchers, policymakers, and others.

Long Term
Direct outcomes include capacity across the partnership to manage programs and perform research, education and extension, and efficient use of system infrastructure and human resources. The long-term outcomes of programs include improved economic, social and environmental conditions for society (as appropriate to the topics/scope of the programs and projects themselves).

PROGRAMS

Case 1 – Sustainable Agriculture Research and Education (SARE)

The largest program in KA902 is the SARE program, which works primarily through competitive grants offered through four regions. SARE grants are aimed at increasing knowledge about – and helping farmers and ranchers adopt – practices that are profitable, environmentally sound, and good for communities. SARE is described in more depth in a "Success Story" below.

Case 2 – Tropical and Subtropical Agricultural Research (T-STAR)

The T-STAR management grants provide resources to oversee management of all the T-STAR grants for the three Caribbean institutions, Universities of Florida, Puerto Rico, and The Virgin Islands, and for two Pacific institutions, University of Hawaii and University of Guam.

Encouragement and coordination from the T-STAR management has resulted in numerous cooperative research projects within and between the Caribbean and Pacific institutions. An outstanding example is the multi-institutional project to develop a predictive model for the impact of and management for invasive species in which all five institutions are participating. The tropical and subtropical areas are important pathways for invasive species entry into the US. Therefore, this work has significance for nation. The management grant has been responsible for the development and maintenance a program web site that provides access to all projects supported by T-STAR and documents accomplishments as projects are completed.

Short Term – Improved knowledge of stakeholder needs in Caribbean and Pacific islands.

Medium Term – Research, education and extension faculty conduct better projects to serve stakeholder needs.

Long Term – Caribbean and Pacific island stakeholders' needs are better met.

<u>Case 3</u> – Sun Grant

The implementation of land grant research, extension, and education programs in renewable energy and biobased products is critical to the sustainability and viability of alternative energy sources in the United States. In 2000, Congress passed the Biomass Research and Development Act of 2000 to implement a multi-agency effort in biobased industry research, with USDA and Department of Energy taking the lead. The purpose of the Act was to implement research through grants, contracts, and assistance in order to stimulate collaborative research and development in biomass processing, enhance creative and imaginative approaches leading to biomass processing, and strengthen the intellectual resources of the United States.

A special research grant project, The Sun Grant Initiative (CRIS Accession Numbers 0191700 and 0200354), is a developmental research project coded at 100% KA 902. The Sun Grant Initiative was established to define priorities and conduct public education in regards to the initiative. The mission revolves around enhancing national security through the development, distribution, and implementation of biobased energy technologies; promoting diversification in and the sustainability of agricultural production in the United States through biobased energy and technologies; promoting economic diversification in rural areas through biobased energy and product technologies; and enhancing the efficiency of bioenergy and biomass research and development programs through improved coordination and collaboration between the USDA, DOE, and land grant colleges and universities. The five universities selected as regional Sun Grant leaders (South Dakota State University, University of Tennessee, Oklahoma State University, Cornell University, and Oregon State University), have held regional conferences. The conferences have informed other land grant colleges and universities about the Sun Grant Initiative and resulted in a proposed administrative structure to support the future activities of the initiative. A comprehensive summary of research, extension, and education activities, as well as centers and partnerships have been created encompassing many participating land grant universities and colleges. The active participation of the National Association of State Universities and Land Grant Colleges (NASULGC) has also been instrumental in propelling the project forward.

Short Term – Land-grant university researchers and educators are familiar with the initiative and are prepared to contribute as appropriate.

Medium Term – Relevant faculty have created and adapted policies and procedures to direct the work.

Long Term – The quality, quantity, scope and relevance of Sun Grant projects and products will be optimized. Ultimately, as a result of the integrated research, extension, and education conducted under Sun Grant, there will be an increased use of biobased products and technologies, and a decreased dependency on fossil fuels.

PROJECTS

Case 1 – Research-Extension Integration and Priority Setting

A formula funded project (CRIS Accession Number 0165276) by Cornell University promotes interdisciplinary applied research and research-based extension to effectively address critical issues identified with stakeholder input**,** and to serve as a vehicle for achieving integration of research and extension activities.

Short Term - A statewide committee of the Cornell University Agricultural Experiment Station and Cornell Cooperative Extension developed improved knowledge of priorities and research-extension integration.

Medium Term – Research and extension faculty conduct their work with better evaluation of stakeholder priorities and greater integration of research and extension.

Long Term – Stakeholders' needs are better met by university research and extension.

Case 2 - Innovation and Dynamic Efficiency in Agricultural Biotechnology
(Consortium project with Cornell, Rutgers and ERS.)

The goal of the project was to provide a more complete understanding of the generation, transfer, diffusion, and impacts of innovations in agricultural biotechnology. Studies were carried out to examine incentives and impacts along the technology chain from research investments, research resource allocations, and finally to farmer adoption, and economic impacts on producers, industry and consumers. This was funded as a research project, with strong outreach. In addition to producing academic publications, approximately fifty presentations discussing the impacts biotechnology were made to a wide range of audiences.

Short Term -- Policymakers, industry, farmers, and consumers have a better understanding of biotechnology issues, and scientists have increased knowledge of economic issues related to their work.

Medium Term – Policymakers make more informed policies, scientists conduct more informed research, and farmers and consumers make more informed decisions.

Long Term – The public is better served by biotechnology research, education and extension.

Case 3 – Public Goods and University-Industry Relationships in Agricultural Biotechnology

In collaboration with the Pew Initiative on Food and Biotechnology, this project convened an expert workshop of leaders from academia, industry and government to identify the most salient issues related to university-industry research relationships (UIRRs) in agricultural biotechnology. The workshop report (http://www.agri-biotech.pdx.edu/Pew_UIRreport-FINAL%20use%20this.pdf, included in evidentiary materials) recommended priority areas for investigation.

The project also conducted case studies of intensive interviews of scientists and administrators at five major land grant universities supplemented with interviews at four other universities and of scientists and managers at several biotechnology firms to understand the motivations, constraints, advantages, and limitations of university-industry research relationships (UIRRs). In addition, a national web survey of 1441 university life scientists engaged in molecular-level research with implications for agriculture, forestry, and aquaculture was conducted.

Short Term – This project improved awareness and knowledge about the potential effects of UIRRs in agricultural biotechnology.

Medium Term –- The project findings can inform actions by universities, firms and governmental agencies to manage UIRRs in ways that provide both publicly accessible science on agricultural biotechnology and enhance the commercialization of useful discoveries.

Long Term -The intended long term effect of the project is to improve the social productivity of UIRRs in agricultural biotechnology. One prime target is to improve the state of basic and publicly accessible science. Another is to foster UIRRs in agricultural biotechnology that not only deliver more and faster commercial discoveries for private interests, such as farmers and food manufacturers, but also contribute more public goods, such as facilitating improved environmental management by small and large farmers.

ACTIVITIES

Case 1 – Improve the Effectiveness of the Current Research Information System (CRIS) to CSREES Cooperating Institutions

Two projects (CRIS Accession Numbers 0182964 and 0198992) were awarded to the University of Vermont to improve the effectiveness of Current Research Information System (CRIS) specifically to CSREES cooperating institutions through enhanced computer processes and web services. These projects do not fall distinctly in research, education or extension but are efforts supporting improved communications of

information about other project efforts in research, education and extension performed in agricultural and related areas.

Submission of effective project information to the Current Research Information System (CRIS) necessitates the completion of several federal forms required to document USDA-funded research. These projects support development of systems and provide maintenance for electronically submitting the required information and ensure the information is complete and accurate before it is submitted to the primary CRIS database. These projects contribute at the front end of an overall objective to improve the communication process making information on activities in research, education and extension supported by CSREES and other USDA agencies more accessible for distribution, decision making, and planning.

Short Term –More and better information about publicly-funded research and education grants is available through CRIS.

Medium Term – Recipients of funding submit their data more efficiently, and users find data more accessible on the CRIS web site.

Long Term - Administrators at cooperating institutions to have much improved capability to manage information about their institution's research and more control over the flow of information submitted to CSREES.

<u>Case 2</u> – Ag Biosecurity: Best Management Practices for Handling Hazardous Non-Select Agents at State Agricultural Experiment Stations and Agricultural Colleges

Agricultural research administrators need science-based risk analysis tools that will assist them in the development of best management practices for the routine handling of potentially hazardous non-select agents in diverse local environments. This project is working to develop science-based site security and risk assessment guidelines including identification of priority non-select agents, as well as development of guidelines for site security assessment and best management practices for managing non-select plant, animal, and zoonotic agents.

Agricultural research facilities contain a vast array of potentially hazardous biological agents that are relatively assessable. These materials could be vulnerable to theft for use in bioterrorist acts against the public; research and university facilities may themselves be the targets of an attack. Congress has required the Department of Agriculture (USDA) and the Centers for Disease Control (CDC) to provide regulations for laboratories handling a list of “select” high risk biological agents; however, these regulations do not address the vast array of potentially hazardous “non-select” biological agents (HNSA) and materials that are routinely utilized in agricultural research facilities.

Responding to security concerns raised by a USDA Inspector General's report on site visits to university agricultural research facilities, the National Institute for Agricultural Security (NIAS) and a coalition of universities proposed the development of best management practices for handling HNSA's at State Agricultural Experiment Stations and Agricultural Colleges, which CSREES funded in the fall of 2003. NIAS and the universities identified expertise, conducted planning, and developed, tested, and refined a decision-making tool to assist research administrators in making informed risk-based decisions about handling HNSAs that would be adaptable to their unique circumstances. The "prototype" decision-tool and the evaluation of its application will be provided to CSREES in the winter of 2006.

Short Term – Researchers and administrators gain new knowledge about best management practices for HNSAs.

Medium Term – Universities will take appropriate actions as a result of the decision-tool recommendations. Managers of research facilities will improve their decision making and avoid unnecessary precautions for benign agents.

Long Term – Society will benefit from increased biosecurity, i.e., decreased human health and environmental risk associated with agricultural research, and research facilities will be more efficient.

SUCCESS STORIES

Sustainable Agriculture Research and Education (SARE) Program

SARE works to increase knowledge about – and help farmers and ranchers adopt – practices that improve profits, environmental stewardship, and quality of life. It does so through competitive grants and other activities carried out by four regional programs with national collaboration and coordination.

The four SARE regions –under the direction of councils that include farmers and ranchers along with representatives from universities, government, agribusiness, and nonprofit organizations – fund approximately 200 projects per year including:

1. Farmer/Rancher Grants (FRGs), in which producers conduct on-site experiments and share results with others.
2. Research and Education Grants (R&Es), in which scientists, producers and others work in an interdisciplinary approach.
3. Professional Development Grants (PDPs), which provide continuing educational opportunities for Cooperative Extension Service staff and other agricultural professionals.

4. Other programs at the discretion of individual regions (e.g. for graduate student projects (in S, NC and W), community development practitioners (S, NE), and educators conducting on-farm research (S, NE, W).

These projects span a wide range of topics including crop production, livestock production, soil and water management, pest management, soil and water management, agroforestry, organic farming, business planning, marketing, value-added processing, and community development. Information on some SARE project outcomes and impacts has been included where topically relevant in other CSREES portfolios (e.g. SARE pest management projects described in the Plant Protection portfolio review), even though those SARE projects are not coded in those portfolios in CRIS. SARE is coded in KA 902 because of its unique model of participatory leadership involving not just regional/national collaboration but also the participation of various stakeholders in regional councils that truly steer, rather than simply advise, the regional programs. These councils ensure SARE's relevance to a broad set of stakeholders and society as a whole. Regional procedures for solicitation, technical review, and selection of competitive grants ensures that the highest-quality projects are funded, in terms of both rigorous science and practical value to farmers, ranchers, agricultural professionals, and the public.

In addition to the regional programs, SARE invests in national coordination and communications, primarily through annual cooperative agreements with the University of Maryland and the University of Vermont. Through these agreements, SARE's national outreach arm, the Sustainable Agriculture Network, draws information from SARE-funded projects and other sources to produce books, bulletins, and electronic resources (see www.sare.org and SAN publications among evidentiary materials) in readable, practical form that farmers, ranchers, and agricultural professionals can readily use.

While the entire SARE program is coded in KA 902 due to its structure, the outcomes below will stress those projects and activities that contribute particularly strongly to the overall goal of 2.1, instead of those more related to other CSREES goal areas such as plant and animal production or pest management. For example, projects related to entrepreneurial agriculture (e.g. innovative marketing, value-added processing, new business planning) are the central focus of approximately 15-30% of all SARE projects in recent years, and a component of scores of others (e.g. on organic agriculture). In addition, SARE in two regions (South and Northeast) is collaborating with regional Rural Development Centers on joint programs that support both sustainable agriculture and community development. (See evidentiary materials for program descriptions.)

One concrete example of SARE's contributions to a particular area of knowledge and practice is in Community Supported Agriculture, in which consumers commit to a season-long share of the harvest of a farm. SARE has funded close to 100 projects on this topic, which is a small but rapidly-expanding approach to marketing and community-building that is very important to many small farmers nationwide.

Short Term - According to SARE's program logic model (see evidentiary materials), the short-term outcomes of SARE R&E and FRG grants are new/better knowledge of sustainable agriculture production and marketing practices (including risks and certainties and economic data) and increased skills and motivation (of agricultural producers and other project participants); the short-term outcomes of SARE's PDP grants are that Extension faculty and other ag professionals have increased knowledge of SARE and sustainable agricultural (SA) practices; increased acceptance of SA practices/principles; increased skills in educational methods relevant to SA practices/principles; and increased awareness of local farmer knowledge about SA.

In a recent survey of Western SARE FRG project leaders, 82% of respondents reported that the information that they gained from their SARE-funded project was "very useful," and another 17% said "somewhat useful."

Recent surveys of Extension agents in the North Central and Western regions show significant knowledge and positive attitudes toward sustainable agriculture and SARE among this primary audience for SARE's PDP. (See evidentiary materials for survey reports.)

In the example of Community Supported Agriculture, SARE funded research in the mid-1990's and again in 2000 to determine the extent to which CSA constitutes an economically viable production and marketing strategy in the Northeast region through surveys of CSA farmers and consumers.

Medium Term - The medium-term (action) outcomes of SARE R&E grants are that project leaders will disseminate research results directly, through SARE's PDP, and through SARE's communications channels, and that that farmers, through R&E and FRG grants, will increase their adoption of production and marketing practices such as value-added production, increased diversification, and reduced use of purchased off-farm inputs. The action outcomes from PDP are that agricultural professionals will increase their integration of SA in all programming (i.e. deliver more educational programs on SA), increase their use and promotion of SAN/SARE results and products, increase referral of farmers to local and/or SARE resources, and participate in on-farm research.

Recent surveys of Western SARE FRG project leaders and their technical advisers show that involvement in a SARE grant led them to seek more information (70% of farmers, 58% of advisers), develop new ideas (86% of farmers, 77% of advisers) and test those new ideas on their farm or ranch (63% of farmers) or recommend that others test the ideas on their operations (71% of advisers). The Western SARE FRG survey documented many changes that farmers and ranchers made in their operations as a result, including:

- Expanded the approach/technology to other parts of the farm or ranch (48%)
- Changed other operations on the farm or ranch (43%)
- Added a new enterprise to the farm or ranch (28%), and
- Obtained new markets for crops or livestock (32%).

The Extension agent surveys in two regions documented, among other things, that three-fourths of Extension agents have led at least one educational program in sustainable agriculture in the past two years.

The results of SARE-funded research on Community Supported Agriculture were shared directly by project leaders, and also through other SARE-funded projects that supported the publication of a how-to book for farmers ("Sharing the Harvest" published by Chelsea Press), a national on-line database of CSA farmers, and a networking conference for CSA farmers. A project funded in 2004 will produce a book on cooperative CSAs.

Long Term - The ultimate goal of SARE (from the standpoint of the customer) is improvement in profits, environmental stewardship, and quality of life. The long-term goal from the standpoint of research/education/extension administration is improved program management.
With respect to the customer goal, the Western SARE FRG survey documented many benefits that the farmers and ranchers attributed to their SARE projects, such as:

- Decreased fertilizer costs (39% of farmers),
- Decreased pesticide costs (43%), increased yield per acre (56%),
- Increased animal production per year (54%),
- Reduced soil erosion (58%), increased soil quality (79%), and
- Increased net income (41%).

Many farmers who operate CSA farms have benefited from SARE's investments in research and education in this topic, including the more than 1,000 farmers who are listed in the SARE-funded on-line database of CSA farms. One notable example is Cheryl Rogowski, a New York state farmer who in 2004 was the first farmer to receive a McArthur "genius" award as a "farmer finding contemporary solutions to the challenges facing family farms." Rogowski, formerly a high-volume, low-margin vegetable farmer, participated in a SARE-funded project in the late 1990s that introduced Community Supported Agriculture to New York City residents. Rogowski says the project changed her and her farm, opening up new opportunities that permanently altered her production and marketing methods and dramatically improved her quality of life.

With respect to the program management goal, the two biggest program improvements within the 2000-2004 review period were the "streamlining" of subawards, and increased attention to impact evaluation. "Streamlining" refers to an agreement between CSREES and the SARE host institutions to place the responsibility for reviewing and approving subawards (i.e., the grants made by the SARE regions) with the SARE regional host institutions. Before streamlining, the subawards were reviewed by CSREES, which often meant delays in customers (grantees) receiving their awards. Part of the streamlining agreement was that CSREES would make site visits to the regions to evaluate how rigorously they are carrying out this responsibility. Site visits in 2004 and 2005 to W-SARE, S-SARE and NE-SARE have resulted in very positive reports. (NC-SARE's site visit is moot since the host is moving institutions.)

Regarding program evaluation, while SARE has always stressed tangible end-user impacts, and conducted or commissions periodic evaluations, until recently it lacked a systematic, program-wide approach to evaluation. An independent assessment in 2002 (see evidentiary materials) was very positive on many aspects of program management (one federal official interviewed by the evaluation consultants called SARE a "jewel in the crown" of federal programs), but noted the need for increased attention to impact evaluation. In 2004 the senior staff of all four regions and the national office developed a program Logic Model (see evidentiary materials), which is being regularly and systematically used to guide program evaluation activities.

NEW DIRECTIONS

The integration of research and extension formula funded programs will continue to increase. Joint planning and priority setting will assure that the most critical issues are addressed and that the results will be made available to the stakeholder promptly and efficiently. The coordination and management of the grants will continue to benefit from the oversight provided by the management grants. CSREES NPLS will continue to provide guidance and encouragement for more integration and coordination. Emphasis will continue to increase on accountability and reporting of impacts and outcomes of funded projects.

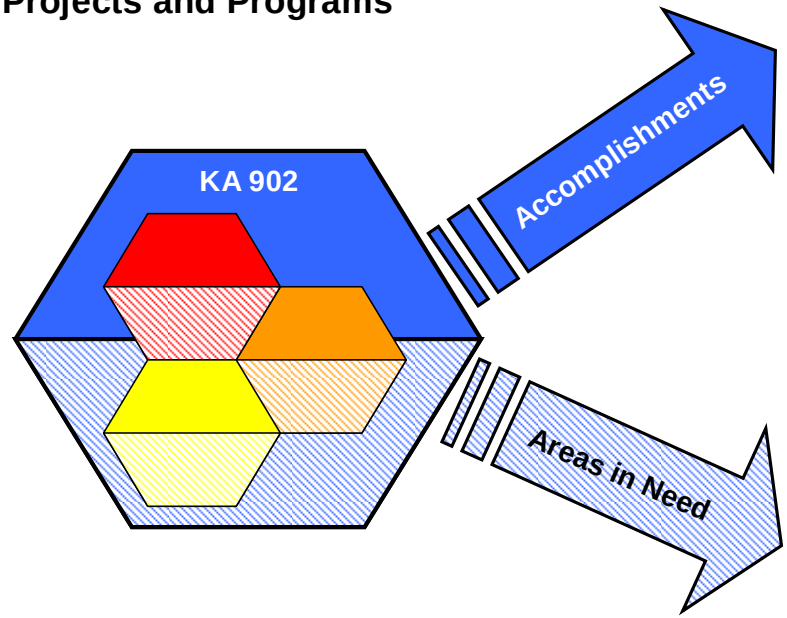
Despite limited funding to SARE in recent years, the SARE regions are adding new types of programs to address emerging needs. For example, three SARE regions (West, South and North Central) have begun offering small grants for graduate student-led projects, increasing the connections to the higher education function of CSREES within a program that is by legislation, primarily focused on research and extension. In another trend, Northeast SARE has joined Southern SARE in partnering with the Regional Rural Development Center in the same region to offer Sustainable Community Innovation Grants. This new program improves SARE's ability to address the quality of life/community goal of sustainable agriculture, as well as leveraging the expertise and resources of two of CSREES's regionally structured programs. Further collaboration among others of CSREES's regionally structured programs is likely to be pursued in the future. In terms of improvements in program management, the SARE regions will continue to increase their attention to documenting program impacts: all four SARE regions are planning evaluations of the impacts of their Research and Education grants.

In FY2004, the National Research Initiative Markets and Trade program funded a 3-year study titled "The Rate and Direction of Agricultural Research at U.S. Land Grant Universities." The research team is lead by Dr. Jeremy Foltz from the Department of Agricultural and Applied Economics at University of Wisconsin. This project is analyzing resource allocation, policy design, and incentive structures in university agricultural research, with a focus on patenting. The project is expected to result in improved understanding of university resource allocation in research, synergies and tradeoffs associated with distinct research outputs (articles, patents, and doctorates), potential changes in the direction of and audience for scientific research (e.g. basic vs. applied, firms for licensing vs. broader public dissemination), and the observable quality of research (in terms of citations, licensing revenues, and other measures). Application of this

knowledge should help program administrators better target projects, resulting in more efficient use of research expenditures. Because of recent programmatic changes to the Markets and Trade program of NRI, however, especially the contraction of program priorities, it is unlikely the program will fund significant future activities in KA902.

Figure III-15

Knowledge Area 902: Administration of Projects and Programs



KA 902 - Major Themes

- Programs with administration shared by regional centers or hosts
- Projects that improve the effectiveness of research, education and extension
- Activities that improve procedures for research, education and extension management

- •Improved stakeholder involvement and program effectiveness through regionally structured programs (e.g., SARE's documented benefits of farmer-rancher grants)
- •Improved effectiveness of research, education and extension (e.g., better public knowledge of biotechnology impacts)
- •The Current Research Information System (CRIS) improved the capabilities of administrators to manage information about their institution's research and better control information submission

- •Programs will continue to increase their attention to documenting program impacts and to integration of research, education, and extension
- •Stakeholder needs and priorities will continually need to be assessed and evaluated
- •CRIS will need to be further refined and developed to continue as data collection becomes increasingly important

Knowledge Area 903: Communication, Education, and Information Delivery

OVERVIEW

Knowledge Area 903 encompasses the various aspects of teaching and learning, including formal and informal education, necessary to the development of a knowledgeable workforce and an informed citizenry that are the key to advancing economic conditions and expanding opportunities in rural America. KA 903 represents the efforts of CSREES to advance economic and business decision-making through the development of human capital. In this way, KA 903 addresses USDA/CSREES Strategic Goal # 2: Support increased economic opportunities and improved quality of life in rural America. This effort is accomplished through support of formal, classroom-based training at colleges and universities, communication and outreach to the general public, education programs directed at producers and consumers, projects designed to build the teaching and research capacity and physical infrastructure of rural universities and minority-serving colleges, data and information systems for fact-based decision-making, disseminating knowledge about the global conditions impacting rural areas, and developing partnerships between community-based organizations and educational institutions.

The American food and agricultural system is the world's largest commercial industry and offers a broad, complex array of challenges. American agriculture is being challenged as never before to develop and use new technologies, expand industrial uses of agricultural materials, and operate to be internationally competitive and environmentally sensitive. Education is the key to meeting these challenges. Our success as world leaders in agriculture and in providing our citizens with the best possible life depends on a critical mass of ingenious and creative scientists, educators, and other professionals who can address the challenges of the future.

Just as a productive agricultural system and abundant renewable natural resources are the basic source of our Nation's economic prosperity, a well-trained cadre of scientists, technicians, and other professionals are the driving force behind a food and fiber enterprise that provide us with a safe, abundant, and affordable food supply. Similarly, solutions to the challenges of sustainable agriculture within complex environmental and social conditions are highly dependent upon well-educated and well-informed producers, processors, and consumers of food, fiber, and other natural products. We must strive to maintain the quality of our advanced knowledge workforce, which is the outcome of a higher education system that is the envy of the world. Failure to do so will result in the loss of our competitive advantage.

The increasing complexities of conducting science and business in the future will require more highly educated workers, with degrees in the food and agricultural sciences. However, the Federal role in agricultural education will continue to be debated, as will funds for education initiatives. These programs will be required to justify their existence on a regular basis. While

the successful record of the land-grant university system in partnership with USDA provides a sound basis for significant future contributions, it will have to be repeatedly justified.
In order for U.S. agriculture to compete in today's global market, a number of production, economic, and policy issues must be addressed by research, education, and extension. Continued advances in biotechnology, precision farming, disease epidemiology, and animal and human nutrition will improve agricultural production efficiency and the quality of agricultural products. The complexity of public policy decisions, as influenced by divergent societal values, economic forces, changing demographics and natural resource sustainability, will be addressed by consensus-building forums. The development of new food and nonfood products such as fuel, paint, plastics, pharmaceuticals and nutraceuticals from agricultural or other bio-based materials will expand the market for agricultural commodities. Some have the potential to minimize our dependence on foreign oil. Better understanding of global markets and improved business and marketing practices can help firms be more successful. Domestic and international policy analysis will identify existing policies that are impediments to trade and development, and lead to alternatives.

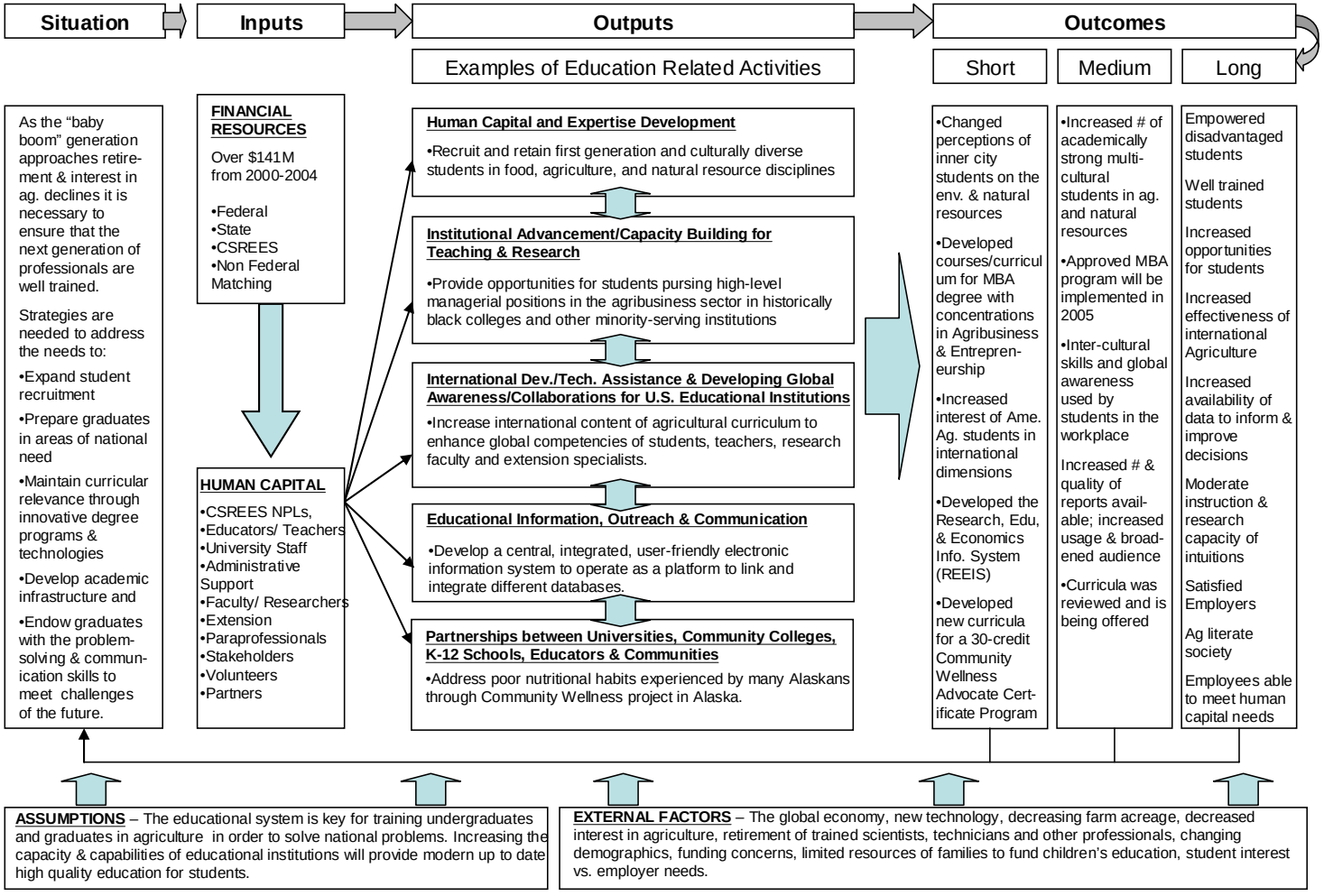
States and local supporters of research, higher education, and extension activities at land-grant universities and other institutions continue to exert pressure to downsize and reduce costs. This will led to reductions in the number of faculty members in the food and agricultural sciences. The long-term effect will be a reduction in the availability of scientists for agricultural research, in the availability of high quality faculty to prepare the next generation, and in professional workers for the entire system.

Recapturing excellence in education will require the contributions of all segments of the Federal government to meet growing national and international challenges. However, agency budget reductions for science and education will restrict resources for such initiatives.

Our CSREES framework for Knowledge Area 903 on Communication, Education, and Information Delivery is based on the Logic Model outlined in the next section of this report.

Figure III-16

Portfolio 2.1: Expand Economic Opportunities through Economic and Business Decision-Making
KA 903: Communication, Education, and Information Delivery



SITUATION

As agriculture matured and became more fully integrated into the social, political and economic structure of the nation, broader issues, including positive and negative environmental and economic externalities, access to and the distribution of the benefits of public investment in agriculture and rural communities, and the sustainability of the scientific workforce have emerged. Breakthroughs in fundamental science, including genomics, microbiology and nanotechnology have raised the bar for the application of science, technology, and practice in producing, processing, marketing and distributing food and fiber products. These sometimes produced additional questions regarding long term risks and benefits, ethics, and domestic and international consumer acceptance. In the post-9/11 environment, the aggregate safety and security of the food and fiber supply, terrorism aimed at food and fiber products, and protecting public health and well being become paramount.

The large "baby-boom" generation of the late 1940s and 1950s is approaching retirement and vast numbers of experienced scientists, technicians, and other professionals will need to be replaced over the next 10-15 years. That is a problem in and of itself. However, the real problem is that the people that will provide those replacements are already in the educational system – and they're not studying science! Minority populations have not historically enrolled in agricultural studies.

Through our programs, CSREES is helping our nation's schools, colleges, and universities develop strategies for the future: expanding student recruitment, preparing graduates in areas of national need, maintaining curricular relevance through innovative degree programs and technologies, developing academic infrastructure, and endowing graduates with the problem-solving and communication skills and the hands-on and collaborative learning experiences they will need to lead scientific inquiry and meet the challenges of an ever-changing world.

CSREES supports education, including extension and human capital development, through grant programs and other initiatives. These programs and initiatives are grouped into five themes according to their objectives, which are:

- Human Capital and Expertise Development (through scholarships, fellowships, teaching awards);
- Institutional Enhancement and Capacity Building for Teaching and Research (including curriculum design and materials development, library resources, scientific instrumentation for teaching, faculty preparation and enhancement for teaching and faculty competency, student experiential learning including internships and service learning, instruction delivery systems including distance education, and student recruitment and retention including educational equity and student financial assistance);
- International Development/Technical Assistance, and Developing Global Awareness and Collaboration for U.S. Educational Institutions in Research, Extension, and Teaching;

- Educational Information, Outreach, and Communication; and
- Partnerships between Universities, Community Colleges, K-12 Schools, Educators, and Communities.

HIGHER EDUCATION

The evolving U. S. system of food, agricultural, and environmental research, education, and extension encompasses the programs of state agricultural experiment stations (SAES); colleges and departments of forestry, natural resources, family and consumer sciences, and veterinary medicine; 1890 and 1994 land-grant institutions and Tuskegee University; other cooperative institutions, including state and private colleges and universities; and USDA agencies (Agricultural Research Service, Economic Research Service, Forest Service, and Natural Resource Conservation Service) and federal departments. Research and extension programs are closely linked to and complement the teaching activities of the land-grant institutions. Additionally, research programs are integral to graduate education, through which scientists are prepared to confront future research challenges. For Science and Education Impacts see: http://www.csrees.usda.gov/newsroom/impacts/04index_pdf.html

This system of publicly-funded research, education, and extension in the areas of food, agriculture, and natural resources supports a diverse, complex knowledge base that is vital to food and fiber production, security, conservation of natural resources, and to the economic well being of the nation. The scientific expertise available through the federal and state research and education system constitutes a valuable national resource with the flexibility to respond quickly to changes in demand, threats to sustainability, and concerns about environmental quality. CSREES contributes a unique national perspective to the network of research, education, and extension partnerships maintained by the USDA and cooperating institutions. This vantage point is essential to the agency's regional and national coordination and tracking of public resources invested to address diverse research and outreach problems.

The Growing Need for Research, Education and Extension

In recent years, the need for problem-solving research and extension activities in food, agriculture, and natural resources has expanded. Changes in this agenda were given impetus by the U.S. Congress when it reauthorized USDA programs under the Food, Agriculture, Conservation, and Trade Act of 1990. This legislation emphasized food and fiber needs, long term viability and competitiveness, improvement of the quality of rural life, the assurance of supply of safe food, and enhancement of the environment and natural resource base. The growing consumer interest in environmental and social issues, as well as the increased complexity of contemporary research problems, has necessitated an increase in multi-disciplinary and interdisciplinary research, education, and extension work.

USDA's higher education mission is carried out in strong alliance with States, universities, and the private sector. Recognizing the significance of this alliance, the Food and Agriculture Act of 1977 designated USDA as the lead Federal agency for higher education in the food and

agricultural sciences. Through the CSREES Office of Higher Education Programs, USDA has implemented the charge with a broad array of initiatives to link teaching, research, and extension and improve the training of food and agricultural scientists and professionals. Most of these efforts were informal until 1984, when the Department initiated the National Needs Graduate Fellowships Grant Program to develop expertise in areas with shortages of scientists. This role was expanded significantly in recent years by implementation of the Higher Education and Secondary Education Challenge Grants Programs, the 1890 Institutions Teaching and Research Capacity Building Grants Program, the Multicultural Scholars Program, the Tribal Colleges Research and Educational Equity Programs, the Native American Endowment Fund, the International Science and Education Grants Program, the Hispanic-Serving Institutions Education Grants Program, and the Resident Instruction Grants Program for Institutions in Insular Areas – all of which are intended to strengthen the quality of education programs at U.S. high schools, colleges, and universities.

The teaching partnership is the most recent addition (1977) to the federal-state partnership comprising research, extension, and education. CSREES teaching initiatives support human capital development through programs that strengthen agricultural and natural resource sciences literacy in K-12 education, improve higher education curricula, modernize institutional academic capacity, and increase the diversity and quality of future graduates to enter the scientific and professional workforce. CSREES assists the nation's schools, colleges, and universities to develop essential strategies to meet future academic challenges. These include expanding student recruitment, preparing graduates in areas of national need, maintaining curricular relevance through innovative degree programs and technologies, developing academic infrastructure, and endowing graduates with problem-solving, communication, and hands-on collaborative learning skills and experiences they will need to lead scientific inquiry and meet the challenges of an ever-changing world.

CSREES Answers the Challenge

CSREES' Science and Education Resources Development (SERD) unit is leading USDA's commitment to human capital development. SERD's grant programs strengthen agricultural and science literacy in K-12 education, influence students' career choices toward agriculture, strengthen higher education in the food and agricultural sciences, prepare graduate students, and train master's and doctoral-level students as future scientists. SERD also provides national leadership for revitalizing curricula, recruiting and retaining new faculty, expanding faculty competencies, using new technologies to improve instruction delivery, attracting outside scholars, developing research and teaching capacity at minority-serving institutions, and increasing the diversity of the food and agricultural scientific work force. (See Section I for a complete list of grant programs that support our efforts.) This diverse portfolio of programs challenges educators to focus on issues important to the future of human capital development in the food and agricultural sciences.

ASSUMPTIONS

- Our success as world leaders in agriculture and in providing our citizens with the best possible life depends on a critical mass of ingenious and creative scientists, educators, and other professionals who can solve the problems of the future.
- Education is the key to meeting these challenges.
- We must strive to maintain the quality of our advanced knowledge workforce, which is the outcome of a higher education system that is the envy of the world. Failure to do so will result in the loss of our competitive advantage.
- States and local supporters of research, higher education, and extension activities at land-grant universities and other institutions continue to exert pressure to downsize and reduce costs.
- Maintaining excellence in education will require the contributions of all segments of the Federal government to meet growing national and international challenges.
- Public support for programs designed to achieve equity and access in higher education and other areas of society will be critical.
- In order for U.S. agriculture to compete in today's global market, a number of production, economic, and policy issues must be addressed by the research, education, and extension.
- Undergraduate training will yield trained professional with the requisite scholarly achievement to enter the workforce or pursue further training at graduate or professional levels.
- Graduate training will yield highly trained professionals with the requisite expertise in the areas of discovery, teaching and learning and engagement in the food and agricultural systems.

EXTERNAL FACTORS

- Global economy; global knowledge
- New technologies (e.g., GMF) and emerging issues (e.g., trade subsidies and bio-terrorism)
- Changing land uses and urbanization
- Changing career aspirations of future professionals
- Level of reward and compensation for professionals in Ag. careers
- Level of interest for women and minorities to pursue careers in food and Ag.
- Level of support for undergraduate education, especially with respect to minority students
- Graduate education in food and agriculture
- Less access to financial support than other science students
- Level of interest for minorities to pursue graduate programs in food and ag. sciences

INPUTS

Inputs into the U.S. system of agriculture research, teaching, and extension activities include money, investments of human capital, and educational infrastructure (classrooms, laboratories, communication systems, electronic and computer capacities, etc.). The funds listed below (see Table III-18) represent only USDA contributions towards grants and other funding instruments. Many of these dollars, however, are leveraged or matched by resources (including scientific and professional staff, as well as donated facilities and operating expenses) from other Federal, state, institutional and other private sources. The monies listed below also do not include those funds spent on Federal staff leadership and coordination.

Financial data for KA 903 is not as straightforward as the other KAs under this portfolio. CRIS, when created some 30 years ago, was set up to handle only research projects; as discussed earlier, education and teaching activities were only recently added in 2003, and extension projects still are not in CRIS. For this reason, financial amounts must be combined from other data sources such as CREEMS, FAEIS, and Budget Office systems. Another difficulty is that KA 903 is funded through over 20 Congressional line items in the CSREES Budget, most of which fall under the CRIS category "Other CSREES." Other CSREES includes funding through competitive and non-competitive grants, administrative discretionary funds, permanent endowment accounts, and special integrated funds. The CSREES administrative unit SERD is responsible for most of the line items contributing to KA 903, most of which are targeted to specific institutional types and/or formal teaching programs. As CSREES moves toward 'OneSolution' where, through a broader approach all research, extension, education and teaching activities can be stored under one system, the data for all KAs, particularly 903, should become much more readily available. Detailed data will be presented during the panel review.

Table III-18: Funding for KA 903 – Communication, Education, and Information Delivery

	Fiscal Year *(in thousands)*					
Sources of funding	2000	2001	2002	2003	2004	**Total**
CSREES Formula	$5	$467	$153	$118	$686	**$1,429**
Other CSREES	$21,135	$28,552	$23,849	$29,352	$29,509	**$132,397**
Non-Federal†‡	$0	$0	$0	$5,378	$5,371	**$10,749**
Total CSREES Funding	**$21,140**	**$29,019**	**$24,002**	**$29,470**	**$30,195**	**$133,826**
Total KA 903	**$21,140**	**$29,019**	**$24,002**	**$34,848**	**$35,566**	**$144,575**
CSREES as % of Total	**100%**	**100%**	**100%**	**85%**	**85%**	**93%**

†Legally-required matching funds (cost sharing).
‡No data available for cost sharing in FY 2000, FY 2001, and FY 2002.

HUMAN CAPITAL AND EXPERTISE DEVELOPMENT

CSREES programs falling under this theme are addressing the key problem facing science education in the near future – the retirement of the "baby boom" generation and the

corresponding need to replace vast numbers of scientists and other advanced-knowledge professionals. Of particular concern are the following issues: (1) Fewer and fewer students and their families have a connection to farms or rural issues; (2) Our Nation's pool of human capital is increasingly composed of minority populations with historically low educational attainment levels and career paths outside of agriculture; (3) One in six Ph.D.s trained in agriculture are exported to other countries; and (5) There are major gaps in the supply and demand for agriculture graduates, especially at the doctoral level and in veterinary medicine.

The Science and Education Resources Development (SERD) unit of CSREES has developed two grant programs specifically addressing the issues identified above – the National Needs Graduate Fellowships Grants Program, and the Multicultural Scholars Grants Program. These two grants programs, together with the CSREES Faculty Fellows Program, the AITC Teaching Awards Program for K-12 Education, the Food and Agricultural Sciences Excellence in College and University Teaching Awards, the WINS Program, and the USDA-1890 Scholars Program comprise the initiatives that fall solely under the Human Capital and Expertise Development theme area. In addition, several other of SERD's higher education grant programs, especially those targeting minority-serving institutions, fund projects addressing student recruitment and retention issues, which also support the Human Capital and Expertise Development theme area. Those projects and their activities and impacts will be discussed in this section of the report.

OUTPUTS

Note that not all of the themes under Knowledge Area 903 have program outputs relating to the three functions of CSREES – research, extension, and teaching. Therefore, only those output functions applicable to each theme area will be reported.

Education

- Performed needs assessments and identified critical areas
- Recommend educational policy and program priorities
- Improved diversity and quality of students entering the food and agricultural sciences
- Conducted education programs in the food and agricultural sciences at the undergraduate and graduate levels

Integrated Programs

- Developed international experiences for faculty and students

OUTCOMES

Short Term

- Increased student access to education
- Diverse, highly qualified students recruited, retained, and graduated

- Employer surveys on human capital needs and requirements for graduates
- Graduates equipped with skills, expertise, and experiences to meet the changing needs of the workforce
- Increased access to and availability of education programs and information in the areas of food and agricultural sciences
- Increased numbers of minority students within agriculture departments and increased graduation rates
- More minority scholarship programs for food and agricultural sciences
- More university-industry partnerships that support minority students in the food and natural resources systems
- Model programs that foster diversity and that can be shared among institutions
- Increased racial/ethnic and gender diversity of undergraduate and graduate students in the food and agricultural sciences

Medium Term

- A diverse set of highly capable individuals recruited and educated, as reflected by, for example:
    - Diverse and highly qualified persons entering training and education programs in the food and agricultural sciences
    - Supply of graduates and trained persons is well balanced with country's employment opportunities and job requirements
    - Higher standardized test scores and high school grades of students entering degree programs in the food and agricultural sciences
    - Increased percentage of students completing their degrees, going on to graduate school, and obtaining well-paid employment in their chosen field of study
- More academically talented students recruited, trained, and graduated in the food and agricultural sciences, especially in specializations with demonstrated shortages of expertise
- Increased state and private support for recruiting and educating students to prepare for careers in the food and fiber system
- Increased number of teacher-training programs for doctoral students, and more doctoral students formally prepared for teaching
- Increased graduation rates within the food and agricultural sciences
- Increased capacity of our Nation's educational system to train students with the experiences and skills needed to meet the food and natural resources needs of society
- Increased number of students with international experiences, and increased number of graduates employed in jobs with an international component

Long Term

- Expertise shortages in critical areas decreased
- A more diversified and higher quality food and fiber work force
- U.S. agriscience and agribusiness graduates compete internationally

DISCUSSION OF SPECIFIC EXAMPLES

The **Multicultural Scholars Grants Program** seeks to increase the multicultural diversity of the food and agricultural scientific and professional workforce, and to advance the educational achievement of all Americans. One example of a successful project from this program is:

Case 1 - Project: University of Vermont – 2001
This project aligns with the national need to promote undergraduate training for students from traditionally underserved sectors of the society by training scholars within the environment and natural resources domain. This training project is increasing the number of academically strong multicultural students in natural resource majors. The project is accomplishing its goals through:

- Recruitment and retention of first generation and culturally diverse students in natural resource disciplines
- Developing a mentoring framework and pipelining Scholars to meaningful experiential learning opportunities, leading to careers in building more sustainable and ecologically sensitive communities

This project empowers disadvantaged students and fostering their success. It has changed perceptions of the environment and natural resources in students from inner cities, and developed a successful framework for meeting the training needs of first-time entrants into the environment and natural resources disciplines. (See the Evidentiary Materials for more information about this project.)

The **National Needs Graduate Fellowships Grants Program** encourages students to pursue and complete graduate degrees in areas of the food and agricultural sciences for which development of scientific and professional expertise is designated as a national need. A successful example of a project from this program is:

Case 2 - University of Arizona – 2002
This project aligns with the national need to address the looming retirement of available expertise and human capital in the food and agricultural sciences. This project trains doctoral-level students in agricultural biosystems engineering with an emphasis in remote sensing. The project is achieving its goals through:

- Student Recruitment and Retention, including Educational Equity and Student Financial Assistance (stipends for training and funds for international research and study)
- Student Experiential Learning, including Internships and Service Learning. This project is involves graduate fellows in technologically advanced food and agricultural systems. These experiences give the fellows a first-hand awareness of the capability of remote sensing to enhance food and agricultural systems. This

knowledge will motivate and enhance future applications and research. (See the Evidentiary Materials for more information about this project.)

SUCCESS STORIES

Case 3

Data from the National Center for Education Statistics and the Bureau of Labor Statistics (see CSREES publication "Employment Opportunities for College Graduates in the Food and Agricultural Sciences: 2000-2005") indicate that, with the help of CSREES competitive grants supporting human capital development, the supply of qualified graduates during the period (57,175 average per year) was able to keep up with demand (57,785 annual openings per year).

Case 4

Since its inception in 1994, the **Multicultural Scholars Program** has awarded 104 competitive grants totaling over $7.6 million and supporting 405 undergraduate scholars. Program performance over the past five years is indicated in the table below.

Table III-19: Multicultural Scholars Program

YEAR	No. of AWARDS	AMOUNT AWARDED	No. of STUDENTS
2000-2001	22	$1,867,491	96
2002	11	$ 955,000	58
2003	11	$ 994,000	59
2004	6	$ 922,623	31

Case 5

Since it inception in 1984, the **National Needs Graduate Fellowships Program** has awarded 492 competitive grants totaling over $54.5 million and supporting 1201 graduate fellows (M.S. and Ph.D.). Program performance over the past five years is presented below. Note that the program is only offered every other year.

Table III-20: National Needs Graduate Fellowship Program

YEAR	No. of AWARDS	AMOUNT AWARDED	No. of STUDENTS
1999-2000	40	$6,279,000	91 Ph.D.
2001-2002	24	$5,658,000	82 Ph.D.
2003-2004	39	$5,764,525	22 M.S. & 73 Ph.D.

From other SERD grant programs, the following are several examples representing impacts:

Case 6

Glendale Community College in California is strengthening its institutional capacity to attract underrepresented students to degrees and careers in the food industry and related fields. The two-year school will seamlessly transfer students to food and nutrition programs at four-year colleges. Twenty-five students are expected to transfer to a four-year institution during the project.

Case 7

Trinidad Community College is creating career pathways and innovative training in aquaculture for underrepresented students through its Aquaculture Technician Program. In collaboration with the Colorado Division of Wildlife and local aquatic resources owners, more than 16 students have been placed in internships and experiential learning situations.

Case 8

The **Universidad del Turabo** is strengthening recruitment and retention of underrepresented students in its baccalaureate degree program and bringing students to the reality of the nutrition/dietetics profession. The university is providing the skills to overcome obstacles for obtaining a college education. Participants will return to their communities to reduce the present nutrition/dietetics shortage and positively impact the health of underserved communities in Puerto Rico. A total of 40 students have been recruited during the first year of the project.

Case 9

Texas A & M University in Kingsville is teaching and mentoring South Texas students who commonly lack opportunities to improve their skills in a science-oriented job market. Fourteen undergraduate students and four graduate students have received research assistantships. The project enjoys a 100 percent retention rate.

Case 10

The Department of Natural Resource Management at **Sul Ross State University** has partnered with the Institute of Renewable Natural Resources at Texas A&M University to develop a Cooperative Doctoral Program in Natural Resources to enhance experiential learning opportunities for minorities through internships, and strengthen linkages with other Hispanic-Serving Institutions with agriculture programs. The Cooperative Doctoral Program has two outstanding Hispanic Ph.D. students currently enrolled in the program, and an additional four Hispanic M.S. students are being groomed for the Cooperative Doctoral Program. Four baccalaureate students have been recruited for the Program and have been hired as interns.

NEW DIRECTIONS

Projections for the period 2005-2010 from CSREES data ("Employment Opportunities for College Graduates in the Food & Agricultural Sciences: 2005-2010") indicate an estimated 52,000 annual job openings with approximately 49,300 annual qualified graduates for the upcoming 5-year period. However, only 32,300 of these graduates are projected to come from U.S. colleges of agriculture and life sciences, forestry, and veterinary medicine. Other jobs will be filled by some 17,000 graduates from such allied fields as biological sciences, engineering, business, health sciences, communication, and applied technologies. CSREES education programs must lead agriculture colleges around the country to re-double their recruitment efforts. This is especially true in fields preparing future scientists and engineers where only 57% of the jobs are projected to be filled by agricultural and natural resources graduates, and agriculture management and business occupations where only about 50% of the jobs are projected to be filled by agriculture-related graduates.

INSTITUTIONAL ENHANCEMENT/CAPACITY BUILDING FOR TEACHING AND RESEARCH

CSREES programs falling under this theme are addressing the following needs:

- Ensuring that students in the food, agricultural, natural resources, veterinary, and human sciences and related disciplines are receiving a high-quality education that encompasses a well trained faculty using modern pedagogical methods, state-of-the-art equipment and laboratory facilities, and employing a curriculum addressing real-world problems and emerging fields of science; and
- Strengthening the teaching and research infrastructure of minority-serving institutions in order to help them in making a significant contribution to human capital development.

The Science and Education Resources Development (SERD) unit of CSREES has developed nine grant programs specifically addressing the issues identified above, including: (1) Higher Education Challenge Grants; (2) Secondary and Two-Year Postsecondary Education Challenge Grants; (3) Hispanic-Serving Institutions Education Grants; (4) Tribal Colleges Education Equity Grants; (5) Tribal Colleges Endowment Fund; (6) 1994 Institutions Research Grants; (7) Alaska Native- and Native Hawaiian-Serving Institutions Grants; (8) 1890 Institutions Capacity Building Grants; and (9) 1890 Facilities Grants.

A highly productive and efficient food and agricultural system requires a well-trained labor force capable of lifelong learning in a world of rapid and radical change. To ensure an adequate supply of well-trained professionals, educational institutions must use all available resources and opportunities. Colleges and universities need to use innovative curricula and instructional delivery systems to make education more accessible to greater numbers of people.

Developing and making use of the intellectual capital from all segments of our society will help maintain a strong workforce in the food and natural resources systems. To this end, our CSREES programs must also involve the secondary schools, colleges, universities, and technical institutions that are providing educational and professional opportunities for minorities and other segments of U.S. society that have been previously underrepresented. When all of society is represented in the food, agriculture, and natural resources systems, these systems will have access to multiple ideas and points of view. In addition, administrators and educators at all universities should seek ways to nurture and graduate minorities in the food and agricultural sciences.

OUTPUTS

Note that not all of the themes under Knowledge Area 903 have program outputs relating to the three functions of CSREES – research, extension, and teaching. Therefore, only those output functions applicable to each theme area will be reported.

Education

Training to:

- Enhance the teaching skills of current faculty members
- Augment faculty competencies for utilizing modern instructional technologies, including training faculty to work as members of multi-disciplinary teams
- Increase faculty skills in teaching and mentoring students from underrepresented groups
- Increase the number of opportunities for students in the agricultural and environmental sciences to participate in experiential learning programs
- Strengthen and broaden the curricula in the food and agricultural sciences to address emerging issues and critical need areas
- Develop students' analytical, problem solving, and communications skills
- Increase the number of instructional programs utilizing state-of-the-art informational and instructional technologies
- Optimize student learning opportunities and made education more accessible through distance education
- Increase participation of minority-serving and non land-grant institutions in CSREES programs
- Augment the teaching and research infrastructure of postsecondary education institutions

Integrated Programs

- Faculty and students trained in the food and agricultural sciences through participation in international teaching, research, extension, and learning programs

OUTCOMES

Short Term

- Adaptation of innovative information and instructional technologies appropriate for higher education within the agricultural and environmental sciences
- Provision of experiential and international learning opportunities for faculty and students
- Improvement of instruction-delivery systems through the use of cost-effective computer technology
- Courses linked, and curricula and faculty shared, via telecommunications applications
- Increased opportunities for multi- and cross-disciplinary teaching projects

Medium Term

- Increased excellence in food and agricultural sciences higher education programs, as reflected by:
  - Augmented faculty skills and competencies
  - Innovative instructional technologies
  - Strengthened and broadened curricula in agriscience and agribusiness
  - Critical thinking, problem solving, and communication skills in curricula
  - Cost-effective program delivery systems
  - Faculty and students with international experiences
- Maintained the higher education teaching infrastructure
- Strengthened academic programs through relevant curricula and improved teacher competencies
- Enhanced infrastructure and instructional capabilities of 1890 and 1994 land-grant institutions, Hispanic-serving institutions, and other minority-serving institutions
- Promoted excellence in education

Long Term

- Ag graduate's capacity to function in a global environment
- Students and faculty recognizing the vital role agriculture plays in meeting society's needs
- Enhanced ability of minority-serving institutions to compete for and secure high quality students, faculty, grants, and private funding support
- Strong and complementary system for food and agriculture higher education program delivery
- Improved and more effective usage of educational system capacity
- Strengthened academic programs in the food and agricultural sciences
- Graduates better trained and prepared to help solve increasingly complex and global problems
- Educational and scientific infrastructure of system enhanced
- Increased diversity in higher education

DISCUSSION OF SPECIFIC EXAMPLES

Initiated in 1990, the **1890 Institutions Teaching and Research Capacity Building Grants Program** was established to build the institutional capacities of the historically black land-grant colleges and Tuskegee University. This program is designed to strengthen institutional teaching and research capacities, through cooperative programs with Federal and non-Federal entities. It is one of nine of CSREES' programs strengthening teaching and research capacity at minority-serving institutions, or developing model programs for education in agriculture.

Of the many challenges facing the nation today, perhaps none looms larger than the critical shortage of African-Americans and other minorities with advanced degrees in science, mathematics, engineering, and technology fields—including food and agricultural science, biotechnology and related disciplines. African-Americans earned only nine of the 449 doctorates awarded in agricultural sciences in 2001, according to National Science Foundation data. There were almost 50 scientific fields in 2002 in which no doctorates were awarded to African-Americans, including agriculture engineering. Additionally, a study by the Woodrow Wilson National Fellowship Foundation found that only 7 percent of Ph.D. recipients in 2003 were black or Hispanic. This has a direct and detrimental impact on placement of minorities in the scientific and professional agricultural workforce.

Support for graduate education is crucial to the 1890 Land-Grant Institutions and Tuskegee University to allow them to produce a new generation of minority professionals in the food and agricultural sciences and other disciplines in which they remain underrepresented.

Long Term Impacts: The Federal investment in the 1890 Capacity Building Grants Program is helping to increase the pool of qualified women and U.S. minorities for scientific and professional jobs related to the Nation's food and fiber system, and for entry into graduate school. Moreover, Capacity Building Grants are increasing the overall pool of qualified applicants to achieve USDA's workforce diversity goals.

Two examples from the 1890 Capacity Building Grants Program at South Carolina State University are provided below:

<u>Case 1</u> – South Carolina State University, "Planning for the Master of Business Administration (MBA) Degree Program in Agribusiness"– 2003
The primary objective of this grant is to develop courses and a curriculum for the Master of Business Administration (MBA) degree, with concentrations in Agribusiness and Entrepreneurship, which provides opportunities for students pursuing high-level managerial positions in the agribusiness sector. A secondary objective is to promote faculty development to teach agribusiness courses in the MBA program. This project has already had an impact on the State, as the South Carolina Commission on Higher

Education has approved the MBA for the fall semester (2005). Long term, the project will recruit, retain, graduate, and place the next generation of educators, professionals, and practitioners in agribusiness jobs. The MBA degree program in agribusiness will provide an opportunity each year for about 15 to 20 students to train for higher-level managerial positions in the agribusiness sector.

Case 2 - South Carolina State University, "Agribusiness and Entrepreneurship: A Program to Develop Agribusiness Entrepreneurs" – 2004
The primary focus of this grant is to develop graduate and undergraduate courses in entrepreneurship. A secondary objective is to re-tool the faculty to teach entrepreneurship courses. This project will have a ***medium-term impact*** through the development of a new Agribusiness Enterprise Resource Center, which will support the new graduate and undergraduate courses in entrepreneurship that are now being developed.

SUCCESS STORIES

Case 3
The **Seacoast School of Technology**, Exeter, NH was awarded a Secondary Challenge Grant in 2003 to: Sponsor summer institutes for New Hampshire teachers to foster the integration and expansion of agricultural biotechnology in New Hampshire secondary education institutions; Educate citizens on the importance of agricultural biotechnology and of Genetically Modified Organisms (GMOs); Foster change in New Hampshire agricultural and biology education by making agricultural biotechnology education integral in all students' education; and Prepare New Hampshire students for high-tech lucrative jobs in the fast-growing biotechnology industry in the Northeast. Activities to date have included: a student-developed GMO display at the New England Museum of Science in Boston; expansion of a regional biotechnology laboratory to include additional equipment and supplies to enable agricultural applications and projects with the New England Museum of Science; regional workshops and summer institutes; student biotechnology internships, and a new Biotech Curriculum Guide to increase student and teacher competencies, and increase participation in agriculture and biology.

Short-Term project impacts to date have included:

- A minimum of 5000 people visited the New England Museum of Science biotech display
- Development of new collaborations including the Eastern Region Partnership that assisted in preparing the Resource Curriculum Guide and regional workshops
- Summer Institutes provided over 200 NH teachers with the information necessary to integrate agricultural-based biotechnology lessons and labs into traditional biology curricula.

- Through the two summer workshops and the Biotechnology Resource Book, teachers now have the knowledge and means to integrate Agricultural education into traditional biology curricula.

Long-Term project impacts include the following:

- 100% of the institution's Biotechnology students (75 students/year) met 100% of the biotechnology competencies
- 90% of students scored at least an 85% on their project
- 100% of the biotech students completed college credits
- 23% of the biotech students were placed in internships
- 90% received a grade of 85% or higher in Biotech II
- Integration of agricultural biotechnology into the New Hampshire state science curriculum.

Case 4

The University of Illinois, Champaign, Illinois was awarded a 2003 Higher Education Challenge Grant for the "National Assessment of Learner Centered Approaches to Teaching in Colleges of Agriculture" project. The objectives of this project were to: Explore and describe the use of learner-centered methods by teaching faculty in colleges of agriculture in the United States; Conduct and in-depth analysis of exemplary practice in active, inquiry, and service learning approaches by teaching faculty in colleges of agriculture; and, Disseminate findings from the project to serve as a resource for future college of agriculture faculty interested in implementing learner-centered methods. Project activities have included a national survey of over 1000 teaching faculty at land-grant institutions, 12 case studies, and dissemination activities including national and regional faculty development workshops and web-based resources.

Long-Term impacts of this project include equipping teaching faculty with the information to make curricular changes that improve teaching and learning across the disciplines that comprise food and agricultural sciences. Specifically, this has included clearer conceptual definitions of learner-centered instruction and exemplary teaching based on a review of current literature; increased knowledge of learner-centered teaching methods through mini-workshops, national case studies, and the national survey; and facilitation of networking agriculture faculty who share interests in active, inquiry, and service learning.

Case 5

California State University, Fresno is building instructional capacity by improving its interdisciplinary dairy science and technology program. Its Dairy Processing Program is being improved and student learning is being maximized by updating fifty year old equipment, and integrating theory with experimentation and application. Milk and dairy processing equipment for the pasteurization and homogenization of milk and milk products has been installed and tested. The impact of the new equipment is both visible and measurable. Former equipment was manually operated and required constant

attention. The new equipment, purchased with CSREES grant money, is computerized and has made a positive impact on learning. The noise level has been measurably reduced making the plant is safer and allowing for clearer communication for teaching. The new equipment is also more compact allowing more students into the unit during the process. The department anticipates an increase in the number of students enrolling and participating in the Dairy Processing program as result. The project is also affecting neighboring industries. Companies have requested permission to visit the plant and to conduct workshops using the automated equipment. By late 2005, the first group of students will have experienced and learned about dairy processing using the new equipment. Formerly, students had to rely on research or theoretical constructs. The grant project is allowing the university to synthesize the learning experience to include both technology and conceptual design.

Case 6

St. Augustine College in Illinois has improved the facilities of its culinary laboratory to meet industry standards and developed a rigorous internship that places students in the industry. Scholarships have been used successfully as recruitment and retention tools.

Case 7

Coastal Bend Community College in Texas is expanding and strengthening its agricultural curriculum to increase student recruitment and retention through: implementing a learning community; providing scholarship and internship opportunities; offering dual credit courses at rural high schools via videoconferencing; recruiting at high schools and agriculture-related organizations; providing release time for faculty to recruit, mentor, and write curriculum; increasing the number of articulation agreements with area universities; and conducting career workshops. The college president and vice-president head the project's advisory team.

Case 8

One funded project at the **University of Puerto Rico** is a collaborative venture between the Departments of Food Science and Technology, Agronomy and Soils, and Chemistry to create a state-of-the-art instrumentation Liquid Chromatography-Mass Spectrometry laboratory for teaching and research. Acquired equipment has enhanced the educational experiences in food, soils, environmental sciences, physical, and agricultural sciences. The new lab has allowed faculty and students to pursue advanced research problems, respond to the specific needs of government and industry, and expand their analytical and educational capabilities. The project has enhanced the institution's ability to serve as a strong partner in multi-institutional research programs and to compete for funds designated for undergraduate and graduate programs in Food, Soils and Environmental Sciences.

Case 9

West Hills (Community) College has assembled resources to increase the participation rate and retention of Hispanic and other underrepresented students in its agricultural

science instructional programs. This project has impacted West Hills College in its first year by attracting the support and participation of fourteen faculty and administrators who will participate in the implementation of the project in the Fall of 2005. Students will begin studies in all of the Learning Communities courses at that time. The Program has already begun to disseminate information about the new approach to Ag Science instruction through regional consortia.

Case 10

Long Beach City College has installed equipment and developed curriculum to teach the skills needed for success in the horticulture industry. This project is familiarizing students with equipment that is up to industry standards and providing innovative instruction using computers and a variety of learning tools and options. Medium-term impacts include providing educational and career options for students that ultimately lead them toward transfer to a four-year university.

Case 11

California State University at San Bernardino is addressing the shortage of environmental health professionals entering into the workforce through recruitment and retention of bilingual pre-professionals in environmental health science. The project supports paid internships, tuition, and science supplemental education for deserving students and other related project needs.

NEW DIRECTIONS

In recent years, there has been increasing pressure on CSREES grant programs to be used as "replacement funding" for monies that academic departments have lost due to institutional spending reductions in the face of tight state budgets. While funding many cutting-edge initiatives and strengthening instructional capacities in response to "field-initiated" priorities, CSREES awards have lost focus and have not been as responsive to USDA and REE strategic goals as they might have been. Future grants will be targeted more specifically toward advancing Agency priorities and responding to demonstrated National workforce and scientific needs than in the past.

INTERNATIONAL DEVELOPMENT/TECHNICAL ASSISTANCE AND DEVELOPING GLOBAL AWARENESS/COLLABORATION FOR U.S. EDUCATIONAL INSTITUTIONS IN RESEARCH, EXTENSION, AND TEACHING

For the United States to remain a leader in agriculture and continue to compete successfully in international markets into the next century, we must develop food and agricultural scientists and teachers who are outstanding in their disciplines, culturally diverse, and competent in global issues.

The next generation of food and agricultural professionals must be educated in a system that recognizes and responds to the global nature of today's food and agricultural industry.

The Science and Education Resources Development unit of CSREES has developed two grant programs specifically targeting the issues identified above – the International Science and Education (ISE) Grants Program, and the International Thesis/Dissertation Research Travel Allowances (IRTA) Program for National Needs Graduate Fellows – along with several other initiatives addressing the to internationalize U.S. education, research, and extension including major projects in Armenia and West Africa (Ghana and Nigeria).

OUTPUTS

Note that not all of the themes under Knowledge Area 903 have program outputs relating to the three functions of CSREES – research, extension, and teaching. Therefore, only those output functions applicable to each theme area will be reported.

Research

- Developed international research opportunities for faculty
- Provided international research and study experiences for graduate students

Extension

- Planned and implemented international development projects
- Recruited and selected personnel for overseas technical assistance efforts
- Facilitated globalization of U.S. campuses
- Served as a point of contact and clearinghouse for information about international activities
- Collaborated with other government agencies, universities, and national organizations

Education

- Established study-abroad opportunities and other international learning experiences for faculty, graduate and undergraduate students, and secondary school teachers
- Hosted international visitors on campuses and presenting seminars and lectures

Integrated Programs

- Initiated partnerships among education institutions and linkages with public agencies and private sector businesses, both in the U.S. and abroad

OUTCOMES

Short Term

- Significantly more students and faculty with international experience

Medium Term

- International understanding by food and agricultural science professionals increased
- International understanding by students and graduates of agriculture programs increased

Long Term

- Faculty with enhanced skills and competencies in global awareness produce better food systems professionals and U.S. competitiveness in agriculture is enhanced
- Augmented skill and competencies of college graduates contribute to U.S. economic competitiveness in agriculture

DISCUSSION OF SPECIFIC EXAMPLES

Case 1

Authorized in 2002 with funding first available in Fiscal Year 2003, the **International Science and Education (ISE) Competitive Grants Program** seeks to help insure the success of U.S. agriculture, which increasingly depends on international markets, trans-border know-how, and germplasm collected from around the world. The basic assumptions for this program is that strengthening the global competencies of students and their teachers, research faculty, and extension specialists will enhance the competitiveness of American agriculture. The program supports activities that internationalize agricultural teaching, research, and outreach.

Outputs –

- Increased international content of agricultural curriculum;
- Formed international research partnerships;
- Trained extension agents to better serve diverse client populations and internationally-focused commercial interests

Short Term **-** Spurred a greater interest in American agricultural students about international dimensions of agriculture; Encouraged trans-national research teams to investigate problems innovatively.

Medium Term **-** Students entered world of work in agriculture with effective inter-cultural skills and global awareness; Innovative solutions to problems identified through trans-national research; and an Extension system viewed as relevant and helpful to diverse local communities and commercial clients

Long Term **-** Leaders in American agriculture work effectively internationally; Research results address national and global issues; Extension remains responsive to evolving needs of clients

SUCCESS STORIES

Case 2

Texas Tech University (Lubbock, TX) received a $2 million CSREES grant to establish an International Cotton Research Center. This project is conducting a comprehensive research program focusing on enhancing the profitability and sustainability of the cotton industry by integrating the expertise of scientists from several disciplines – genetics, breeding/biotechnology, crop physiology, entomology, microbiology, weed science, soil science, climatology, precision agriculture, agricultural marketing/finance, agricultural policy, textile science, and agricultural communications. Sub-projects in this study are evaluating (1) the effects of genetic and environmental factors on yield and fiber quality; (2) means of increasing producer profitability through reducing the cost of production through more efficient use of water and soil nutrients, and the use of marketing pools; (3) the fiber quality components that are most important in determining the price received by producers; and (4) several different policy scenarios on the demand for and price received for U.S. cotton.

Outputs **-** The information generated from the project is being communicated to consumers, producers, agribusiness industries, merchandisers, and the textile industry.

Short Term - Fiber quality is increasing and playing an ever more important role in the price received by producers

Medium Term - The price received by producers for their cotton is keeping pace with the increased cost of production; Cotton production (yield) on the Texas High Plains is increasing on a per acre basis

Long Term - Demand for U.S. cotton is increased world-wide and is having a large impact on the price received; U.S. economic competitiveness and balance of trade is enhanced.

NEW DIRECTIONS

Recent developments in bringing global awareness and international experiences to students, faculty, and the general public are already having a positive impact on U.S. economic competitiveness. However, in order for the future of American agriculture to continue this success, an international dimension to agricultural teaching, research, and extension must be a central and integral part of higher education – not just an add-on,

part-time, or "special" experience. Toward this end, higher education programs funded by CSREES will endeavor to fully integrate global awareness into academic programs across the board in the agriculture, food, natural resources, and human sciences.

EDUCATIONAL INFORMATION, OUTREACH, AND COMMUNICATION

CSREES programs falling under this theme are addressing the need to make students aware of the enormous variety of agriculture-related careers, and the need to increase the public's understanding and appreciation the role agriculture plays in our Nation's economic and social fabric. A basic understanding of agriculture and science literacy is fundamental to this goal. Specific objectives being addressed include:

1. Providing agriscience and agribusiness career information to students;
2. Co-sponsoring and participating in nation-wide data collection and dissemination efforts about agriculture;
3. Conducting analytical studies on human capital needs and issues in the food, agriculture, and related sciences; and
4. Developing joint instruction initiatives by colleges, universities, and other educational institutions.

OUTPUTS

Note that not all of the themes under Knowledge Area 903 have program outputs relating to the three functions of CSREES – research, extension, and teaching. Therefore, only those output functions applicable to each theme area will be reported.

Research

- Produced data and other information on enrollments and degrees earned at all levels of instruction (high school, associate degree, bachelor's degree, master's degree, doctoral degree)
- Produced data and other information on student placement
- Produced data and other information on faculty, human capital needs for USDA and the agricultural system, and on the supply and demand for graduates in the food and agricultural sciences

Extension

- Disseminated effective instructional methodologies, technologies, and curricula
- Communicated to the public about the impacts of CSREES programs
- Produced publications and Web-based information on enrollment, degrees granted, and employment opportunities
- Generated copyrights for and sales of innovative instructional materials and modules in text, electronic, and visual media

Education

- Disseminated effective instructional methodologies, technologies, and curricula
- Developed partnerships among education institutions and linkages with public agencies and private sector businesses
- Provided students, faculty, administrators, and parents with data on enrollment, degrees granted, and employment opportunities in the food and agricultural sciences
- Produced refereed journal articles by faculty
- Generated copyrights for and sales of innovative instructional materials and modules in text, electronic, and visual media

Integrated Programs

- Developed informational brochures outlining opportunities for extension, education, and research opportunities for U.S. students, faculty, and extension professionals

OUTCOMES

Short Term

- High school teachers and guidance counselors, students and their families are better informed about agriscience and agribusiness careers
- College students and faculty are better informed about employment opportunities in the food and agricultural sciences
- Elementary, middle school, and high school classes are provided with agriculturally-related teaching materials and lessons
- Faculty and college administrators have an increased awareness of emerging agriscience and agribusiness disciplines, career opportunities, and requisite educational preparation needs

Medium Term

- Agricultural and science literacy are being advanced in classes at all academic levels
- Curricula in institutions of higher education are being modified to respond to employers' needs and to prepare students with the knowledge, skills, and abilities they'll need after graduation
- Student recruitment strategies are being modified to reflect current world realities about modern agriculture careers and employer needs

Long Term

- The general public has an increased awareness and understanding of agriculture and of the many opportunities for study and careers in the field
- Skill gaps are being closed and human capital needs for the future of American agriculture are being addressed by informed college faculty and administrators

- Students from all socio-economic and ethnic groups are opting for degrees and careers in agriculture and the emerging modern sciences necessary to a dynamic global enterprise
- The next generation of scientists and other professionals is being prepared for excellence.

DISCUSSION OF SPECIFIC EXAMPLES

Case 1

The **Agriculture in the Classroom (AITC)** program serves nearly 5 million students and 60,000 teachers annually through workshops, conferences, field trips, farm tours, web-based information, and educational publications and other resources. Begun in 1981, AITC is an education program that promotes agricultural literacy among the Nation's students and schools by infusing agricultural topics into the classroom curriculum in a variety of science and mathematics subjects. It was established to address the fact that, since the mid-1990s, the number of U.S. citizens engaged in farming and living in rural areas has declined annually. AITC was created to help ensure that U.S. citizens would learn about agriculture and its role in our society, and it continues to address the need for increased agricultural literacy among the nation's students. The goal of this program is to enable them to become informed adults, citizens, and voters.

Specific examples of this program include the "Growing Space" publication (done in collaboration with NASA and the University of Florida) and the National Resource Directory (done in collaboration with Utah State University).

Outputs:

- Growing Space project staff developed and published two volumes of the classroom resource publication, *"Growing Space"*.
- National Resource Directory committee members determined what elements would be most appropriate for inclusion in the directory, what capacity, infrastructure and funding would be required for maintenance of the directory.

Short Term **-** Growing Space project staff distributed both classroom publications by contacting middle school science teachers and offering classroom material if teachers would administer a pre- and post-test to their students; An appropriate host was located for housing the National Resource Directory, experienced educators were recruited to review material for inclusion in the database, and the on-line Web-based resource was premiered at the AITC national conference.

Medium Term **-** AITC teachers have received free classroom resources that are aiding in teaching agricultural science and increasing agricultural literacy. The National Resource Directory is filling the need for a compendium of scientifically accurate and peer-reviewed teaching resources that are free and widely available to teachers interested in

education about agriculture. The target audience is teachers and other interested persons seeking a compendium of scientifically accurate and useful information.

Long Term **-** Growing Space has increased agricultural literacy among middle school science students by teaching the similarities between agriculture's uses in space exploration and life on earth. The National Resource Directory is available on AITC's national web page, and it is providing a seamless delivery mechanism of current and scientifically accurate educational resources to help develop and maintain an agricultural literate population.

Case 2

USDA's Research, Education and Economics (REE) mission agencies, the Forest Service, and their university partners required a central, integrated, user-friendly electronic information system for accessing information about programs and projects. The **Research, Education, and Economics Information System (REEIS)** was envisioned to operate as a platform to link and integrate many different databases used to support these agencies.

Outputs:

- Information available through REEIS now includes extension data, research data, and education data.
- REEIS now contains expanded data sources and sources of data.
- Ease of use has been improved repeatedly.
- The number and quality of reports has grown.
- All of these factors have contributed to increased usage of the system and its relevance to a broader audience.

The ***Long-Term outcomes*** of this project include increased availability of data upon which university and government policy makers can rely for improved decision making.

SUCCESS STORIES

Case 3

The **Extension Disaster Education Network (EDEN)** – a collaborative, nationwide effort – links Extension educators from across the U.S. and various disciplines. CSREES funding in fiscal year 2004 totaled $230,000 for the project entitled "Food and Agricultural Defense Initiative."

Output**s -**

- EDEN provides a national clearinghouse (in cooperation with Louisiana State University) to local Extension workers across the United States to help them build working relationships with their local and state emergency management networks
- EDEN provides educational programs on disaster preparation and mitigation

- EDEN staff assume locally appropriate roles during disasters and collaborate in recovery efforts
- Local Extension workers provide educational programs including agro-terrorism preparation and mitigation information to local growers and regulatory personnel.

Medium Term **-** The EDEN clearinghouse and state EDEN contacts are providing program leadership, statewide coordination with agro-terrorism regulatory response agencies and organizations, and a personal link to EDEN resources for local Extension workers

Long Term **-** EDEN is enabling Extension educators to use and share resources to reduce the impact of disasters when called upon to do so.

Case 4

A project with the University of Alaska Cooperative Extension Service entitled, **DISTANCE DELIVERY OF FOOD SAFETY, FOOD PREPARATION, AND NUTRITION INFORMATION IN ALASKA** received a CSREES grant for $257,671. This project is using videoconferencing, webcasts, and a library of digital audio visual files to deliver home economics food safety, preparation, and nutrition information to rural areas and communities in Alaska.

Case 5

The **Extension Indian Reservation Program (EIRP)** in fiscal year 2001 awarded a grant strengthen the Fort Hall (Idaho) Agricultural Extension program. The Fort Hall Reservation consists of 544,000 total acres and 344,942 of these acres consist of rangeland used by cattlemen. Approximately 4,429 Tribal members are enrolled on the Fort Hall Reservation. The objectives of the Fort Hall Extension office are the continued development and implementation of sound, research-based agricultural, youth and socioeconomic programs to better serve the community of Fort Hall in the disciplines of beef cattle management, natural resource management, horticulture, farm business management, and 4-H.

Outputs:

The extension program developed and conducted workshops in many disciplines of agriculture, natural resources and 4-H, including: *Multi-County Beef School* pertaining to Bovine Spongiform Encephalopathy, Bio-Security and Country of Origin Labeling (COOL); the *Fort Hall Annual Beef School* pertaining to Animal Feedlot Operations/Confined Animal Feedlot Operations (AFO/CAFO) Regulations, Bovine Spongiform Encephalopathy (BSE or Mad Cow Disease), Market Implications of Mad Cow Disease, COOL, Brucellosis and Trichomoniasis; *Bull Grading and Selection Tour; Range Management Tour; AFO/CAEO presentations and tours; Cooperative Weed Management programs; Bovine Viral Diarrhea educational program* and testing project*; the Northwest Intertribal Agricultural Conference; the Northwest Regional EIRP*

meeting; a *Green Manure Workshop and tour* to teach alternative methods to pesticide use for potato production; *Alfalfa school; Gooher Control program; Drought Information and Resources workshop*; and *Cereals and Forages workshop*.

A number of education programs also were developed and delivered, including: a hay testing and nutrition project; a heifer estrous synchronization project to demonstrate sound breeding practices for heifers; a native plants restoration project through collaboration with high school students to plant camas seeds and bulbs on selected areas of the reservation; a range photo monitoring project; and approximately five range tours as well as twenty-five farm and ranch visits were conducted.

4-H youth programs conducted were cooking, macrame, leather working, painting, pottery and horse/livestock classes.

A 12-week farm business management program through Idaho State University for Tribal members was conducted.

The EIRP agent also serves as the FSA youth loan advisor for the Reservation.

***Short and Medium Term*:**

- The beef management program resulted in ten ranchers changing their beef management practices to meet beef quality practices and guidelines.
- Two ranches and some tribal natural resource programs have modified grazing practices to comply with AFO/CAFO regulations.
- Five local ranchers modified their bull selection methods to meet criteria developed by local grazing associations and the extension office.
- Permanent photo points were established on range units which enabled permittees to adequately assess range utilization levels on their particular allotments and resulted in improved grass use of 25%.
- The horse 4-H program expanded our reservation's youth horsemanship skills. Enrollment in the horse 4-H program doubled from an enrollment of six members in 2003 to fifteen members in 2004. In fact, eight members attended the county fair while two youth qualified for the state 4-H horse show. This was the second year youth from the reservation qualified for a 4-H state competition.

- The Fort Hall Extension office reached an overall clientele contact of 791 individuals including both youth and adults through ranch visits, various programs, workshops and office visits initiated by clientele for the year of 2004.

***Long Term*:** The photo plots have demonstrated that the Reservation's rangelands are in need of improved utilization methods. This has assisted the Bureau of Indian Affairs and the Tribe in adjusting stocking rates and time management of grazing.

- 4-H youth in the horsemanship skills program capitalized on knowledge, skills and leadership principles taught in the program.
- The FSA youth loan program, which is coordinated through the extension office, gained five new youth that are well on their way to establishing their own beef herds.

NEW DIRECTIONS

CSREES will utilize several mechanisms to increase educational outreach to its constituents. Analysis of the best practices for distribution of material to audiences across the nation is one avenue that will be examined, but the scope of this analysis will also include an examination of the final outcome achieved by the educational material and distribution methods. An increase in test scores and workforce development, as measured by higher enrollment in agriculture related disciplines, are among the outcomes that will demonstrate effective programming.

PARTNERSHIPS BETWEEN UNIVERSITIES, COMMUNITY COLLEGES, K-12 SCHOOLS, EDUCATORS, AND COMMUNITIES

In today's world, initiatives launched by the Federal Government have a better chance of succeeding if they are done in collaboration with other public and private entities at the national, state, and local level. Such collaboration not only helps ensure "buy in" and program sustainability but it also leverages additional resources focused on solving some of our most intractable problems. CSREES, through its National Program Staff and its competitive and non-competitive programs and other projects, pursues various opportunities for interaction and involvement with its constituencies and partners. Activities include:

- Identifying areas of critical national need
- Leading higher education priority setting and facilitate coordination with system and across public and private agencies
- Designing, implementing, funding, and managing national higher education grant programs
- Articulating the need for strengthened education infrastructure
- Building partnerships across the entire spectrum of education institutions
- Brokering teaching and research capacity building with public and private sector agencies/organizations
- Co-sponsoring conferences and forums with other agencies

OUTPUTS

Note that not all of the themes under Knowledge Area 903 have program outputs relating to the three functions of CSREES – research, extension, and teaching. Therefore, only those output functions applicable to each theme area will be reported.

Research

- Increased sharing of educational resources among agriculture departments and research institutes
- Increased partnerships among education institutions and linkages with public agencies and private sector businesses
- Established linkages among land-grant institutions and partnerships with USDA, other public agencies, and private industry

Extension

- Provided outreach and communication to teachers about effective instructional methodologies and technologies, and about the impacts of new approaches and programs
- Disseminated new curricula and teaching plans
- Established partnerships among education institutions and linkages with public agencies and private sector businesses

Education

- Encouraged more linkages among U.S. agricultural and environmental institutions, programs, and agencies and their appropriate international counterparts
- Encouraged greater sharing of resources and expertise
- Provided incentive programs that reward multidisciplinary, multi-institutional, and international partnerships to ensure greater access to information and more effective problem solving
- Increased collaborative/partnership ventures between institutions and the private sector to solve problems that transcend the ability of a single school to resolve.

Integrated Programs

- Promoted partnerships among education institutions and linkages with public agencies and private sector businesses
- Augmented the teaching and research infrastructure of education institutions
- Promoted innovative instructional technologies
- Encouraged the establishment of multi-disciplinary faculty teams
- Promoted experiential learning programs

OUTCOMES

Short Term

- Public/private partnerships and joint involvement and cooperation by food and agricultural education with other Federal agencies
- Overall increase in resources available to academic programs in the food and agricultural sciences

Medium Term

- Cost-effective program delivery systems
- More regional degree programs
- Increased participation of minority-serving and non land-grant institutions in programs
- Non-Federal matching funds and other resources leveraged by grant awards

Long Term

- Colleges sharing resources, programs, and staff
- Enhanced educational experiences at reduced cost

DISCUSSION OF SPECIFIC EXAMPLES

Established in fiscal year 2000, the **Alaska Native- and Native Hawaiian-Serving Institutions Education Grants Program** provides grants to enable these institutions to strengthen their capacities to carry out education, applied research, and related community development programs through collaboration with each other and with units of state government and the private sector.

Case 1

One example of an outstanding project includes **Community Wellness in Alaska**. This project addresses poor nutritional habits experienced by many Alaskans. Alaska is vastly different from other states due to its geography, extreme climatic conditions and low population density. Travel and communication hardships have overwhelming impacts on health care delivery and continuity. This project is coordinating, integrating, expanding, and enhancing the existing Community Wellness Program into a collaborative partnership between the University of Alaska Southeast Sitka Campus and the Native-run Southeast Alaska Regional Health Consortium (SEARHC), and includes the state Department of Health and other partners.

Outputs:

- Adapted a new curricula – a 30-credit Community Wellness Advocate Certificate Program – received state-wide review and upgrading
- Placed an increased focus on traditional native foods

- Established an online course
- Produced student study lessons online with Breeze software with faculty narrating the study guide
- Pilot test online study guide with students.
- Developed a 160-hour practicum, under the supervision of a licensed nutritionist, which permits students to implement and evaluate learning
- Purchased new resource material for nutrition education resource kits
- Distributed Nutrition Education Resource Kits, Food Demonstration Kits, and Community Lending Library Materials

Long-Term Outcomes

- The 30-credit CWA Certificate Program, reviewed by nutritionists and UA-Southeast instructional development staff for cultural appropriateness, is now being offered
- Teaching materials and curricula now include traditional native foods
- Student enrollment is increasing
- 13 student study lessons and study guide online completed
- New resource materials for nutrition education resource kits are now available and community lending libraries have nutrition resources for the students and community through partnership with the Alaska Department of Health. Kits already tested and now ready for CWA student learning include: Nutrition Education Resource Kit, Food Demonstration Kit, Community Lending Library materials, Home Canning Kit for the Food Safety/Food Preservation course, Food Demo Kit, patterned after the Alaska Department of Health's 5-A-Day Program.

Case 2

A second example of an outstanding project under the Alaska- and Hawaiian-Serving Education Grants Program is the **University of Hawaii Agribusiness Education, Training and Incubator Project.** On September 30, 2004, University of Hawaii (UH) consortium members completed the first-year of the on-going multi-year UH Agribusiness Education, Training and Incubator Project. There were 9 UH campuses participating in the first year of the consortium effort to invigorate the agricultural science and agribusiness education and training programs at the various partner campuses to include elements of entrepreneurship development. This newly articulated UH consortium effort represents a multi-year strategy to re-organize previously independent projects to partner campuses around the shared goal of supporting agricultural education, training and, through the incubator component, economic development programs that stimulate agriculture entrepreneurship and the development of new and struggling agribusinesses.

Outputs:

- Hired experts with specialized experience in leveraging agribusiness resources and supporting new and existing agribusinesses and agriculture entrepreneurs

- Supported campus and program personnel during the transition phase in response to high quality market research and identified opportunities in Hawaii's marketplace for the intended recipients and communities
- Prepared campuses to increase technical capacity to perform detailed and accurate market analyses, supported and trained new and struggling agribusinesses, and readied the agribusiness community to institute appropriate modifications to enhance growth of diversified agriculture and business.

Medium-Term Outcomes

- Project Director and associate director to manage the incubator consortium are on board.
- Mapping the agricultural marketplace to identify market opportunities and methods for agribusiness development have begun and are on-going. This task connects the PD/co-PD with the partner campuses, students, agribusinesses, and local communities.
- While continuing transitioning the individual to coordinated consortium, the campuses are beginning to develop and implement more market-oriented educational, product research, development and entrepreneurship training programs.

Long-Term Outcomes (anticipated):

- Double the value of diversified agriculture in Hawaii within 5-7 years and in so doing revitalize Hawaii's rural communities and benefit Hawaiian and other minority students traditionally under-represented in the agricultural sciences and agribusiness.
- Coordinate market-based, hands-on learning opportunities that prepare students and residents for continued education, meaningful careers, and personal enrichment through agribusiness enterprise and ownership.
- Organize implementation of a coordinated program of agriculture education, training and agribusiness incubation across nine (9) University of Hawaii campuses serving all communities on Hawaii's main islands.

SUCCESS STORIES

Case 3

The National Research Initiative Program of CSREES in fiscal year 2003 awarded a $1 million competitive grant to multiple institutions with **North Carolina State University** as the lead institution, to establish a **HOMELAND SECURITY TRAINING** program. This project funds development of training materials and curricula, and the implementation of training programs for public and private crop consultants, extension personnel, technical assistance personnel, and other first detectors of threats to America's forests, crops, and rangeland. This project will help prevent and minimize the impacts of crop bioterrorism through the design and delivery of a program to train and certify crop

consultants and county educators as "first detectors." With a target audience of 25,000 nationwide, it works in collaboration with a broad array of partners, including NPDN regional directors, the USDA Animal Plant Health Inspection Service and Regional IPM Centers, subject matter specialists, crop consulting organizations, and the National Agricultural Library to achieve its objectives.

Case 4

Cornell University (New York) received a $748,848 grant establishing the **NORTHEAST REGIONAL AQUACULTUE CENTER (NRAC)** to develop and support aquaculture research, development, demonstration, and extension education activities to enhance viable and profitable aquaculture production in the northeastern United States. The NRAC is catalyzing the economic development of an industry that comprises open and closed, fresh and salt-water systems – producing a wide array of fish, shellfish, and other aquatic organisms – supported by public and private research and development. The NRAC is a principal public forum for the advancement and dissemination of science and technology needed by the region's aquaculture producers and support industries. This is achieved through the NRAC's facilitation of regional stakeholder communications – linking industry and government representatives to university scientists and educators – guiding and stimulating regional research and outreach initiatives. NRAC-sponsored projects emphasize science and education to stimulate industry growth – measured in size and numbers of aquacultural enterprises – through development and dissemination of profitable and environmentally benign technologies.

Case 5

New Mexico State University is strengthening the technology competency and instructional delivery systems at several institutions serving underrepresented agricultural students through the establishment of an educational technology consortium of Hispanic-Serving Institutions, including rural community colleges throughout the Southwest. It has provided opportunities for students to be involved immediately in increasing their technology skills, in addition to developing longer term integration of technology in the classroom. It also is progressing towards three different initiatives identified by students and faculty: electronic portfolios; an applied innovative technology class for students in the college; and a technology awareness workshop offered to all faculty, staff, and students within the college. These training programs also are available on-line to the other members of the educational consortium**.**

Case 6

Ventura College received a grant in 2004 and is now working in collaboration with Allan Hancock College in training and supporting underrepresented students on integrated sensor technologies (such as GIS/GPS data management). This project is assisting farmers with precision agriculture in order to increase yields and hold costs steady while overcoming drought, rising operation costs, and other factors that affect

operation. The project is training agricultural supervisors to master data collection, data analysis, decision-making, and variable application of treatments.

Case 7

A community college in Washington, **Columbia Basin College** (CBC) has targeted high school seniors and college freshmen wishing to pursue a four year degree in the agricultural science field. The students will earn an AA degree at CBC and transfer to Washington State University for the completion of a Bachelors of Science in Agriculture. The program has successfully established an educational relationship with CBC's Math and Science faculty and Washington State University's academic advisor for the agricultural sciences careers as well as the WSUTC faculty in the Entomology department to have a better understanding of the curriculum, expectations and requirements for related careers.

Case 8

California State University—Monterey Bay (CSUMB) has partnered with a two-year institution, **Hartnell College** to provide student/parent field-based agriculture and watershed workshops and curriculum, student/parent University Science Day, and tutoring/mentoring to Hispanic students from local area high schools. Collaboration between these two institutions has resulted in a coordinated transfer system between Hartnell and CSUMB and support mechanisms that assure successful transitions between institutions. Fourteen minority students from CSUMB, Hartnell, and other collaborating community colleges have been placed in internships at local and regional agriculture and watershed agencies and organizations this year. An additional 30 Hispanic students will be placed in similar internships during the upcoming year. The project emphasizes connecting students to their internship sites and to their academic paths through increased mentoring and academic advising.

Short term impacts include: improved academic skills enabling students to successfully complete a four-year university program; increased student interest in pursuing careers in similar fields as their internships; and increased student interest in continuing their education at the graduate school level.

Long-term include: strengthened connections between the university's community partners in agriculture and watershed sciences, and its local Hispanic population; and success in attracting, retaining, and graduating an increased number of Hispanic students.

Case 9

A two-year institution in Arizona, **South Mountain Community College** (SMCC) has established new partnerships through links to area high schools and student internships at local community-based organizations. SMCC has expanded student opportunities in bioscience careers by developing a comprehensive biotechnology curriculum and the laboratory facilities necessary to promote student success in biosciences. This new approach matches local high school students with college students and faculty. The

project is focused on the high school to college transfer process, and on the employment pipeline. The project is establishing a highly interactive and comprehensive learning environment that includes student experiential learning and internships at local businesses. As a result of enrollment growth in biosciences, South Mountain Community College is adding fulltime biology, chemistry, and environmental science faculty in 2005 (the first faculty for a new interdisciplinary program starting at this institution). High school and college students have produced fifteen joint research projects and the bioscience students have delivered local and regional oral presentations of their work.

Case 10

Northern Arizona University (NAU) and SMCC have formed a 2+2+2 partnership to increase the number of Hispanic and other minority students enrolling in NAU's environmental science program to achieve Baccalaureate of Science and advanced degrees. The NAU/SMCC partnership was precipitated by support from CSREES and by SMCC Bioscience successes that resulted from USDA grant funds.

Case 11

California State University Monterey Bay and **Hartnell College** (CA) were awarded a USDA-Hispanic Serving Institutions Education Grant to design and initiate a seamless four-year agribusiness management degree program. Students may pursue either an agricultural sciences or a business administration track at Hartnell or another community college and then go on to earn a B.S. in Business Administration with a Concentration in Agribusiness management.

Outputs:

- Formed an informal Advisory Board that includes founder-owners or CEOs of major agribusiness firms such as Tanimura and Antle, Mann Packing, Taylor Farms, and Mills Family Farms, as well as labor and community leaders such as the Center for Community Advocacy, the head of the Santa Cruz Farm Bureau, the Growers-Shippers Association of the Central Coast, and the present and immediate past Monterey county Agriculture Commissioner
- Completed a broad industry/community survey that provided valuable baseline information for curriculum design
- Published articles in local papers
- Addressed the "Agricultural Cluster Working Group" and other industry-community groups
- Made presentations to freshmen and sophomores at both Hartnell and CSUMB, and current Hartnell agricultural sciences students have visited classes at CSUMB and heard about the program
- Made a brief preliminary address at a monthly meeting of the Central coast Human Resources Association

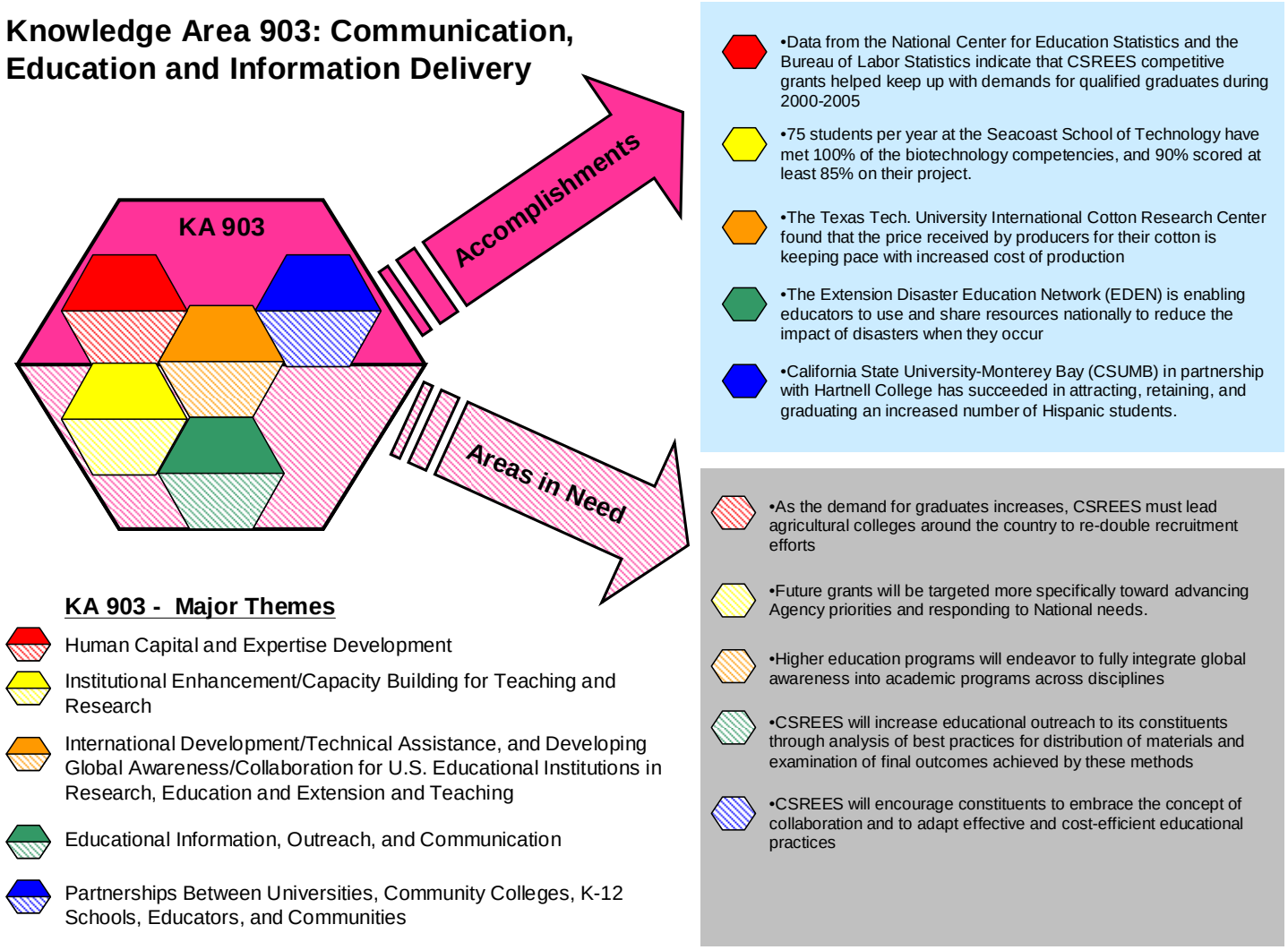
Short Term **-** Completed overall curriculum design and received final CSUMB and Hartnell academic approvals for the Agribusiness Concentration; Recruited students for the program

Medium Term **-** Building relationships with key community stakeholders (including representatives of industry, labor, government and the general public); Both institutions are making a commitment to support the program long-term; Building a solid foundation of support for the program in the local community

NEW DIRECTIONS

Financial pressures on state and institutional budgets, projected shortages of advanced-knowledge professionals in certain fields (as the baby-boom generation nears retirement), and the fluidity of jobs and people in today's market all argue for initiatives that reduce competition, increase cooperation and shared resources, and leverage funds through multiple partnerships. CSREES, along the rest of the Federal Government, will establish new programs and offer new incentives that will encourage our constituents to embrace the concept of collaboration and adapt effective and cost-efficient educational practices.

Figure III-17



Section IV – Criteria and Dimensions of Panel Review: Expand Economic Opportunities through Economic and Business Decision-making

Portfolio Assessment Report

RELEVANCE

Scope

During the period of this portfolio review, farmers, ranchers, business people, communities, and facilities across the country faced significant new challenges and opportunities. The effects from the globalization of markets for agriculture and development of communication technologies that reduced the effects of distance on rural commerce were rapid. As this change accelerated, CSREES programs in rural and community development helped people, farm operators, and communities position themselves for a more prosperous and secure future.

Portfolio 2.1 – "Expand Economic Opportunities in Rural America by Bringing Scientific Insights into Economic and Business Decision-making"

- KA 134 – Outdoor Recreation
- KA 602 – Business Management, Finance and Taxation
- KA 608 – Community Resource Planning and Development
- KA 609 – Economic Theory and Methods
- KA 901 – Program and Project Design, and Statistics
- KA 902 – Administration of Projects and Programs
- KA 903 – Communication, Education, and Information Delivery

Portfolio 2.1's ambitious objective has required both large and small-scale multi-disciplinary efforts. Consequently, the activities in this portfolio involved making investments across a wide range of topics. From illuminating the relationships between "Community Capitals" to an improved understanding of the rural economy with a focus on how local economic, extension and governing institutions can improve their decision-making to reduce poverty and increase the economic prospects of non-metropolitan communities. In addition, the governance, leadership, planning and decisions of federal, state and local governing bodies, as well as the impact of their actions on civic engagement and institutional participation in the context of accelerating social changes in technology, demography, and the political economy were analyzed. These activities took place primarily in KA 608. In a closely related area, investigations of business decisions regarding financing, risk, insurance, and farm operations were done at great depth in KA 602. Furthermore, the managerial challenges of providing rural infrastructure and services along with those in the development of tourism and outdoor recreational amenities were intensively examined in KA 134. All of the previously discussed

decisions were mostly investigated at the applied levels and in rural community contexts in KAs 134, 602, and 608. However, CSREES also sponsored considerable research in understanding program and project design, administration, education and in more general terms both in KA 609 and the "900 Series" – KAs 901, 902, and 903.

As with many CSREES portfolios, a key strategy is to use our federal investments to leverage other funds and resources to support and sustain comprehensive, locally led economic and community development. A variety of funding mechanisms support this portfolio (e.g., formula funds; competitive grants; congressionally directed grants; cooperative agreements) to cover a very broad range of critically important health and quality of life issues. In the period of FY2000-2004, formula programs (Hatch, Evans-Allen, McIntire-Stennis) and competitive programs such as the National Research Initiative Competitive Grants, and Small Business Innovative Research Programs contributed comparable percentages of research support. The NRI funding was 2.2% of Total CSREES funding for all KAs reported here. SBIR funding was 0.8% of Total CSREES funding for all the KAs reported. Congressionally directed research grants represented 5.6% of Total CSREES funding for all KAs reported. This investment includes support for other activities such as Higher Education Programs and cooperative extension.

CSREES functions as the primary agency in the USDA in the provision of extramural funding for research, education and extension programs designed to expand economic opportunities through improved decision-making in rural areas. Because of the linkages that are inherent within the land-grant universities between research and educational programs (on-campus or extension), CSREES is in a unique position to support development of knowledge and its subsequent dissemination and implementation. Among other land-grant institutions that receive support are Rural Development Centers, Risk Management Education Centers, and the Rural Poverty Center and web-based administration of the SARE Program. While partner agencies such as the Department of Defense, Health and Human Services and others provide significant funds to support health and quality of life in rural communities, CSREES provides the majority of support for research, education, and extension efforts related to expanding economic opportunities through economic and business decision-making.

The total funding in Tables II-3 and II-4 in Section II of this report (p.53) needs to be clarified when relevance is being considered. During 2000-2004, CSREES managed almost $230 million for all the KAs reported. Approximately 85% of that amount went to KAs 901, 902 and 903, which were placed here because they developed new methods and instruments that support economic development decisions.

When just looking at the funding for the KAs that support Objective 2.1 (KAs 134, 602, 608 and 609), we find that CSREES managed $33.8 million dollars. Of this approximately 58% was devoted to Rural Community Development (KA 608), and about 25%, or $8.3 million went to projects involving business management, finance and taxation decision-making (KA 602). Thus, the majority of that work is focused on emerging, re-emerging and high-impact issues related to improving local governance and leadership as well as efforts to develop better tools and techniques for farmers and agribusinesses. A smaller portion of the funds supporting

Objective 2.1.; about 14% went to Outdoor recreation and 9% went to Economic Theory and Methods.

Overall, the 2.1 Portfolio has led to multiple outcomes through its support of basic and applied research, education, and extension initiatives. Its ability to integrate parts of these efforts through activities such as the Risk Management Education, the Rural Development Centers, and SARE is a unique niche. For instance, SARE integrates research, extension and the professional development of national and regional leadership with stakeholder involvement.

Discovery of new foundational knowledge related to economic and business decision-making has had far-reaching impacts beyond simply CSREES initiatives for improved health and quality of life in rural communities. New knowledge generated by CSREES funds becomes a valuable resource to aid solution development by other partner agencies and organizations, including related industry. Overall, investments have led to profound improvements in local governance and leadership, as well as economic theory and applied methods, especially as they are used by farmers and agribusiness in managing risk. Examples of significant progress for these areas are included in other sections of this document.

Focus on Critical Needs of the Nation

Summary of Critical Needs for Rural America
Rural America is home to a fifth of the Nation's people, keeper of natural amenities and national treasures, and safeguard of a unique part of our culture, tradition, and history. Today, rural America comprises over 2,000 counties, contains 75 percent of the Nation's land, and includes 49 million people. The well-being of America's rural people and places depends upon many things:

- The availability of employment providing a living wage
- Access to critical services including education and health care
- Prosperous communities with proactive governance
- A healthy natural environment
- Markets and infrastructure
- Trade and commerce

Challenges look very different in rural rather than in urban areas. Small-scale, low-density settlement patterns make it more costly for rural communities and businesses to provide critical services. Declines in farm production jobs and income have forced many workers to seek new sources of income. As a result, today many farmers rely on off-farm work. Five hundred thousand U.S. farmers have household incomes below the poverty line, although overall, farm household income in the US exceeds non-farm household income (ERS). Low-skill, low-wage rural manufacturing industries must find new ways to challenge the increasing number of foreign competitors. Changes in the availability and use of natural resources in rural areas have further affected people who earn a living from these resources, as well as those who derive recreational and other benefits from these natural amenities. Finally, there have been rapid

changes in both communication technologies and demographic shifts. Some rural areas have met these challenges head on. Others have fallen behind and are not positioned well for the future.

CSREES peer review of formula-funded research proposals and competitive grant proposals and similar review of state Cooperative Extension plans of work and annual reports ensure that programs and activities focus on critical areas. National planning activities that are sponsored by the CSREES through several centers, including the Regional Rural Development Centers (RRDCs), the Regional Risk Management Education Centers (RMECs), the Sustainable Agriculture Research and Education (SARE) Program, and the Rural Poverty Research Center (RPRC), all play a unique role in USDA's service to rural America. They link the research and educational outreach capacity of the nation's public universities with communities, local decision-makers, entrepreneurs, families, and farmers and ranchers to help address a wide range of development issues. They collaborate on national issues that span regions—like e-commerce, the changing interface between rural, suburban, and urban places, and workforce quality and jobs creation. Each center tailors its programs to address particular needs in its region. Moreover, they help to guide state and regional level extension programming to contribute to the meeting of pressing national needs. The competitive review process especially encourages innovative ideas that are likely to open new research approaches to enhancing health and quality of life.

These critical issues were addressed with significant research, education and extension efforts in the Goal 2 knowledge areas in this portfolio. These efforts clearly illustrate contribution to timely, relevant research, education and extension directed to the solution of critical problems of national significance. More specifically, there were considerable research, education and extension efforts directed toward rural poverty, local governance, the problems faced by small farmers, economic shocks from structural changes as well as demographic changes, usually through KA 608, Community Resource Planning and Development, but also directly through KA 602, Business Management, Finance and Taxation and KA 134 Outdoor Recreation.

A number of highly successful projects in KA 608 tackled the issues of poverty and employment. Project 2.6 - “From Welfare to Work: The Effectiveness of Policy in Rural Labor Markets,”(p. 102); Project 2.7 - “Poverty, Labor Markets and the Potential Impact of Welfare Reform on Single Female-headed Households, (p. 104); as well as Project 2.1b – a subproject of the multi-state project “Rural Economic Development: Alternatives in the New Competitive Environment” (p. 94) that examined job readiness programs. Finally, a significant amount of effort went into generating knowledge and understanding the effects of structural changes on rural economies. As did several other subprojects of the multi-state effort - Project 2.1 (p 89).

With the goal of improving the quality of life in rural America, the problems related to the insufficiency of human and political capital in the governance of rural communities was just beginning to be investigated during the period of review. The representative project here is Project 3.1 “Impacts of State-imposed Growth Management on Rural Areas,” (p.110).

KA 602 addressed gaps in farmers' abilities to optimally account and adjust to operating and financial risk and changes in taxation in a way that helped them to better meet global competition and become more viable. This was done in a number of ways. First, through the creation of Risk Management Education Centers and the programs associated with them (p. 159). New business models, decision-making approaches and organizations were also developed to adapt to increased global competition (p. 164).

The provision of housing and other amenities, as well as pressures on outdoor recreational land were also pressing issues. Programming leadership met this head-on with many projects. Additional studies of amenities provision were two housing studies plus an unusual grant to a private-sector firm to develop alternative technologies and assessments for municipal water treatment processes (p. 121).

A lot of upstream effort is required to develop valid theoretical and reliable pedagogical decision-making approaches that are applied to the direct needs listed above. These received attention in KA 609, 901, 902, and 903, which collectively sought to improve the conceptual constructs and programmatic approaches to these issues.

Identification of Emerging Issues

Setting priorities is an important means of facilitating the improvement of economics and business decision-making skills needed to meet the challenges facing rural communities in the United States. Congress sets the budgetary framework by providing funds to CSREES. Members of Congress also make recommendations for the scientific and programmatic administration through appropriation language and through their questions and comments during Congressional hearings. Input into the priority-setting process is sought from a variety of customers and stakeholders. The Agricultural Research, Education, and Extension Reform Act of 1998 formally required that formula-funded projects reflect stakeholder priorities.

Participation by National Program Leaders (NPLs) in review panels for competitive programs, federal interagency working groups, program reviews, and stakeholder workshops were and continue to be important mechanisms for CSREES to identify emerging issues for Goal 2 Knowledge Areas. Collectively, NPLs attend professional and scientific meetings that cover all of the agency's species of responsibility to stay current on scientific trends that should be reflected in CSREES programs and in the coordination of priority setting with other federal agencies. Through such meetings, NPLs learn of stakeholders' current priorities, and solicit comments and suggestions on ways that CSREES can assist in meeting their needs. For example, the NPLs involved with KA 608, 602 were instrumental in setting up and maintaining the regional centers mentioned above, and making sure these issues were squarely before the decision-makers.

Integration of CSREES Programs

Although CSREES is dedicated to integrative efforts in all its programming areas, there are some challenges to accomplishing this, which are sometimes beyond its control. For example, some legislative authorizations are so specifically defined they preclude optimum integration at the project level.

CSREES is the main contributor to funding for Portfolio 2.1. Over the five-year period, it averaged about 53% of the known funding for projects in these knowledge areas, at times varying from 49% to 57% in different years (p. 53, Table II-4, Section II).

The agency has several strategies that support even greater integration. Close coordination took place between the NPLs in different units of the agency, the Economic and Community Systems Unit, The Families, 4-H, and Nutrition Unit, the Natural Resources and Environment Unit, and Plant and Animal Systems units. This yielded much more "integrated" results for the social and behavioral sciences aspects of the agency, regardless of funding mechanism limitations. Many projects in this portfolio, especially those in KA 608 overlapped with those in KA 607, 801, 802, 803, 804, and 805 of Portfolio 2.2. In some cases, CSREES sponsored efforts led entire communities to come together to work on a particular issue. Often a single unified roadmap to resolve that issue would be agreed upon, and the resulting projects and partnerships were able to break down the traditional barriers that have impeded national cooperation and coordination across institutions and agencies. Many of these projects seek to integrate current and future funding for a specified area as a matter of course.

CSREES has a historical record of thoroughly understanding and incorporating stakeholder input in the integration of its programs. Our stakeholders often called upon and did in fact made recommendations on how to apply CSREES' budget, usually through stakeholder advisory boards (which evaluate annual progress and recommend future funding directions) and consist of professional associations like NSULGC, and the State and Federal partners. With this input, CSREES has made steady progress in integrating its programs, but recognizes that additional integration is still possible.

Multidisciplinary Balance

Mission-linked research targets specific problems, needs, or opportunities. *Fundamental research* involves the quest for new knowledge about important economic and managerial theories, statistical approaches and program theories and designs and opens new directions for mission-linked research. Both mission-based and fundamental research is essential to the sustainability of improvements in the expanded economic opportunities through economic and business decision-making.

CSREES competitive grant programs specifically encourage multidisciplinary research when soliciting proposals. Congressional language requires the NRI competitive grants program to support a minimum of 30% multi-disciplinary work, however the actual percentage achieved is closer to 40% or higher. Moreover, CSREES requires that 20% of the research formula funding that it provides to states be devoted to multi-state activities, which directly promotes multidisciplinary approaches for selected topics of importance to health and quality of life. In response, the regional agriculture experiment station systems use the funds to support multi-state research projects and committees. During the period of review, NPLs in these KAs served as advisors to 63 multi-state research projects (see Evidentiary Materials). These multistate committees are making important contributions by strengthening existing collaborations across

the country, including international linkages, and by beginning new partnerships that further broaden the committee's composition.

Unnecessary duplication is avoided and communication and outreach is supported. Funds from federal, state and private organizations are well coordinated and CSREES' investment is well leveraged. From the extension perspective, multidisciplinary approaches are common. It is difficult to imagine how the improvement of health and quality of life through extension outreach could be successful without such an approach.

QUALITY

Significance of Outputs and Findings

The findings from this portfolio have been used by farmers, small towns and community governments all over the country. Risk management tools and knowledge have made farmers throughout the nation more viable and competitive. Other findings have been used in Congressional testimony and discussion, by international, federal, state and local policy makers, and in discussions with insurance firms and banks, by industry and trade associations, by environmental and agricultural advocacy groups, and by the larger social science community as it forges new directions in the research of decisions-making, program administration and governance.

The efforts in education have led to vastly improved training of graduate students and postdoctoral students in agricultural studies related to the provision of agricultural economics and management and more specifically to skills in financial, risk, and taxation. There have also been valuable efforts taking place to develop innovative economic and program theories as well as new curricula, such as the recently established National Needs Fellowship program at the University of Florida. It is also evident in CSREES' Higher Education Programs. Research competitive awards contribute greatly to training. For example, during 2000-2004, a total of 14,600 graduate students were supported in whole or in part by USDA funds through fellowships, traineeships, or research assistantships. This includes 5,674 in Agricultural Sciences, 4,427 in Biological Sciences, and 1,515 in Economics (National Science Foundation, Graduate Student Survey).

Research results and findings from formula funds have also contributed important accomplishments related to the improvement of economic and business decision-making in rural communities.

Stakeholder/Constituent Inputs

The National Program Leaders have effective networks and mechanisms that assist them in establishing priorities and assuring program relevancy.

The 1998 Agricultural Research, Education and Extension Reform Act (AREERA requires recipients of formula funds (Hatch, Evans-Allen, and Smith Lever) to collect stakeholder inputs every year and describe the process used to identify individuals or groups as stakeholders. Also each institution needs to describe how these inputs relate to plans of work, priority setting, immediate needs and long-term goals, guidance on monitoring, and proposed research activities.

During 2000-2004, CSREES maintained close involvement with its principal partners and stakeholders through both formal and informal processes. Details are included in the Performance Criteria section.

CSREES National Program Leaders actively participate in partner workshops or information dissemination sessions which is another valuable source of information. Active communication linkages are maintained with NASULGC and its membership organizations. Additionally, active communication is fostered with multiple professional societies and organizations through National Program Leaders' memberships, invited presentations, and formal requests for guidance. National Program Leaders' involvement with multi state committees, as well as competitive peer review panelists and panel managers, and regional grants workshops provide invaluable feedback and direction. Numerous national and international scientific conferences, meetings, and sub-committees are attended by agency social and behavioral scientists that help inform decisions regarding program development. NPLs participate on Federal interagency working groups, committees and task forces, which contribute to close linkages with other Federal priorities. Partner strategic plans are also used to align CSREES' efforts.

Alignment of Portfolio with Current State of Science-based Knowledge and Previous Work

Portfolio 2.1 is well positioned with state-of-the-art studies of Economic, Business and Rural Governance decision-making.

CSREES began its support for the development of eXtension to better meet future information dissemination needs through the internet during the period of review. More recently, the 2005 eXtension budget of $2.7M was composed of contributions from State Extension Services of an amount equal to 0.8 of 1% of Smith Lever funding. Most of the budget will be devoted to content development, building information technology infrastructure, communications and marketing; long range planning, evaluation and financial development, and administrative costs. Work has begun in several areas of content for the prototype, including the "eXtensionizing" of materials from the Rural Development Centers, Risk Management Education Centers and through the SARE Program.

In addition, institutions representing the five Cooperative Extension Service regions are discussing issues of multi-institutional branding. Overall "look and feel" of content pages and institutional branding of that information continues to be developed to accommodate the numerous guidelines and rules associated with each state system.

Appropriate Methodology of Funded Projects

Formula Funded projects are peer reviewed by each institution and must agree with the Plans of Work that are approved by CSREES (see Evidentiary Materials). All proposals are then reviewed by CSREES and either approved, disapproved, or deferred for revision. All concerns of reviewers must be addressed before a special project is recommended for funding. In some cases, the CSREES project liaison also solicits ad hoc reviews from authorities outside of the agency to better inform the recommendation.

All competitive projects are rigorously reviewed by individual experts and Peer Review Panels for scientific merit, innovation, impact, national significance, and potential for success. Competition is extremely keen. Due to many needs but small agency appropriations for the improvement of decision-making and governance in rural areas, it is more difficult to receive a USDA competitive grant than a grant from the HHS or the EPA. For example, there is only around a 20% success rate for applicants.

PERFORMANCE

The performance of the programs funded in this portfolio can be assessed in several dimensions, which, when combined, suggest that overall, the programs are advancing the knowledge and application of science for the improvement of health and quality of life in rural America and across the nation.

Portfolio Productivity

Overall portfolio productivity can be assessed, in part, by the sum of its parts. The Portfolio 2.1 area previously described demonstrates various research, education and extension outputs and outcomes. The outcomes and impacts highlighted in this document, along with the evidentiary materials, provide very strong evidence of excellent productivity with the limited resources available.

Annual and final reports are required in CSREES' electronic Current Research Information System (CRIS) making most assessments of productivity relatively straightforward. This is also true for formula research projects, and special research grants. The assessment is more difficult with formula extension programs, because states exercise wide latitude in what they report. Nevertheless, the existing data indicate that CSREES was quite effective in improving the efficiency of its programs and projects in its portfolio. CSREES is confident that the health and quality of life impacts are equally high (examples are reported in this document), however, at the national level, the current system provides an incomplete picture of the universe of results and impacts that emerge from CSREES-funded extension programs. The agency currently is developing a mechanism to strengthen the collection of extension information for future reporting.

Portfolio Comprehensiveness

Portfolio 2.1 is exceptionally broad in scope, even before the inclusion of the 900 series KAs. It spans from the stewardship of natural resources to the development of new statistical methodologies. In spite of the range, since decision-making affects many aspects of rural life

the KAs could nevertheless complement one another. Furthermore, programs in this portfolio meet their intended outcomes at the individual project level, as well as at state and institutional levels where broad guidelines and discretions are provided to states through formula funds. Evidence of the achieved outcomes can be seen in the Outcomes and Success Stories in Section III of this document as well as in the associated evidentiary materials.

Portfolio Timeliness

Assessing the timeliness of the work in this portfolio is largely done by monitoring the submission of final reports or requests for renewal, extension, or budget carryover. These determinations are relatively easy to track for competitive grants and special grant projects where formal proposals and annual reports are due. With competitive funds, timeliness is maximized since renewals are not possible until the original award is complete. Additionally, every new NRI competitive proposal that is submitted is required to include a one-page progress or termination report for all NRI competitive grants received by the submitting project director in the previous 5 years. If productivity and timeliness have not been strong, review panels will not recommend additional funds until the situation is corrected. Also, NRI coordinated agricultural projects are funded as continuation awards, meaning they do not receive the next year's budget until their previous year's progress has been evaluated by Stakeholder and Scientific Advisory Boards and approved by CSREES. Assessing the timeliness of the work accomplished through formula programs, particularly extension programs, has inherent challenges. Research projects have discreet start and completion dates; extension programs may have semi-discrete start dates, but often do not have a completion date, due to the nature of education, which is rarely "completed." In this case, the "timeliness" criteria become harder to assess. What can be assessed, in place of timeliness, is extension program evolution. As issues change and new knowledge is gained, extension programs are continually evolving in order to incorporate new considerations. This is monitored, in part, through the state Annual Reports that are reviewed by the close to 100 National Program Leaders affected by the projects in this Portfolio.

Agency Guidance Relating to Portfolio

CSREES provides guidance in the conduct and assessment of programs through a number of mechanisms. The primary source is through the leadership and management of the portfolios by NPLs. National Program Leaders are responsible for the performance of the portfolio within specific disciplines and across funding sources and functions. Within their sphere of influence, NPLs interact with multi-state research committees, interagency working groups, ad hoc program committees, strategic planning efforts and other venues with the university and industry communities. Part of this interaction involves conveying agency needs and expectations regarding the funding that is provided. This is usually more relevant to formula-funded programs, as competitive grant recipients have formal obligations to complete project objectives for which they were funded. Programs of Research – These are plans and other guidance provided to researchers, states and other administrators of research, education and extension programs.

As part of the grant review process, reviewers and NPLs not only help researchers receive their funding, but may also suggest avenues of research. When a request for application is

distributed, project directors of funded projects are expected to fulfill the project objectives and to provide annual progress reports and final reports. The requirements that must be fulfilled by the Project Director are clearly spelled out in the Terms and Conditions of the award document that is sent to the performing institution. In this way, CSREES ensures that funding recipients clearly understand their obligations. In addition, the use of cooperative agreements as part of grants and research contracts can spell out specific responsibilities and performance requirements of the Grantee (or contractor) and CSREES.

In addition, the CSREES Planning and Accountability unit provides considerable guidance through its administration of the Annual State Plan of Work process. These place several reporting and program information requirements on State and State University administrators.

Finally, through the proliferation of sponsored programmatic websites and the newly re-designed CSREES website in particular; information regarding work in this portfolio is now easier to retrieve. It includes timely updates and summarizes of all agency funding opportunities from one "funding opportunities" page.

Examples of these various forms of agency guidance are contained in the Evidentiary Materials.

Portfolio Accountability

The work accomplished in this portfolio is monitored by NPLs who either manage competitive grant programs, serve as agency liaisons for special grants, multi-state committees, interagency working groups, etc, or review state annual reports.

The Current Research Information System (CRIS) system is an informational resource that allows NPLs to track the progress of research and, more recently, education programs. Though not designed to fulfill all accountability purposes, CRIS is accessed by NPLs to determine if projects were completed as funded, requests for extensions and budget carryovers are justified, and progress reports submitted prior to approving requests for renewals. The agency also initiated a policy that prohibits a project director from receiving another competitive award if she/he has an outstanding CRIS termination report for another agency project. Therefore, a system of checks and balances exists to catch projects that are slow in their reporting.

Formula-funded programs are evaluated on a state-by-state basis by a two-member NPL Review Team. These reports are examined for completeness, evidence of impacts, and stakeholder involvement. NPL reviewers are responsible for the entire state report, regardless of the expertise of the NPLs. A written assessment is completed and returned to each institution. In the event a report has deficiencies, the Lead NPL communicates those deficiencies and awaits additional documentation before proceeding with the review. Additionally, all agency multistate committees are monitored using a national database, the National Information Management and Support System (NIMSS: http://lgu.umd.edu/lgu_v2/) that comprehensively collects all relevant accountability information including: History ; Statement of Issue(s) and Justification; Related, Current, and Previous Work; Objectives;

Methods; Measurement of Progress and Results; Participation; Outreach; Meeting Information, Participants Directory, Publications, Minutes. NPLs also monitor projects through site visits and formal program reviews.

CSREES is also in the process of designing new processes and tools, particularly monitoring and evaluation systems, and will train the agency's partners in their use. In an environment in which funding support at all levels is becoming tighter, any activities that strengthen accountability and impacts will likely have greater funding support. This is true of the President's Management Agenda and OMB results-based budgeting processes.

Currently CSREES is in the midst of revamping the CRIS system to improve both its ability to track funding and improve its ability to analyze research performance. The broadening of knowledge areas should also improve the agency's ability to follow projects and assess their performance. Finally, the implementation of OMB's One Solution effort at the Federal Level and the Plan of Work effort at the agency level have vastly improved the reporting and accountability of results with respect to this and other CSREES portfolios.

Acronyms and Translations

Acronym	Translation
AACSB	Association to Advance Colligate Schools of Business
ACE	Army Corps of Engineers'
AFO	Animal Feedlot Operations
Ag	Agriculture
AITC	Agriculture in the Classroom
AREERA	Agricultural Research, Education and Extension Reform Act
BSE	Bovine Spongiform Encephalopathy
CAFO	Confined Animal Feedlot Operations
CaRDI	Community and Rural Development Institution
CARRS	Community, Agriculture, Recreation and Resource Studies
CBC	Columbia Basin College
CBD	Central Business District
CDC	Centers for Disease Control
CGEMs	Computable General Equilibrium Models
CIFT	Center for Innovative Food Technology
CRIS	Current Research Information System
CSA	Community Supported Agriculture
CSREES	Cooperative State Research, Education, and Extension Service
CSUMB	California State University—Monterey Bay
CWA	Community Wellness Advocate
DOD	Department of Defense
DOE	Department of Education
EDEN	Extension Disaster Education Network
EIRP	Extension Indian Reservation Program
EPS	Environmental Protection Agency
EQIP	Environmental Quality Improvement Program)
FAEIS	Food and Agricultural Education Information System
FIPS	Federal Information Processing Standard
FRGs	Farmer/Rancher Grants
FS	Forest Service
FSA	Farm Service Agency
GCT	Green Community Technology
GIS	Geographic Information Systems
GMO	Genetically Modified Organisms
GPS	Global Positioning Systems

HACCP	Hazard Analysis Critical Control Point
HBCU	Historically Black Colleges and Universities
HHS	Health and Human Services
HNSA	Hazardous “non-select” biological agents
HSI	Hispanic Serving Institutions
IFAFS	Integrated Future Agricultural Food Systems
IPEDS	Integrated Post-Secondary Education System
IPM	Integrated Pest Management
IRTA	International Thesis/Dissertation Research Travel Allowances
ISE	International Science and Education
ISTM	Information Systems & Technology Management
ITA	Intensive Technical Assistance
KA	Knowledge Areas
LDP	Loan Deficiency Payments
LGU	Land-grant universities
MBA	Master’s in Business Administration
MDF	Medium density fiberboard
MSU	Michigan State University
MTC	Massachusetts Technology Collaborative
NASS	National Agricultural Statistics Service
NASULGC	National Association of State Universities and Land Grant Colleges
NAU	Northern Arizona University
ND	North Dakota
NETD	National Extension Tourism Design Team
NFAMEC	National Food and Agribusiness Management Education Commission
NIAS	National Institute for Agricultural Security
NIH	National Institutes of Health
NIMSS	National Information Management and Support System
NPDN	National Plant Diagnostic Network
NPL	National Program Leaders
NPP	Net primary productivity
NPS	National Park Service
NRAC	Northeast Regional Aquaculture Center
NRCS	Natural Resource Conservation Service
NRI	National Research Initiative
OASDFR	Outreach and Assistance to Socially Disadvantaged Farmers and Ranchers
OMB	Office of Management and Budget
ORACBA	Office of Risk Assessment and Cost-Benefit Analysis
ORTL	Off-road vehicles (ORVs)Outdoor Recreation Leadership and Tourism
PDP	Professional Development Grants

PDP	Project Director
PI	Principal investigator
PIA	Prison Industry Authority
PIE	Public Issues Education
QTL	Quantitative Trait Loci
R&E	Research and Education Grants
REE	Research, Education and Economics
REEIS	Research, Education, and Economics Information System
RFA	Requests for Applications
RME	Risk Management Education
RMEC	Regional Risk Management Education Centers
RPRC	Rural Poverty Research Center
RRDC	Regional Rural Development Centers
RUPRI	Rural Policy Research Institute
SA	Sustainable agricultural
SAES	State agricultural experiment stations
SAM	Social Accounting Matrix
SAN	Sustainable Agriculture Network
SARE	Sustainable Agriculture Research and Education Program
SBIR	Small Business Innovation Research
SDF	Socially Disadvantaged Farmer
SDP	Socially disadvantaged producers
SDR	Standardized donor selection
SEARHC	Southeast Alaska Regional Health Consortium
SERD	Science and Education Resources Development
SMCC	South Mountain Community College
TANF	Temporary Assistance of Needy Families
T-STAR	Tropical and Subtropical Agricultural Research
UGA	University of Georgia
UH	University of Hawaii
UIRR	University-industry research relationships
USDA	United States Department of Agriculture
UTAP	Universal Trail Assessment Process
VAR	Vector Auto-regression
WTO	World Trade Organization
YWA	Yellow Wood Associates