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## ANALYSIS OF USDA FUNDED RURAL DEVELOPMENT RESEARCH PROGRAMS IN THE UNITED STATES AND THE SOUTHERN REGION

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The improvement of economic and social conditions in rural areas has long been a special goal in our nation's history. Rural development is a broad-scale effort encompassing the many dimensions or conditions which determine the quality of life, such as access to public services and facilities, economic development, and the protection or enhancement of natural and environmental resources. As suggested by this diversity of programs, numerous government agencies and academic disciplines are involved in the process of rural development.

Though much of rural development's total budget is allocated to implementation or action-oriented programs, research remains a necessary element and involves a sizeable amount of manpower and money. In this context, research includes the development of scientific and technical knowledge, new technology, and facts useful to private and public decision makers who plan and carry out rural development action programs. Though not a complete listing of all rural development research projects, the Current Research Information System (CRIS) of the USDA maintains information on projects involving federal funds and state projects which have been submitted voluntarily. In FY 1976, these files contained 953 rural-development-related research projects involving more than \$27.3 million and 45.3 scientist-years at the 56 agricultural experiment stations, forestry schools, and cooperating institutions.

Of the total budget for CRIS projects reviewed in this article, \$3 million is associated with Title V, the research and extension section of the Rural Development Act of 1972. The FY 1976 appropriations for all titles in this Act total \$1.3 billion.

Despite research's relative position in the total rural development effort, its importance is not being overlooked. However, information is still lacking at the national level about the

coordination and allocation of limited research funds. The Southern Rural Development Center (SRDC) maintains a classification of CRIS projects, but only for the Southern states [3].<sup>1</sup> A recent evaluation of rural development projects in Title V was national in scope, but did not include research outside Title V [2].

The purpose of this article is to provide a national overview of rural development research and to identify the current level of resource use and academic approaches being applied in the process. A special emphasis is given to research patterns in the Southern region. This information makes possible a discussion of the appropriateness of the allocation in terms of the apparent development needs of each state and the policy implications of continuing the present research pattern.

### PROCEDURE

The rural development research abstracts obtained from CRIS were classified according to the Research Problem Areas (RPAs) used by the USDA and SRDC. Although information from the CRIS reports on project objectives and manpower expenditures may not always be the same as the researcher's allocation, these reports provide a measure of aggregate rural development research funding and a means of examining patterns in the distribution of research in the U.S. The four major research areas are community services and facilities, people building, economic development, and natural environment in rural areas (Table 1). The composition of activity in each area is self-explanatory from the submatrix headings; the natural environment projects include only the portion directly involved with rural development and not a complete listing of all resource projects in the country. Much of the current research activity

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<sup>1</sup>The 13 states in the Southern region are: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia.

TABLE 1. MATRIX OF PROJECT CLASSIFICATION AND NUMBER OF PROJECTS UNDER EACH CLASSIFICATION FOR THE U.S. AND SOUTHERN REGION

Problem Areas	U.S.	Southern Region
<b>Community Services and Facilities</b>		
1.01 Health services and facilities	12	7
1.02 Water systems	9	4
1.03 Sewage and waste disposal	14	5
1.04 Community recreation	4	2
1.05 Fire and fire protection	7	6
1.06 Transportation and communication	16	3
1.07 General community services	60	11
1.08 Planning and community decision-making services	14	1
1.09 Housing, equipment, furnishing	24	11
1.10 Taxation and financing in rural communities	26	7
1.11 Miscellaneous	7	2
	<u>193</u>	<u>59</u>
<b>People Building</b>		
2.01 Human development	56	25
2.02 Education and human development evaluation	30	9
2.03 Rural labor market studies	31	12
2.04 Demography	67	18
2.05 Health, nutrition and safety	16	12
2.06 Household management and decision making	36	16
2.07 Community decision making	29	7
2.08 Quality of life, index, indicators	48	21
2.09 Sociological aspects of small farming	14	2
	<u>327</u>	<u>122</u>
<b>Economic Development</b>		
3.01 Hold and attract industry	13	5
3.02 Plant location	6	2
3.03 Income and employment effects of rural industry	35	15
3.04 Income and employment effects of natural resource development policies	30	6
3.05 Impacts of rural recreation plans, projects	56	19
3.06 Rural co-ops	7	4
3.07 Technologies and enterprises for farms	38	17
3.08 Economic interaction in rural areas	64	20
3.09 Income and employment effects of governmental programs, regulations, taxes	25	5
3.10 Plans for rural economic development	45	17
3.11 Miscellaneous	7	1
	<u>326</u>	<u>111</u>
<b>Natural Environment</b>		
4.01 Land use planning, zoning	70	3
4.02 Natural resources and recreation	9	0
4.03 Natural resources and water	11	1
4.04 Natural resources: soils	5	4
4.05 Natural resources: forest	3	0
4.06 Natural resources preservation	5	1
4.07 Miscellaneous	4	0
	<u>107</u>	<u>9</u>

SOURCE: Compiled from CRIS research abstracts.

encompasses more than one area or does not fit conveniently into any of the defined areas. In these cases an assignment is made to the category considered most appropriate.

The CRIS abstracts represent all rural development research at state agricultural experiment stations which has at least partial federal USDA funding and a portion of state-funded projects which are submitted voluntarily to the CRIS system. Though CRIS maintains projects in its system beyond the termination date, only projects with FY 1976 appropriations are included in the classification.

After examination of research allocation patterns, the distribution by academic disciplines is presented. The multitude of disciplines involved in rural development necessitates combining disciplines which use similar approaches to research. For example, agricultural economics is composed of economics, business, statistics, resource economics, and combined agricultural economics and rural sociology departments. Rural sociology consists of rural sociology, sociology, political science, and other social sciences. Education consists of agricultural and regular education, agricultural journalism,

and community education. Aggregating in this manner reduces the number of academic disciplines to nine.

## ANALYSIS AND RESULTS

In this section four types of analyses of rural development research are considered: (1) the distribution in the Southern region by problem areas over time, (2) the geographic distribution by problem areas, (3) the distribution by disciplines and problems areas in the South and the U.S., and (4) a correlation analysis of research funds and selected measures of rural development needs in the South and the U.S.

### Rural Development Research in the Southern Region

On the basis of the major classification categories from the SRDC, 76.7 percent of the Southern region's 301 projects are in the economic development and human resource development area (Table 2). The natural environment component of rural development, which

TABLE 2. NUMBER AND VALUE OF IDENTIFIED RURAL DEVELOPMENT PROJECT TYPES BY FOUR REGIONS OF THE U.S., FY 1976<sup>a</sup>

Region	Research Areas				Total
	Community Services	People Building	Economic Development	Natural Environment	
<u>SOUTH</u>					
Number of Projects	52	100	98	8	258
Percent of Total	20.2	38.7	38.0	3.1	--
Dollar Value Per Project	30,875	35,019	33,706	48,679	34,109
<u>NORTH</u>					
Number of Projects	47	58	69	31	205
Percent of Total	22.9	28.4	33.6	15.1	--
Dollar Value Per Project	29,804	20,400	40,819	31,358	34,115
<u>NORTH CENTRAL</u>					
Number of Projects	51	83	78	41	253
Percent of Total	20.2	32.8	30.8	16.2	--
Dollar Value Per Project	29,060	25,249	31,063	42,660	30,631
<u>WESTERN</u>					
Number of Projects	26	42	50	23	141
Percent of Total	18.4	29.8	35.5	16.3	--
Dollar Value Per Project	19,229	22,332	28,127	34,502	25,800
<u>TOTAL</u>					
Number of Projects	176	283	295	103	857
Percent of Total	20.5	33	34.4	12.0	--
Dollar Value Per Project	28,343	27,275	35,831	37,903	31,717

SOURCE: Compiled from CRIS abstracts obtained from Cooperative State Research Service (CSRS), USDA.

<sup>a</sup>Classification does not include 98 projects where funding information was not available.

primarily involves land use planning, is not emphasized in the South and accounts for only 3.1 percent of the region's total projects. Land use and environmental concerns are apparently more pressing issues in other regions of the country as indicated by a greater percentage of the total projects.

The 301 projects reported in FY 1976 represent a 50 percent increase over the number found in a similar study on the Southern region in 1973 (Table 3) and several changes in the composition of projects. In addition to new projects in the natural resources area, there has been a significant change in the distribution of projects within the other three areas. On the basis of a chi-square test, the difference in project distribution is significant at the 2.5 percent level, the major change being a 125 percent increase from 49 to 111 economic development projects. The years of this shift coincide with the implementation of the Rural Development Act of 1972 and perhaps indicate the particular emphasis of Title V for more projects in the income and employment areas.

Another change has been an apparent increase in research effort per project as indicated by the increase from .353 scientist-years per project in FY 1973 to .467 scientist-years per project in FY 1976. The greatest change has been in the people building area where researchers have increased their effort per project from .278 to .475 scientist-years.

### Geographic Distribution of Rural Development Research

In other regions of the country, the economic and human resource development areas are also emphasized in research. A major difference in the research programs of regions outside the South is a greater involvement in projects concerned with the natural environment.

It is especially apparent in the Northeast and North Central regions where a larger number of urban population centers create more potential land use conflicts. The distribution of projects among the other three research areas appears to be very similar for all regions. This observation is formulated as a hypothesis that there is no difference among regions in the distribution of research projects and research money. By a chi-square test, only the Southern region (with the small number of projects in the natural environment area) has a distribution significantly different (at the 5 percent level) from the national distribution. Thus, the Western region, which has the fewest rural development projects, has an allocation within the region which is similar to that in the Northeast and North Central regions and to that in the Southern region with the exception of the smaller number of natural resource projects.

Another geographic question is whether total research funds and projects are being allocated in accordance with the percentage of the rural population in each region. By a chi-square test, the distribution of research projects and funds is significantly different from the expected distribution based on the percentage of the total rural population within each region. The largest discrepancy from the expected distribution is in the Northeast, where the number of both projects and research dollars is proportionally larger than the number of rural people living in that region.

### Disciplinary Distribution of Rural Development Research

In addition to the geographic distribution of projects, the CRIS abstracts provide information on the academic disciplines involved in rural development research and some

TABLE 3. ALLOCATION OF RESEARCH WITHIN THE SOUTHERN REGION BY RESEARCH AREAS FOR FISCAL YEAR 1973 and 1976

Research Areas	Number	FY 1973			FY 1976					
		Percent of Total	Scientist Years	Percent of Total	Scientist Years	Number	Percent of Total	Scientist Years		
Community Services	40	(19.8)	19.1	(26.75)	.477	59	(19.60)	27.0	(19.78)	.457
People Building	113	(55.9)	31.46	(44.06)	.278	112	(40.53)	53.2	(37.79)	.475
Economic Development	49	(24.3)	20.84	(29.19)	.425	111	(36.87)	53.4	(37.93)	.481
Natural Environment	NA	0	NA	0		9	( 3.0 )	7.2	( 5.11)	.800
Total	202	(100)	71.4	(100)	.353	301	(100)	140.8	(100)	.467

SOURCE: Compiled from CRIS research abstracts and Davis [1].

suggestion of the approaches being applied to development problems. In the Southern region and the entire U.S., agricultural economics is the department most involved in rural development research, followed by rural sociology departments (Table 4). As is expected, agricultural economics is most involved in the economic development areas where major research activities are analyzing economic impacts of development strategies and activities. A chi-square test of the pattern of projects by academic discipline confirms that the distribution of projects, research funds, and scientist-years among the five most active departments is not independent of the research problem areas—a finding which is not surprising given various research specialties. A second test examining the independence of the distribution of research by academic disciplines and the regional location of the research indicates that at the .05 level of significance only projects in people building research are related to the South-nonSouth location of the research. However, the hypothesis that the distribution of research funds among academic departments is independent of the regional location of the research is rejected at the .05 level. This outcome is due to differences in the average funds per project among regions. Overall, the South has a higher average of funds per project; however, this result is not consistent within each of the four research problem areas.

## Correlation Analysis

The foregoing discussion provides a basic understanding of the distribution of rural development projects by problem areas, geographic areas, and academic disciplines, but does not address questions on the desirability or appropriateness of these allocations. Because much of rural development research is focused on the specific problems of the state where the research is done, the amount of research effort devoted to rural development should in turn be related to the development needs of that state. This relationship is explored by using a simple correlation analysis of research expenditures with the development needs of the state as measured by the unemployment rate, average family income, high school completion rate, and a measure of housing quality. The strength of any inferences drawn from the correlation results depends upon the quality of these variables as measures of rural underdevelopment. Although there may be problems of reliability and accuracy from using aggregate demographic variables to measure rural conditions, this correlation test does provide some means of judging the allocation of rural development research among states.

The correlation tests are based on a hypothesized relationship between certain of the indicator variables and the level of research funding in each of the four major research

TABLE 4. RURAL DEVELOPMENT RESEARCH INVESTMENTS BY PROBLEM AREA AND ACADEMIC DISCIPLINE FOR THE U.S. AND SOUTHERN REGION, FY 1976.

Academic Discipline	U.S. and Southern Region	Community Services			People Building			Economic Development			Natural Environment			Total		
		No.	S.Ys.	Fund/Proj.	No.	S.Ys.	Fund/Proj.	No.	S.Ys.	Fund/Proj.	No.	S.Ys.	Fund/Proj.	No.	S.Ys.	Fund/Proj.
Agricultural Economics	U.S.	86	48.5	29,446	88	45.6	26,084	184	105.3	31,527	46	30.6	36,197	404	237.8	30,481
	S.R.	20	7.3	24,674	32	23.3	35,009	54	39.5	35,670	7	7.1	57,433	113	77.2	38,442
Sociology	U.S.	21	7.3	25,439	87	33.0	27,398	25	7.0	23,029	13	4.3	26,937	146	51.6	26,327
	S.R.	7	2.2	19,776	27	12.5	30,922	11	2.0	17,070	1	.1	6,305	46	16.8	25,378
Agronomy	U.S.	9	4.0	34,144	3	1.4	47,265	21	11.7	38,520	22	9.6	31,136	55	26.7	35,327
	S.R.	4	1.7	45,774	3	1.4	47,265	8	3.3	45,405	0	--	--	15	6.4	45,875
Education	U.S.	7	1.2	13,336	31	8.9	30,493	3	1.1	29,429	0	--	--	41	21.2	27,485
	S.R.	1	--	14,902	7	3.6	31,845	1	--	49	0	--	--	9	3.6	26,429
Home Economics	U.S.	10	4.5	19,953	27	10.9	26,501	3	1.1	15,509	0	--	--	40	16.5	24,039
	S.R.	6	3.5	25,802	16	7.2	29,472	1	.6	24,406	0	--	--	23	11.3	28,294
Forestry	U.S.	1	0	14,614	2	.7	8,767	18	13.4	51,534	7	3.5	30,064	28	17.6	41,793
	S.R.	0	--	--	0	--	--	8	7.1	66,161	0	--	--	8	7.1	66,161
Engineering	U.S.	15	8.9	23,364	3	1.1	29,834	3	4.4	84,826	6	3.7	89,157	27	18.1	45,532
	S.R.	5	5.8	42,889	2	.3	9,408	0	--	--	0	--	--	7	6.1	33,323
Economic Development Division	U.S.	7	5.9	47,628	7	4.8	42,942	11	17.8	102,981	0	--	--	25	28.5	70,671
	S.R.	1	.8	36,100	2	4.1	13,300	0	--	--	0	--	--	3	4.9	20,900
Others	U.S.	20	8.3	32,552	35	22.7	23,699	27	13.9	34,609	9	10.6	50,959	91	55.5	31,577
	S.R.	8	5.7	46,293	11	6.1	38,695	15	2.9	18,150	0	--	--	34	14.7	31,418
Total	U.S.	176	88.6	28,343	283	136.1	27,275	295	175.7	35,831	103	62.3	37,905	857	462.7	31,717
	S.R.	52	27.0	29,804	100	55.5	20,400	98	55.4	33,706	8	7.2	48,679	258	145.1	34,109

SOURCE: Compiled from data available on CRIS abstracts.

areas. For example, in the people building research area, the percentage of a state's population in rural areas, the percentage below the poverty level, and the state's unemployment rate were expected to be related positively to research funds in that state, whereas the high school completion rate and the average family income measures were expected to be correlated negatively with research funding. Similar hypotheses were set up for the other research problem areas.

Results of this correlation analysis are presented in Table 5. Most noticeable is that in all four research areas, research funds are strongly correlated (significant at the 1 percent level) with the percentage of each state's population living in rural areas. This outcome is partly due to the formula funding process for the allocation of SAES research monies.<sup>2</sup> The highest number of significant correlations is within the people building and economic development research areas; four of the hypothesized variables are significant for the Southern region in these two research areas. However, not all results are as originally hypothesized. The unemployment rate was expected to be positively related to research funding in the people building and economic development research areas. The negative coefficients ob-

tained could be due to a measurement problem from using aggregate state data rather than statistics on only the rural population. Alternately, if one assumes that research funding in the people building and economic development areas is intended to improve employment possibilities, the negative correlation results suggest that inadequate funds are being allocated to states with high unemployment rates.

The correlation results for these two research areas in just the South show similar or higher levels of significance. These results suggest that for states of the Southern region, a higher percentage of total research funds is being allocated to states with more pressing development needs (as measured by average family income, percentage of families below the poverty level, and the percentage of housing without plumbing) than is being allocated in states in the U.S. as a whole. In the community services and natural resources research areas, the results for the South and the U.S. are similar in that there is a general lack of significance in the relationships. Only the measure of rural population is significantly correlated with funding in the community services research area, at the .05 level.

The results from this correlation analysis present a mixed picture. Within the people

TABLE 5. CORRELATION OF RURAL DEVELOPMENT RESEARCH FUNDS PER CAPITA WITH SELECTED DEMOGRAPHIC VARIABLES IN FOUR MAJOR PROJECT AREAS FOR THE U.S. AND SOUTHERN REGION, FY 1976

Underdevelopment Indicators	Community Services		People Building		Economic Development		Natural Environment		Total	
	Southern Region		Southern Region		Southern Region		Southern Region		Southern Region	
	U.S.	Region	U.S.	Region	U.S.	Region	U.S.	Region	U.S.	Region
Unemployment Rate	--	--	-.370 (.0123)	-.295 (.326)	-.090 (.537)	-.067 (.827)	--	--	-.199 (.281)	.643 (.168)
Average Family Income	-.101 (.503)	-.359 (.228)	-.322 (.031)	-.524 (.065)	-.031 (.828)	-.370 (.212)	.266 (.110)	-.930 (.007)	-.281 (.124)	-.766 (.075)
Percent of Population in Rural America	.572 (.0001)	.741 (.0038)	.395 (.007)	.608 (.027)	.625 (.0001)	.667 (.012)	.458 (.004)	.608 (.200)	.801 (.0001)	.896 (.015)
Percent of Population Below Poverty Level	-.034 (.820)	.387 (.190)	.341 (.021)	.607 (.027)	.099 (.494)	.688 (.009)	-.126 (.455)	.382 (.454)	.047 (.799)	.276 (.595)
Labor Force Participation Rate	-.028 (.849)	-.376 (.204)	.054 (.721)	-.092 (.764)	.232 (.107)	-.458 (.115)	.277 (.096)	-.794 (.058)	-.024 (.896)	-.565 (.242)
High School Completion Rate	--	--	-.103 (.497)	-.505 (.078)	.080 (.581)	-.313 (.297)	--	--	.070 (.707)	-.506 (.305)
Percent of Housing Without Plumbing	--	--	--	--	.145 (.317)	.725 (.005)	--	--	.053 (.775)	.728 (.100)

SOURCE: Research funds for FY 1976 available from CRIS abstracts maintained by CSRS, USDA and statistics for indicator variables from U.S. Department of Commerce, *Bureau of Census, Data Book for the White House Conference on Balanced National Growth and Economic Development*, 1978.

NOTE: Numbers in parentheses are levels of significance.

<sup>2</sup>Federal funds for SAES research are allocated on the following basis: 20 percent equally among all states, not less than 52 percent on the basis of the size of each state's rural population in relation to total U.S. rural population, and not more than 25 percent for cooperative research among states. However, this formula is an aggregate guideline that does not distinguish among types of research.

building research area, the finding that funding is significantly correlated with four of the six hypothesized demographic variables suggests that funds are going to states where these demographic variables indicate there is greater need. At a .10 significance level, the economic development research area for the South also has four variables significantly correlated with funding. However, the lack of significant relationships in the other research areas does not necessarily suggest a misallocation of research funds, but rather may be suggesting an inappropriate measure of the need for research in the natural resources and community services areas.

The foregoing discussion and correlation analysis relate only to the allocation of total research funds and not to the adequacy of the total level of funding. Whereas in many types of agricultural research the final research outcome, such as a new wheat or corn strain, is easily transferable to other regions, rural development research results are more rigid because the research often is designed to the specific needs or problems of a community. Thus, if the correlation results are used as a measure of the appropriateness of the current allocation of research funds, improving the distribution of funds would involve a change in the allocation of research funds between states rather than an across the board increase in research funds for all states.

## SUMMARY AND CONCLUSIONS

The data provided by the CRIS abstracts provide an overview of national rural development research activities with an opportunity to compare research in the South with work in other regions. The comparisons show that the allocation of total projects, monies, and manpower is similar for all regions with the exception of the South, which has a significantly smaller number of natural resource projects than the other regions. Although the South has proportionally fewer projects and research funds than suggested by its share of the nation's rural population, only the Northeast

region has research funds and projects significantly greater than its share of the rural population.

In terms of research trends between FY 1973 and FY 1976 for the Southern region, total projects increased from 202 to 301 and a significant reallocation of research effort occurred which provided more emphasis on economic development projects. Another change during this period was an increase in the average number of scientist-years allocated per project.

A correlation analysis shows research funding in each of the four major research areas to be significantly related at the .05 level to the percentage of population in rural areas. In the people building and economic development research areas, funding is related significantly at the 5 percent level to average family income and the percentage of population below the poverty level, but not to the employment rate, labor force participation rate, and the high school completion rate. In the community services and natural resources areas, only the labor participation rate is related significantly to natural resources research funding. Thus, if these indicators are accepted as measures of relative needs, the evidence is mixed as to whether research is going to areas of greatest needs.

This discussion provides an initial analysis of rural development research patterns. This type of analysis could be strengthened by further refinement of the aggregate indicator variables for each state to isolate underdevelopment conditions in rural areas. What is perhaps most noteworthy from this analysis is that the results do not show major discrepancies from expected patterns. This finding suggests the allocation process is achieving a distribution of rural development funds to places where a high degree of development need has been indicated. It follows that future research should be directed toward an evaluation of the research outcomes.

Evaluating the outcome of rural development research and assessing the adequacy of the total level of funding in rural development are difficult tasks. Methods for this type of evaluation are in a rudimentary stage of development and more research is needed to provide adequate techniques.



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