

demonstrated. Wood wastes (excluding bark), fruit pits, nut shells, and corn cobs are good to excellent fuels for gasification. Other fuels tested—rice hulls and straw; cotton gin trash; corn fodder; straw from cereal grains, oil crops and dry beans—produce more ash (table 1), and slag formation becomes a problem when the ash content is above 5 or 6 percent.

Considering all aspects of the downdraft gasification process, it appears that the two most desirable fuels tested were dried prune pits and wood blocks (2 by 2 inches, Douglas fir). The next most desirable group of fuels included corn cobs, peach and olive pits, unprocessed nut shells, and wood chips of a shape and size comparable to whole-log chips for paper pulp.

Because of the physical relationship between the partial-combustion zone and the reduction zone in the firebox, it appears that small amounts of silicon in a fuel—as little as 2 percent—make it unacceptable for downdraft gasification. This is certainly true for rice straw and rice hulls. Waste-paper pellets also proved unsatisfactory, because they contain approximately 4 percent silicon from glass not removed when the paper is separated from raw solid waste.

Alternative designs

For fuels with substantial slagging problems, it appears that another approach to gasification is needed. It is known that improved crossdraft and updraft gasifiers can handle coal fuels that produce slag, although more testing is needed to determine how well they operate with cellulosic fuels such as agricultural and forest residues. Plans for such testing are under way.

Assuming that the problem of slagging can be overcome, another question remains: What are the costs and savings? Tables 2, 3, and 4 show the producer-gas energy available in two common agricultural residues, estimated costs of preparing and gasifying those fuels, and the resulting values compared with those of fossil fuels.

Only in the case of cotton stalks as a substitute for natural gas does an efficient gasification process appear unprofitable at these cost levels. It should be noted that the cost of energy per million Btu is about 2½ times higher for gasoline and diesel fuel than it is for natural gas. For that reason, gasification may hold more economic promise as a substitute for gasoline and diesel fuel than for natural gas.

John R. Goss is Professor, Department of Agricultural Engineering, and Raymond H. Coppock is Communications Specialist, Cooperative Extension, University of California, Davis.

Rural rebound: newcomers revitalize small towns

Gala Rinaldi

Edward Vine

Edward J. Blakely

Ted K. Bradshaw

Small rural towns, long characterized as depressed, isolated, and socially backward, have undergone a remarkable transformation since about 1970, experiencing either population stabilization or growth, and in the United States, Europe, and Japan their economies have rebounded.

Rural areas, once thought of as pastoral and agricultural or based on extractive industry, are rapidly moving toward more balanced and robust economies. Newcomers seeking attractive rural settings and simpler lifestyles are largely contributing to this greater economic viability.

Only a small percentage of rural populations continue to make their living from farming. New technology and knowledge-intensive industry, tourism and service organizations are forming a large part of what is coming to be termed post-industrial or advanced industrial rural society.

Butte Community College offers educational and employment opportunities to residents in the Oroville area.

Photo by Tracy Borland



Recent research on nonmetropolitan California by the authors indicates that rural areas may well be the "new frontier" for advanced industrialism. As a result, they are now the focal point of a movement away from raw material-based industrialism (nonrenewable forest and energy resources) toward a new human resource-based economic system.

The purpose of the research reported here was to (1) provide a framework for understanding the recent trends in rural growth, (2) examine the role newcomers play in the changing economic base of rural areas, and (3) suggest some alternatives available to small town public officials and community leaders toward emerging economic options.



Photo by Tracy Borland

Gerry Taylor was a radio engineer in Hollywood, Phoenix, San Francisco, and England before moving his family to Grass Valley in 1974, where he is a senior engineer with a small electronics firm.

TABLE 1. Percent Reporting Factor Favorable to Decision to Move to Rural County.

	Working	Retired	Total
	%	%	%
Climate or geography	71	88	76
Rural atmosphere	86	90	87
Simplicity of life	74	79	76
Job prospects	42	3	30
New business or job potential	49	3	35
Number in sample (N)	(155)	(67)	(250)*

* Includes 28 unemployed or otherwise not in labor force.

TABLE 2. Education Level of Newcomers.

	Working	Retired	Total
	%	%	%
Less than high school	4.5	28.4	11.8
High school graduate	17.4	31.3	21.8
College, some through BA	63.2	32.8	54.5
BA, MA, PhD	14.3	6.0	11.8
(N)	(155)	(67)	(250)

Research setting and approach

Five communities were selected to represent a diversity of types of growth in our sample areas. Although newcomers from various backgrounds were found in each community, we focused on the following large concentrations of growth:

1. Mendocino in Mendocino County with its historic coast, nearby state parks, and a significant artist colony represents a growing tourist industry.

2. The Mendocino mountain communities of Philo, Boonville, and Comptche are centers of countercultural lifestyles representing "back to nature" farming.

3. Chico, Butte County, is a university town, and its growth is related to the provision of professional services in medicine, law, education, engineering, government, and the arts.

4. Oroville, Butte County, represents a growing trade, nonprofessional, and government service center.

5. Our final study area, Paradise, Butte County, represents a rapidly growing retirement community whose citizens contribute to the economy through the pensions and social security income they bring with them.

Results of the survey

The survey data confirmed our basic treatise. The recent migrants are better educated than the long-time residents and a significantly high percentage of newcomers are in professional occupations. The newcomers to these California towns are typical of other newcomers who have been studied by other researchers. They have considerable resources.

Generally, the survey found: (1) The primary motivation for migrating to rural areas was to pursue a rural lifestyle even though economic conditions were generally less desirable for the newcomers; (2) the newcomers use their previous training and employment skills and have made a significant contribution to the economic growth of these areas; (3) newcomers have used their abilities to a large extent by starting their own businesses, mostly small individual activities (the newcomers' job skills and abilities rather than any raw material have formed the base for business expansion), and (4) the newcomers are largely a nondependent group, using few unemployment or other services.



The small-town church is a symbol of rural America.

A migration of people with resources

Data presented in table 1 illustrate the fact that the primary motive for migration to rural areas was to pursue a rural lifestyle rather than to gain economic or employment opportunities. For some this was because they had retired. Our sample included 27 percent retired persons. Among working persons lifestyle values were also favored over work.

The newcomers from urban areas (74 percent) of our total sample provide the most significant resource for rural economic growth.

The newcomers provided a substantial transfer of economic resources when they moved. Six out of ten newcomers reported savings of well over \$1,000. Major income resources were available to 71 percent of the respondents.

The newcomers are well educated and are highly skilled. Among heads of households, more than 63 percent have had some college training. Interestingly, the newcomers who were working included 6.5 percent with masters' degrees and 7.8 percent with PhD's. Table 2 presents the data on the level of education of the respondents.

Successful employment

The migration of highly skilled workers to rural areas is usually considered unlikely, according to current economic theory. The questions to be addressed are: Why did these skilled workers migrate and how have they succeeded in creating employment opportunities in the small town economic system?

There were three patterns of locating a job among the newcomers. First, about 8.4 percent of the workers were transferred by

The large retirement population draws younger newcomers to provide medical and health services at the Feather River Hospital in Paradise.



Photo by Tracy Borland

an employer from another county. Another 34 percent, such as college professors in Chico, arranged their jobs before moving. The remainder, 54 percent, sought jobs after coming to the county.

In terms of occupation we found that 29.8 percent of the newcomers were employed in professional, managerial, or technical jobs. Almost one in six (16.2 percent) of the newcomers worked as sales persons or clerks and one in five worked as food preparers, food servers, or protective service workers. Construction workers or truck drivers were another large occupational category (22.6 percent). Only 9 percent worked as machine operators or attendants; none were laborers.

More than 40 percent of the places of employment have not been in existence in the same community for more than five years. Thus, newcomers have found or created employment in new businesses.

Among all newcomer interviewees, the median family income was between \$11,000 and \$11,999. The primary source of income was wages for the employed workers and social security for the retired and disabled. Individual income earned by

the head of household was supplemented by spouses' earnings in many cases. Spouse employment was identified in 42 percent of the cases, where the breadwinner was married, and their employment experiences were similar to those of the male head of household. Retirees had higher incomes than anticipated.

Median Income of Newcomers

Male head of household, one income	\$11,000-11,999 N = 67
Male head of household, two incomes	\$12,000-14,999 N = 55
Female head of household	4,000-4,999 N = 27
Retired	9,000-9,999 N = 73
Total	\$11,000-11,999 N = 250

One of the significant results of this research is the discovery that nearly 33 percent of the entire sample started a business in their new rural county. Table 3 shows the results of this question.

The impact of these data is to emphasize that rural migrants are a net resource for new kinds of economic development in rural California. Instead of an emphasis on

economic growth through attracting industry, the new migrants are a resource for considerable economic stimulation.

One major use of public facilities was for training programs to improve job performance. About 28 percent of the sample reported taking noncredit courses in the rural county. This underscores the role of higher education resources in rural economic development.

Dependency

In general, the findings show that the new migrants are not a dependent group. Community resource structures do contribute valuable assistance, however. For example, 21.3 percent of the working primary breadwinners report having received unemployment insurance, and 10.2 percent of the spouses collected payments. Otherwise, the data indicate that the urbanites who come to rural areas neither use nor need public support. A primary motive for moving to rural areas among our respondents was a desire to be "self-sufficient" and to reduce dependence on government and urban institutions.

Conclusion

Clearly, newcomers form a new important economic resource for their communities. They bring with them employment skills as well as professional backgrounds which enable them to either find or create employment. This is an important finding because it runs almost counter to the prevailing view of personal economic choice. That is, employment opportunity is not the primary motivation for this form of migration. Rather, the quality of community life represents the principal ingredient in their economic choice.

Gala Rinaldi and Edward Vine are Staff Research Associates, Applied Behavioral Sciences, at U.C., Davis; Edward J. Blakely is Professor of Community Development and Educationalist in the Experiment Station, Berkeley and Davis, and Ted K. Bradshaw is an Assistant Research Sociologist at the Institute of Governmental Studies, U.C., Berkeley.

TABLE 3. Percent Migrants Starting Business in New Rural County

	Working	Other	Retired	Total
	%	%	%	%
Place of primary employment	36.1	10.7	1.5	24.0
Other business started (e.g., investment)	6.5	3.6	1.5	4.8
Attempt or business failure	3.8	7.1	3.0	4.0
Total businesses started (N)	46.4 (155)	21.4 (28)	6.0 (6.7)	32.8 (250)

TABLE 4. Industry by Type of Employment, Recent Migrants

	Workers employed
	%
Agriculture	9.7
Mining/construction	12.9
Manufacturing	11.6
Transportation, utilities	6.4
Trade	16.8
Finance, insurance, real estate	3.9
Services	7.11
Professional industries	24.5
Government	5.2
(N)	(155)