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TOWARD AN APPROACH FOR RATIONALIZING THE RURAL HOUSING DELIVERY SYSTEM

by

Henry Sanoff,* King Burgwyn,** Michael McNamara *** and Terry Alford****

NEEDS AND PERCEPTIONS OF HOUSING

Recently, the Select Committee on Nutrition and Human Needs in the United States Senate (1) determined that two-thirds of America's inadequate housing is in rural areas. That is, of the seven million substandard units in this country, about four million are outside metropolitan areas. However, counting only those dwellings with deteriorating structure and without plumbing facilities seriously understates the true severity of the problem. If we also consider all over-crowded housing inadequate (that is, all units with more than one occupant per room), then additional millions of units would be added to the rural housing problem in the 1970's. The need over the next ten years has been estimated by the Rural Housing Alliance (2) to be 13.5 million new and rehabilitated housing units, of which seven million or 700,000 a year must be subsidized.

More importantly, measuring inadequate housing only by the number of substandard units focuses solely upon the housing unit itself. Housing broadly defined includes three basic elements: a physical dwelling unit, its inhabitants and their behavior toward the unit, and its surrounding environment. Thus, improvements in physical dwelling units cannot be considered in isolation of other factors. Rather, they must be linked to changes in occupant behavior and to overall environmental upgrading. Clearly then, the systems approach appears to be a method for isolating the critical components of the problem.

Historically, as families migrated throughout the United States, many carried with them the house style of their region to wherever they happened to be going. Thus, today, examples of many of these styles may be found almost anywhere in the country. Furthermore, imitations of previous styles have appeared and continue to persist.

In almost no other sphere of human activity has there been such resistance to change as in housing, the area that affects us most immediately and directly. To effect change, however, is always more difficult than to continue with what has been tested and accepted.

The house then, is not just a structure, nor a shelter, but an institution influenced by the cultural environment to which it belongs. It is evident that the house form is a reflection of ideas, attitudes, and needs of its occupants and is symbolic of their life style. (3) This socio-cultural dimension requires recognition as a contributing factor to the present housing dilemma.

INCOME AND HOUSING

The National Commission on Rural Poverty (4) has indicated that lack of family income lies at the root of the rural housing problem. Generally, the median incomes of rural families are from twenty to thirty percent lower than the national average. This low earning capacity can be attributed to the rural wage earner's lack of education and job skills and the failure of the rural economic system to produce viable employment opportunities.

Besides the problem of financial poverty and all the social ills that accompany it, there exist serious failures in the housing production process in rural areas. The present production system is faulty to the point that it absorbs much of the \$9 billion a year that the Federal Government spends subsidizing the incomes of poor families through welfare and social security payments. Numerous studies by the U.S. Department of Agriculture

(5) have indicated that home mortgage financing is substantially less available and more expensive in rural areas. Besides this lack of credit, there has been a tremendous rise in the cost of residential construction. Housing Secretary George Romney has estimated that 80 percent of American families cannot presently afford to buy a decent home. (6) The recent inflationary period has caused the cost of construction to increase to the point that only middle-income families can purchase new homes as indicated in Table 1.

TABLE 1: DISTRIBUTION OF MONTHLY COSTS FOR NEW SINGLE FAMILY HOMES SOLD IN NORTH CAROLINA IN 1969

Cost Component	Amount	Percentage
Mortgage ²		
Principal (dwelling, land, closing cost)	\$ 57	25%
Interest	105	46
Insurance ³	5	2
Taxes ⁴	24	11
Maintenance ⁵	14	7
Utilities ⁶	20	9
Total Monthly Payment	\$ 225	100%
Family Income Required to Pay 25% for Housing	\$10800	

NOTES

1. Average price for new homes was \$20,468 in 1969.
2. 30-year mortgage at 8½ percent increase plus ½ percent mortgage insurance premium and 5 percent down payment.
3. Based on \$3 per thousand of purchase price annually.
4. Based on \$25 per thousand of purchase price annually.
5. Average expenditure for families earning between \$5-10,000 in the South.
6. Estimated for North Carolina (U.S. average is \$25).

THE RESPONSE OF THE FEDERAL GOVERNMENT TO THE RURAL HOUSING PROBLEM

The response of the Federal Government has been limited to the mortgage loan and insurance programs financed by the Farmers Home Administration (FmHA). The FmHA provides a direct source of credit to those families living in rural areas and cities with populations under 10,000. In 1968, the Section 502 Program was established to make mortgage loans to low- and moderate income rural families with incomes below \$8000. These families are required to pay no more than twenty percent of their income for mortgage, tax, and insurance payments. In the event that twenty percent will not cover these costs, the FmHA will reduce the interest rate to as low as one percent. While the interest credit program is capable of reaching families in the \$3-4000 income range, its impact has been marginal since as few as 11,000 loans were made in the country in 1969.

SELF-HELP HOUSING: A MEANS TO REACH THE POOR

Another aspect of the Section 502 Program that has proved workable in rural areas has been the self-help operation conducted by the Office of Economic Opportunity (OEO) and the FmHA. The Self-Help Housing Program allows individual houses to be built, under supervision, by groups of low income families who will live in and own the dwellings. Their labor serves as a substitute for capital equity and generally reduces the mortgage loan \$3-4,000 per dwelling. The entire self-help process will often require twelve months with six to eight months in the construction stage

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and six months for administrative processing. While limited in extent (only 667 loans were made in 1969), work in Florida and California substantiates its potential for further development. Presently local OEO nonprofit, tax-exempt corporations initiate the organization of this program. These corporations provide assistance in obtaining house plans, preparing loan applications, and locate and supervise the participants in housing construction. The FmHA provides long term low-interest loans (as low as one percent) for construction materials, subcontracting, and sites.

While few housing units have been constructed with the self-help program, the capacity to extend the limited credit resources of the FmHA to more families is inherent in the program. However, to have any substantial impact on the present housing need, this capacity must be coupled with a more rational approach to housing production. Home building in small towns and rural areas has traditionally been a handicraft business, with limited pre-cutting and preassembly of manufactured building components. This slow, inefficient process is further complicated when untrained laborers (each group of self-helpers must be introduced to the most basic building skills) must be coordinated to perform unfamiliar tasks. Often the problems that arise during the construction period of six months can have a detrimental effect on the morale of the self-help participants. In short, a greater degree of production planning is necessary to realize a substantial increase in the volume of self-help building. (Table 2)

TABLE 2: DISTRIBUTION OF MONTHLY PAYMENTS FOR SINGLE-FAMILY DWELLINGS FINANCED UNDER THE FmHA-OEO SELF HELP HOUSING PROGRAM

Cost Component	Amount	Percentage
Mortgage ¹		
Principal (land and materials)	\$ 23	25.0%
Interest	12	13.0
Insurance ²	3	3.0
Taxes ³	21	22.5
Maintenance ⁴	14	15.0
Utilities ⁵	20	21.5
Total Monthly Payment	\$ 93	100.0%
Family Income Required to Pay 25% for Housing	\$4464	

NOTES

- \$8200 mortgage for 30 years at 3 percent interest.
- Based on \$3 per thousand of assessed value (\$12,000) annually.
- Based on \$25 per thousand of assessed value (\$12,000) annually.
- Average expenditure for families earning between \$5-10,000 in the South.
- Estimated for North Carolina (U. S. average is \$25).
- The average house measures 24' x 40' and is sited on a quarter acre lot.

FACTORY PRODUCTION OF BUILDING COMPONENTS

Production planning in the building industry has not reached the level of sophistication as observed in the science-based industries (aero-space, automotive, food preparation). However, there exist organizational techniques which can be utilized to produce a better housing product. First, the production of building components (walls, floors, roofs) can be moved off the dwelling site. Since the production of components is essentially a cutting and joining operation, greater speed of assembly and quality control can be achieved when mass production is introduced. By employing unskilled labor to operate simple machines, many similar components can be produced quickly. The components produced must be designed to join easily to form the complete dwelling (particularly since self-help participants will be involved in the site assembly).

By factory producing similar components, materials can be bulk purchased in truck load lots at wholesale prices. In eliminat-

ing the retailer, savings up to 20 percent can be achieved. Before bulk purchasing can be effective, however, there must be some guarantee that sufficient housing will be demanded to merit large material purchases. In the existing OEO-FmHA Program, this guarantee is only as large as the local FmHA agent's commitment to self-help housing: since the FmHA is the only source of credit to the self-help families. In most cases this commitment will not exceed twenty-five mortgage loans.

Before revisions in present programs are implemented, the financial costs of factory production of building components must be weighed. These costs will vary considerably with different localities. For purposes of discussion, the Macon Program for Progress (MPP) in western North Carolina will be described. This OEO funded anti-poverty agency administers numerous programs including a self-help housing operation and a housing rehabilitation effort.

The assets owned by the MPP include a revolving loan from the State Government which will be used to purchase materials. Since the FmHA is the only source of credit for self-help families, the volume of production should be coordinated with various levels of funding. Ultimately, the deciding factor will be the cost of the building components package that the self-help family will purchase; to justify the transition to a factory process this cost should be comparable to the price of the present package (\$6700).

Since the MPP is a nonprofit, tax exempt corporation, the profits realized from the sale of the building component packages cannot exceed the expenses incurred in producing the package.

The pertinent variables in this analysis are the cost of building materials and the volume of units over which the labor, overhead, and financing expenses can be amortized. Preliminary

To further amortize the factory expenses, either a more substantial savings must result from the purchase of wholesale materials or a large number of units must be sold. Increasing the volume of units seems the most likely alternative. Such an increase could result from the sale of building components to families not participating in the self-help program. Many low income families do not have a head of household able to assist in the building process yet are eligible for mortgage loans from the FmHA, either under the Section 502 Program or the FHA Section 235 Program. These families could purchase the building components package and pay an additional amount to have MPP personnel assemble the components on the dwelling site. By adding this dimension to the building program, the volume of units over which the factory expenses are amortized could be increased to forty units as described in Exhibit 3. A production level of forty units would reduce the sales price of the building components package to \$6930 and the mortgage amount to \$8430 (\$230 above the present mortgage amounts).

The machinery and storage facilities in the factory are sufficient to produce as many as 100 units annually. As the production level increases and more types of materials (mechanical equipment, concrete blocks, etc.) are bulk purchased, the price of the building components package will recede.

EXHIBIT 3: CASH FLOW ANALYSIS FOR FORTY YEARS

	First Year	Second Year
Estimated Annual Expenses		
Building Materials	\$240,000	\$240,000
Labor	na	27,000
Overhead and Utilities	6,000	6,000
	<u>\$246,000</u>	<u>\$273,000</u>
Other Disbursements		
Loan for First Year	\$ 29,160	\$ na
Labor Expenses		
Mortgage Payment on the building and machinery	2,185	2,185
	<u>\$277,345</u>	<u>\$275,184</u>
Sales Price of the Building Components Package to the Self-Help Family	\$ 6,930	\$ 6,875
Mortgage Amount Required	\$ 8,430	\$ 8,375

investigations have revealed that a 10-20 percent savings can be realized from the purchase of wholesale materials in bulk. A conservative estimate of ten percent has been used in the cash flow analyses. Assuming a commitment of twenty-five FmHA mortgage loans, the factory expenses can be amortized sufficiently to allow the building components package to be sold to a self-help family for \$7500. When added to the cost of land acquisition and development (\$1500), this produces a mortgage totalling \$9000, \$800 more than the present mortgage amounts.

FACTORY PRODUCTION OF THE PLANK AND FRAME SYSTEM

One dominant characteristic of conventional construction is the multiplicity of building materials necessary to produce the finished product. Often small building firms do not use enough of each one of these products to warrant purchase in wholesale bulk lots. By forming a building unit that serves as the structure as well as the finished surface, the amount of a single material used in the dwelling can be substantially increased. Two inch by six inch lumber with tongue and groove edges can be combined with structural frames to form such a building system as that illustrated in Figure 1. This building unit can be used for walls, floors, and roofs, thus including large quantities of similar lumber per dwelling unit. The fabrication of the plank components consists of gluing the tongue and groove lumber together to form panels. The frames will be constructed from precut lumber nailed with compressed-air guns.

The factory building constructed to fabricate the plank and frame components will also serve as a storage and distribution facility. This capacity allows greater control of shipment of building components and more efficient work scheduling of self-help participants and subcontractors (heating, plumbing, etc.).

SELF-HELP ERECTION AND ASSEMBLY OF BUILDING COMPONENTS

The erection and assembly process can begin with site clearing and the installation of a masonry foundation. The floor frames would then be set in place and covered with a plank floor, followed by the erection of structural framing members to align the wall and plank components. While the size of the plank components will vary, the weight of any component will not exceed two hundred pounds; thus, the components would be easily handled by three men. Each plank component will be fastened to the frame and glued together.

Once the entire house is closed to the weather, doors and window openings can be cut and installed. Mechanical equipment can also be installed prior to the finishing of all interior surfaces. After the foundation is completed the closing-in process should take approximately two days. The interior and exterior finishing can then progress at a pace dictated by the self-help participants and their supervisor.

HOUSING DESIGN

Previous sociological findings in user needs and preferences in housing provide us with sufficient evidence that numerous malfunctions do exist. While most people engage in the same daily activities, the place in which they are performed varies considerably. There is also a relevant argument that while low vacancies exist for low-income families, that in itself does not suggest that housing being offered is satisfactory, but a choice that the user must make from what is available to him. Clearly then new alternatives must be made available that suggest spatial arrangements more suited to a greater variety of life styles. The proposed demonstration house is but one step in that direction. Recognizing

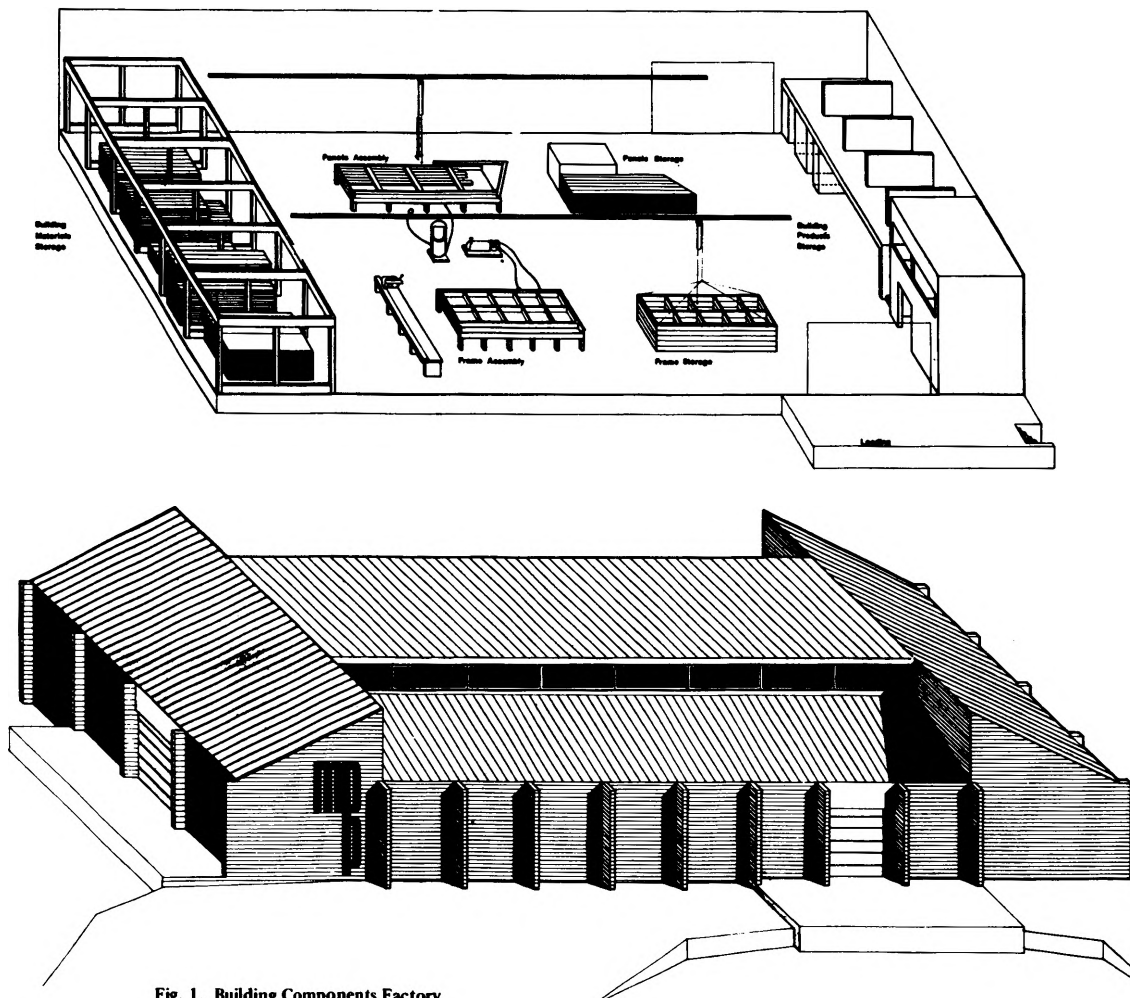


Fig. 1. Building Components Factory

that family structure and solidarity are influential factors in planning the dwelling and that personal autonomy or the ability of children and adults to clearly demark their domain are important planning criteria, the demonstration house attempts to provide for this type of family living. It is clearly indicated in the design that the children's sleeping area and adjacent play space, their territory, is located on the second floor of the dwelling, above the adults' territory the dining, kitchen, living and sleeping spaces.

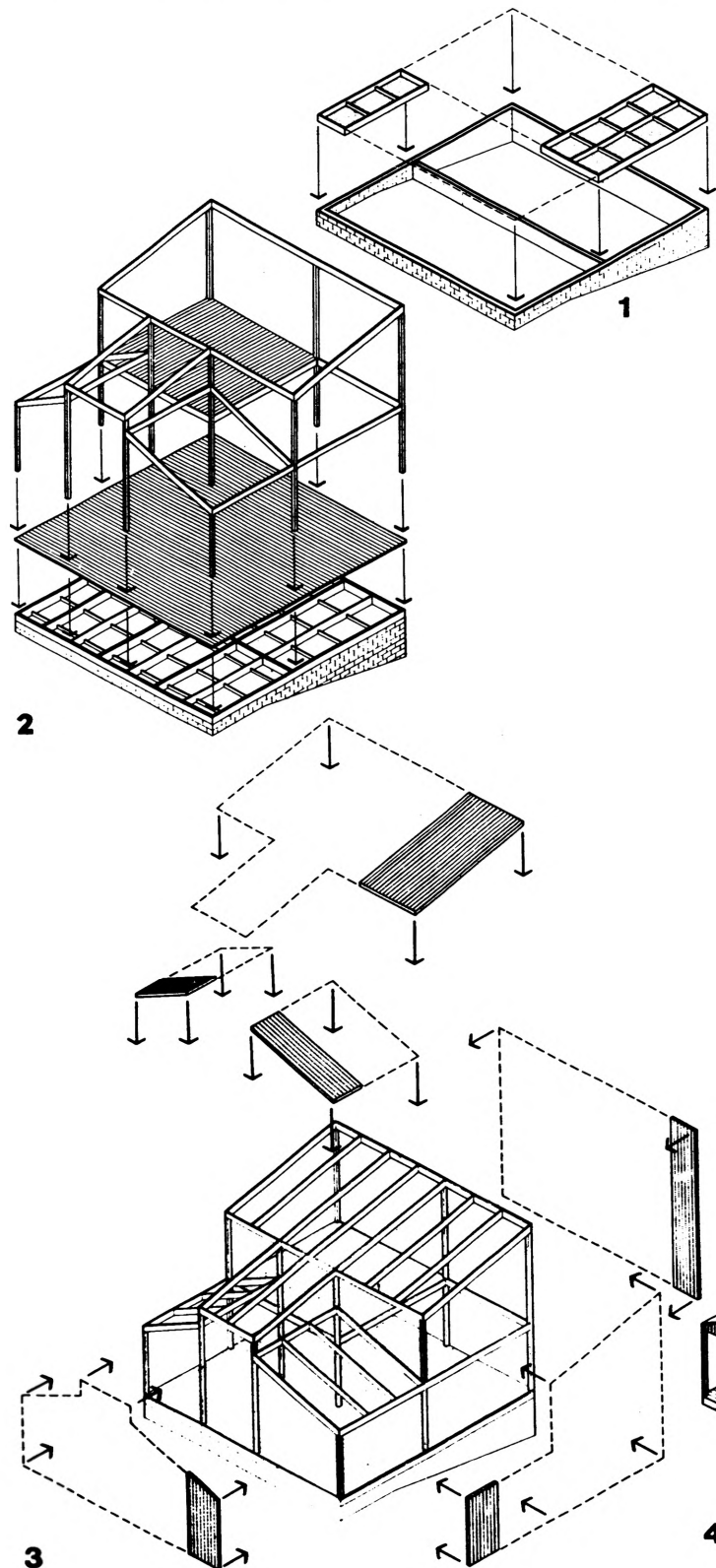


Fig. 2. Site Erection Procedure

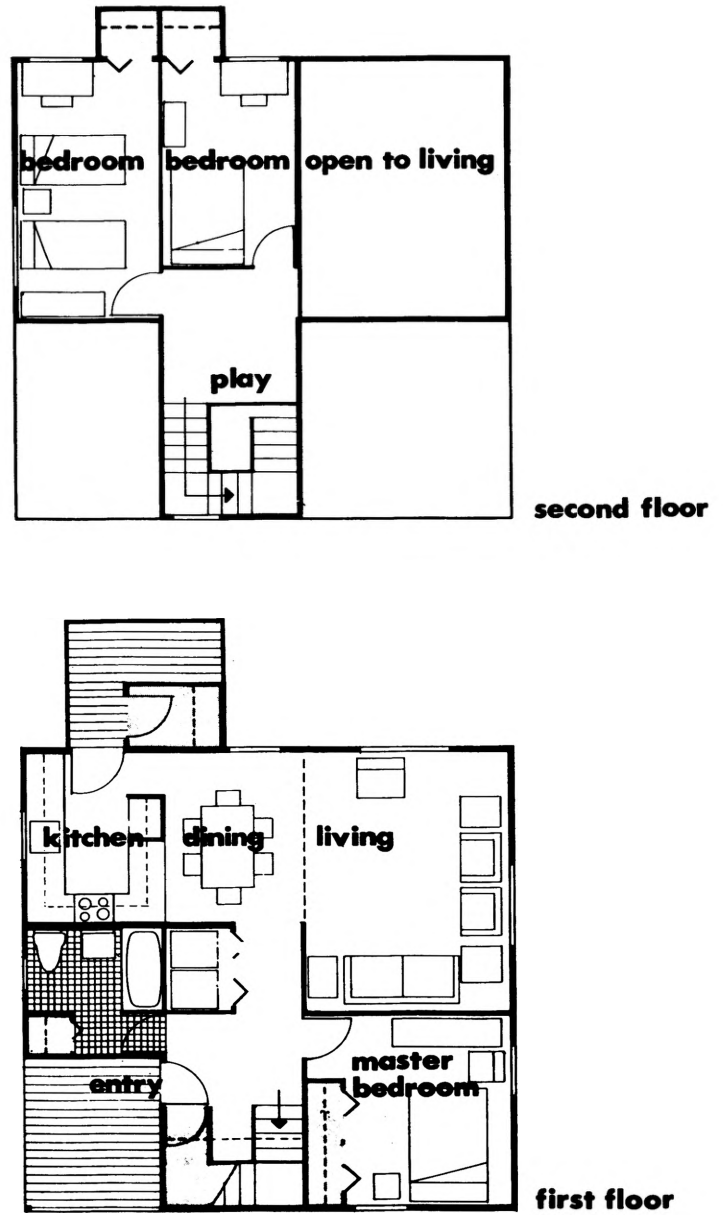
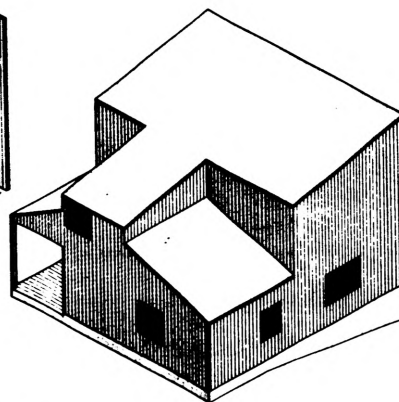


Fig. 3. Demonstration House Plan



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CONCLUSION

The rural housing program described in this paper is an attempt at systematically analyzing a basic set of needs and the development of a delivery system responsive to local requirements at all levels. Solutions to environmental problems need to be based upon realizable changes in existing behavior patterns and a means of monitoring the effects of change. The recognition of the user as a vital ingredient for change must be the predominant consideration for interventionists if the present housing crisis is ever to be ameliorated.

The incorporation of the general systems approach permitted certain innovative options that heretofore were unavailable. It provided the ability to analyze and resolve sub-problems deeply imbedded in the rural housing dilemma. Future solutions may be needed to rely on more sophisticated analysis techniques and implementation strategies since it is evident that previous approaches have been unsatisfactory.

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