

**SOCIOLOGICAL ASPECTS OF THE ADOPTION
OF CONSERVATION PRACTICES**

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SOCIOLOGICAL ASPECTS OF THE ADOPTION OF CONSERVATION PRACTICES

BACKGROUND

Although economic factors are certainly significant in the decision to adopt conservation practices, they fail to account for all adoption behavior. Sociological factors are also significant and, for some farmers, ranchers, and landowners, even outweigh economic considerations. Furthermore, in many cases, they establish the context in which economic factors become significant. Farmers and ranchers (hereafter farmers will include ranchers) who have a strong conservation ethic, for example, may be willing to accept reduced profits in return for the feeling that they have contributed to the welfare of future generations. Environmentally concerned farmers may also be willing to invest in practices that will enhance the environmental quality of their lands and water resources, as well as enhance the economic value of the land when it is sold or passed on to the next generation. An understanding of these and other sociological factors is helpful in developing successful programs for soil and water conservation.

Over the last three decades, research findings on the use/nonuse of conservation practices have been collected under the adoption-diffusion theoretical approach. Originally, this research focused on adoption of commercial, profit-oriented innovations such as hybrid seed corn, soil testing, and agricultural chemicals (Nowak, 1983). Many of these innovations were characterized by high capital investments and/or relatively complex technologies. During the sixties, researchers developed social-psychological models to determine the characteristics of the farmers who adopt innovations. These models were used to explain adoption behavior on the basis of social and psychological characteristics of individual adopters. The importance of social-psychological variables was further emphasized by the international work of Rostow (1960) and McClelland (1961) who offered explanations of third world development through analyzing personality characteristics. In all this research, the emphasis was specifically on explaining behavior through individual action (van Es, 1983).

With regard to agricultural innovations, Everett Rogers has been instrumental in synthesizing a typology that associated personal characteristics of farmers with the timing of their adoption/nonadoption of the innovation in question (Rogers, 1962; 1983; Rogers and Shoemaker, 1971). Critics have argued that this perspective ignores extra-personal factors such as a farmer's ability to purchase the innovation, as well as relevance of the measure for the particular farm operation. Peter Nowak (1983) has also pointed out several other weaknesses: investigators examined the communication process associated with adoption of innovations as a unidirectional phenomenon -- from agricultural institutions to farmers; researchers defined an innovation as it existed at the time of the study even though subsequent technical modifications might have changed its adoptability; investigators did not consider the actual research process that underlay the creation of the innovation; investigators did not study the social consequences of the innovations with respect to impacts on people of different socioeconomic status; and almost all investigators used surveys to gather data, which may have biased the results with inadequate or unreliable samples.

Adoption of conservation practices has become a central focus of environmental research in the seventies and eighties. Two things are not new: (1) the practices themselves and (2) dependence on the social-psychological model. Some conservation practices are probably as old as the practice of agriculture, but the institutionalization of soil and water conservation through the development of standard practices began with the formation of the Land Grant College System in 1862, the Cooperative Extension Service in 1914, and the Soil Conservation Service (SCS) in 1935.

During the dust bowl days of the thirties, saving soil was perceived as profitable because deep, fertile topsoil was considered absolutely necessary to maintain agricultural productivity. The introduction of chemical fertilizers and other production innovations has enabled farmers to maintain or increase productivity in spite of soil loss. At the same time, public concern for the environment has focused on off-site impacts of erosion, such as effects on water quality. The cultural meaning of conservation practices, therefore, has changed emphasis somewhat from maintaining a productive soil base for a profitable farm enterprise to looking beyond one's own farm boundaries and protecting the greater environment (Nowak, 1982). Thus, the farmer or landowner is called upon to adopt conservation practices, not only to protect his or her own future, but also to protect society's future. Because of this change in social context, old conservation practices can still be considered innovations, since for many producers they represent new practices. Some practices, such as conservation tillage, are new practices that became feasible with the development of herbicides, insecticides, and conservation tillage equipment.

Researchers continued to use the social-psychological model to explain adoption of conservation practices in the seventies. However, the adequacy of the model has been questioned, based on the criticisms cited earlier. Although there is an on-going debate on whether this theoretical approach is appropriate to use as an explanation for the adoption of practices, it is, for the most part, an artificial issue. Both pro (Nowak, 1983; Heffernan and Green, 1982) and con (Pampel and van Es, 1977; van Es, 1983) positions, when examined carefully, have similar concerns and call for similar measures; that is, an expanded model that still retains social-psychological elements. One issue that is emphasized differently, however, is the voluntary adoption of conservation practices. Nowak (1983) feels the social-psychological model can be used to explain voluntary adoption, while van Es's (1983) position is that the structure of agriculture has changed so much (in terms of federal support programs, regulations, the increased power of agribusiness and corporate farms, and the capital intensive nature of farming) that voluntarism is a romantic concept divorced from the political and social realities of agriculture.

EXPANDED MODEL FOR ADOPTION OF CONSERVATION PRACTICES

An expanded model to explain adoption of conservation practices permits a balanced presentation of research findings that represents what are, in essence, four major sets of explanatory variables: social-psychological, farm structural, ecological, and institutional. Research already exists in each category, which indicates the model has already been expanded by empirical studies.

It should be noted that, while many of these research studies have identified variables with statistical significance relative to the adoption of conservation practices, the variance explained is small. This frequently occurs in social science research, and demonstrates the complex task of the behavioral researcher who is attempting to develop predictive models.

SOCIAL-PSYCHOLOGICAL VARIABLES

The social psychological variables associated with conservation use fall into two subcategories: individual level characteristics of the farmers) and attitude variables. Characteristics of farmers include age, years farming, education, off-farm employment, and social participation (defined as the number of farm organizations to which a farmer belongs). Age, a commonly used independent variable in research on adoption of innovations (Rogers, 1983), has been used to try to explain conservation behavior, but with dubious success. Research results show a varied relationship between age and conservation behavior. Some studies have found that older farmers are more likely to be SCS cooperators and adopters of no-tillage techniques (Hoover and Wiitala, 1980; Lasley and Nolan, 1981), but other studies find no relationship between age and use of conservation practices (Carlson, et al., 1981). Still other studies show that younger farmers are more likely to adopt conservation practices. Nowak and Korshing (1983) argue that younger farmers are more likely to adopt reduced tillage technologies, while older farmers are more likely to adopt structural practices and other cultural practices such as grass waterways and stripcropping. This age-selective adoption may account for the lack of a relationship in other studies.

Some studies indicate that the number of years farming has a positive and significant relationship with the use of conservation practices, at least in the early years (Abd-Ella, 1981), while others show that experienced farmers are more likely to rely on traditional tillage practices (Miranowski, 1981). More research needs to be conducted on both age and length of time farming. It is possible that even though there is a positive relationship between these variables, the relationship may be nonlinear (Basu, et al., 1982).

A positive association has been found between education and the use of conservation practices (Carlson et al, 1981; Ervin and Ervin, 1982; Pampel and van Es, 1977). In addition to the use of practices, education is positively related to perception of erosion problems, knowledge of government projects, and positive attitude toward these projects (Ervin and Ervin, 1982; Taylor and Miller, 1978).

Off-farm employment is negatively related to both the use of conservation practices (Ervin and Ervin, 1982) and the decision to adopt conservation practices (Taylor and Miller, 1978). (Both use and decision to adopt have been used as dependent variables in research studies to measure adoption.) Several variables, when controlled, could help explain this negative relationship. Controlling for both size of farm and farm income might reveal that data on small, part-time farmers have masked the relationship between part-time farmers operating larger farms and adoption of conservation practices. Type of non-farm occupation could also affect conservation behavior: professional part-timers might be more likely to adopt because of higher education

levels and availability of cash income. Other factors, such as the number of hired farm laborers and hours of off-farm employment might also be important factors. Unfortunately, researchers have not examined these relationships in depth.

Social participation such as membership in local organizations has a positive relationship with the use of conservation practices (Abd-Ella et al., 1981; Clearfield, 1983; Korsching et al., 1981). Farmers who are local opinion leaders are also more likely than other farmers to adopt conservation practices (Lovejoy and Parent, 1981). This is probably related to the fact that local leaders tend to be better-educated, manage larger farms, and have a good understanding of soil erosion problems.

ATTITUDES

Although attitudes are treated separately here, they are related to individual level variables as well as farm structural variables. One must remember that an attitude is defined only as "a predisposition to act" and does not always represent one's behavior. Some farmers may have strong conservation attitudes but may not follow through on these attitudes due to financial limitations, lack of information, etc.

Four attitude variables have been examined in research studies in relationship to use of conservation practices: stewardship, risk orientation, non-economic orientation toward farming, and attitudes toward government involvement. Stewardship, or the belief that farmers have a moral obligation to protect natural resources, is positively associated with the use of conservation practices (Ervin and Ervin, 1982; Nowak, 1982c). However, the influence of stewardship (or the "conservation ethic") on the actual use of practices appears to be declining. One recent study has determined that other factors, such as economic returns, are far more influential in the adoption of practices (Carlson et al., 1985).

Risk orientation, (defined as the likelihood one will take chances) has been positively related to use of conservation practices (Ervin and Ervin, 1982, Nowak and Korsching, 1981). However, Napier et al. (1985) found that farmers who were most concerned about environmental issues also were the most risk averse, noting that risk of adoption will probably have to be reduced before these farmers will use conservation practices. Economic orientation toward farming (a farmer who places a high value on being one's own boss) is also positively related to use of practices (Ervin and Ervin, 1982), and significantly related to concern with soil erosion (Buttel et al., 1981).

Farmers have mixed attitudes toward government involvement in agriculture. On the one hand, farmers generally do not support any type of legal pollution controls. Furthermore, if the economic situation for farmers worsens, they become even less supportive of government intervention that has a regulatory flavor to it (Marsh and Christenson, 1977). On the other hand, most farmers feel the government is responsible for funding conservation.

FARM STRUCTURAL VARIABLES

Farm structural variables related to the adoption of conservation practices include: size of operation, net income/farm sales debt levels, tenure, and farm specialization/diversification. Overall, studies on farm size and the use of practices show either a significant effect (Nowak and Korsching, 1981; Abd-Ella et al., 1981) or a strong positive relationship (Carlson et al., 1981; Choi and Coughenour, 1979; Coughenour and Kothari, 1962; Ervin and Ervin, 1982; Pampel and van Es, 1977). Most studies indicate the larger the farm size and the more income produced by the farm enterprise, the greater the use of conservation practices.

Early studies in adoption have shown a positive relationship between a farmer's use of credit and use of conservation practices. These studies were concluded, however, before the credit conditions that are prevalent in agriculture today. It can be expected that farmers with high debt levels will be more concerned than ever about profit maximization. Practices that can be shown to maintain or increase profits (such as conservation tillage) will be more likely to be adopted than more costly conservation practices. High debt loads will further impact soil and water conservation efforts due to the inability of farmers to maintain existing practices. High debt will also increase pressure on farmers to plant more row crops on marginal land.

Some studies associating farm tenure (owning or renting) to use of conservation practices show that ownership is significantly related to use of profitable practices but not to use of unprofitable practices (Pampel and van Es, 1977). Even when practices are not controlled for profitability, the relationship of farm ownership and use of conservation practices has been found to be in a positive direction (Abd-Ella, 1981; Carlson et al., 1981). Ervin (1985) maintains that "Despite past and present investigators' efforts, the question of whether rented land receives less, the same or more erosion control than owner-operated land remains an enigma ... Nonetheless, theory and empirical evidence suggest that erosion control decisions on rented land will differ markedly from similar owner-operator decisions."

Also related to ownership is family participation in the farm operation. When families have common aspirations regarding the future of the farm, use of conservation practices is significantly higher (Abd-Ella et al., 1981; Carlson and Dillman, 1983). Family size is also positively related to the number of practices used, as is the degree to which married couples share in farm decisions and the degree to which the family is involved in gathering farm-related information (Abd-Ella et al., 1981; Pampel and van Es, 1977).

Research concerning the relationship between the degree of farm specialization/diversification and use of conservation practices shows mixed results. One study found more specialized farms used significantly fewer practices and expended little effort in reducing soil erosion (Ervin and Ervin, 1982). A second study found that, the more specialized a farm, the greater the number of practices used (Abd-Ella et al., 1981).

ECOLOGICAL VARIABLES

Two factors are important when considering the effect ecology has on adoption of conservation practices: (1) actual soil erosion conditions, and (2) perception of those conditions. Research findings are mixed, perhaps because of the variability in research techniques and the research definition of the erosion problem. Some researchers have calculated erosion rates on study farms, using the Universal Soil Loss Equation (USLE), while others have accepted the farmer's evaluation of erosion conditions. When the USLE was used to evaluate erosion, one study found that soil erosion was not a significant explanatory variable relative to adoption of practices (Nowak and Korsching, 1981). Another study found a significant relationship between erosion potential and a farmer's effort in reducing the erosion problem (defined as the difference between the worst erosion possible and actual erosion) but not to the number of conservation practices used (Ervin and Ervin, 1982).

A longitudinal study that compared farmers' perceptions of their erosion problems with objective evaluations by SCS personnel (Hoover et al., 1982) found considerable differences in evaluation between farmers and soil conservationists. These differences decreased with intensified financial, educational, and technical assistance. In 1971, only 1 percent of the farmers felt soil erosion was a "major problem" on their farm, while SCS personnel estimated that 85 percent of the farms were in this category. In 1982, after 11 years of conservation efforts, 20 percent of the operators felt soil erosion was a major problem while SCS conservationists estimated 57 percent. What seems important is that a perception of the problem is a prerequisite to conservation efforts. In other words, perception of a problem is a necessary but not sufficient condition for the adoption of conservation practices.

Recent research has shown that the pattern of perception of soil erosion exhibits the "proximity effect;" that is, farmers and landowners are more likely to identify erosion as a problem somewhere other than on their own farm. Farmers are most likely to identify erosion as a problem in their county, somewhat less likely to identify it as a problem in their community, and even less likely to identify it as a problem on their own farm (Bultena et al., 1984). There may be several reasons for this discrepancy. For one, farmers may not have an erosion problem on their own farm. (Research upon which the "proximity effect" hypothesis has been based did not involve actual, on-farm evaluations of erosion.) Second, farmers may not be aware of the magnitude of erosion on the farm because sheet and rill erosion is not characterized by large gullies and dramatic soil losses. Third, there may be a desire on the part of farmers to deny the problem in order to reduce the psychological stress resulting from their failure to act.

Another aspect of perception is the fact that farmers frequently overestimate the extent to which they are practicing good soil conservation. This is especially true in regard to conservation tillage. Nowak and Korsching (1985) have found that farmers consider themselves to be using conservation tillage when they use conservation tillage equipment or reduce the number of passes over the field, even though residue on the field is far below the standard for conservation tillage.

If, as the research indicates, there is a widespread lack of awareness of erosion problems and of effective conservation practices, then education and technical assistance must be provided before the process of adoption can begin. Some researchers have referred to this as the "supply" side of

the adoption process rather than the "demand" side. The "supply" side of the adoption process considers the ways by which innovations and information about them are made available to individuals or households through agencies and their implementation strategies (Brown, 1981). Institutional variables are more likely to be related to the supply side of the adoption process. The "demand" side emphasizes adoption of an innovation as an outcome of an individual learning or communications process determined primarily by individual and/or farm unit characteristics.

INSTITUTIONAL VARIABLES

Of all the variables affecting the adoption of conservation practices, institutional variables are among the most influential, yet they are the least defined, the most difficult to document, and the least researched. In the long run, however, institutional factors may have the greatest impact on adoption and use of conservation practices. Social scientists who gathered at the 1982 RCA Symposium called attention to the inconsistencies and conflicts between conservation and production goals of USDA agencies, and called for research to evaluate and identify the institutional barriers to conservation (English, et al., 1984). The 1985 Farm Bill addresses some of these concerns with its "Sodbuster", "Swampbuster", and Conservation Reserve features.

RCA Symposium participants also cited a need to "break down barriers among institutions involved in soil and water conservation by strengthening decentralization of program control and development of multi-agency planning at the local level" (English, et al., 1984). Recent research has shown that, although conservation agencies are frequently selected as likely sources of needed conservation information, there is confusion about the types of assistance available from individual agencies (Bultena, et al., 1984).

In general, the higher the number of institutional contacts, the greater the likelihood farmers will use conservation practices (Abd-Ella et. al. 1981, Clearfield, 1983; Nowak and Korsching, 1981). Ervin and Ervin (1982) found that farmers who are SCS cooperators or who have an SCS conservation plan are more likely to use conservation practices.

As one would expect, cost-sharing programs have been found to have a substantial effect on use of conservation practices. Studies of several demonstration projects show that there is a significant relationship between the number of conservation practices subsidized and the use of practices (Nowak and Korsching, 1981; Ervin and Ervin, 1982; Hoover et al., 1982). However, perceptions of economic feasibility may be as important to the adoption process as actual economic feasibility (Clearfield, 1983). Erwin and Alexander (1981) found that, except for no-till planting and contour stripcropping, a majority of the farmers interviewed perceived that other conservation practices were economically profitable. They point out that "...one can argue that perceptions of economic profitability are of utmost importance for adoption. Once the practice has been adopted then performance (i.e., realized returns versus costs) will determine continued use." Research on cost-share rates is very limited. It exists mostly in the form of case studies and tends to be site- and practice- specific. More broad-based research needs to be done in this area before any general statements can be made for the purpose of policy development.

Although the influence of institutional factors on adoption of conservation practices remains a relatively unexplored area of research, there is considerable interest in the "supply" side of the adoption model. Extrapolation of results from studies of adoption in other areas suggests that the market approach, in which emphasis is placed on information, technical and financial assistance, and target clientele, might achieve greater application of conservation practices. Lawrence Brown (1981) refers to this as the "Market and Infrastructure Perspective," explaining that "individual behavior does not represent free will so much as choices within a constraint set and (that) it is government and private institutions which establish and control the constraints." He has proposed three stages in the diffusion process as (1) establishment of diffusion agencies through which the innovation is distributed to the population at large, (2) implementation of an agency strategy to induce adoption, and (3) adoption of the innovation.

Several recent research studies have used this concept as the basis for examining information sources, relationships among conservation agencies and Soil and Water Conservation Districts, and characteristics of target clientele. (Bultena et al., 1984; Korsching and Hoban, 1984). They have cited the need to see farmers as "segmented" rather than "mass" audiences, and to target information and technical assistance to sub-groups based on their common needs, characteristics, stages in decision-making, etc. This approach may be particularly relevant as conservation agencies focus their assistance on areas with the most critical resource problems where it may be necessary to work with a variety of client groups. Knowledge of these new clientele - their needs, values, information sources, etc. - will enable agency personnel to develop more successful strategies to market conservation. As Burch and DeLuca (1984) have stated, "Research on innovation-adoption suggests a complementarity between (the) two sources of information. Mass media make the innovation known, but interpersonal sources make it respectable. Early adopters appear to have greater exposure both to mass media and to interpersonal sources of information."

CONCLUSION

Recent research in the area of adoption of soil and water conservation has provided useful information for program implementation. Several characteristics of likely adopters have been identified. We know, for example, that adopters of conservation practices are likely to be well-educated, full-time farmers with a high level of organizational participation. We also know that farmers who possess the "conservation ethic" - that is, those concerned with preserving the land for future generations - will also be more likely to adopt, although other factors, such as risk aversion, may intervene. Other characteristics, such as farm ownership, family participation and awareness of erosion problems are also typical of adopters.

This profile of most likely adopters enables agency personnel in the field to evaluate the clientele in a particular area and estimate the likelihood that recommended conservation practices will be accepted and applied. If the level of "adopter characteristics" is high, there may be little need for intensified technical assistance, cost sharing or other program implementation strategies.

It is possible, however, that agency efforts have already reached many of these early adopters. A recent evaluation of the SCS Conservation Technical Assistance (CTA) Program shows that half

of CTA planning assistance in 1983 was provided to those who have been district cooperators for at least 3 years.. almost three-fourths of CTA direct assistance was provided to owner-operators and more than one-half of CTA direct assistance was provided to full-time farmers (USDA, 1985). These are the "ready, willing and able" farmers and landowners with whom SCS technical personnel have worked for the last 50 years.

The National Conservation Program, since 1983, has focused attention on the most critical problem areas and provided the impetus for a redirection of SCS program activities. This redirection has necessitated a shift from the "first come, first served" clientele of earlier days to a different clientele - one that may or may not include farmers and landowners with high adopter characteristics. This shift is reflected in the SCS evaluation of targeted areas: CTA direct assistance time was proportionately higher for landlords, non-farmers, and those who were not conservation district cooperators (USDA, 1985).

Sociological research indicates to us that redirecting our efforts to new clienteles may not be easy, and that special implementation strategies may be needed to achieve high levels of adoption. The research confirms that the American farming community (and therefore agency clientele) is less and less the homogeneous group of full-time family farmers that comprise the popular American image of "farmer", and more and more a heterogeneous group composed of large, corporate farmers, part-time farmers, farm managers and absentee landowners. This warrants an additional shift in the focus of the adoption-diffusion model from the social-psychological perspective to a marketing perspective, which, in paralleling structural change in agriculture, can begin to provide information that can help the agency achieve success with new clienteles) such as:

1. Farmers should be viewed as a "segmented", rather than a "mass" audience.
2. Farmers need "personalized" information and technical assistance that will help them increase their awareness and recognize sheet and rill erosion as a problem on their own farm.
3. Farmers need information and technical assistance that will help them evaluate the economic impacts of proposed conservation systems on their operation.
4. The "mass media," especially farm magazines, should be used in greater amounts for the dissemination of conservation information in the early stages of adoption.
5. The role of the various agencies involved in conservation should be clarified, common goals among the agencies firmly established, and a teamwork approach of public and private organizations at the local level emphasized.
6. Implementation strategies and marketing approaches should be targeted to the needs, abilities and attitudes of different clienteles. (For example, absentee landowners, part-time farmers).
7. Obstacles to conservation (such as tradition, perceived costs, and risk aversion) should be identified by local farmers and dealt with as part of the program implementation process.
8. An evaluation of the "best mix" of technical, educational, and financial assistance should be considered in relation to the socioeconomic characteristics of local community members. This could involve sharing agency personnel, highly coordinated information campaigns, and innovative financing measures.

9. Potential and existing interpersonal networks among farmers, ranchers and other land users should be used to help disseminate conservation information, especially in the later stages of adoption, and to expand participation among a wide variety of local groups.

These, and other findings from sociological research can provide SCS with the bases for developing program implementation strategies that can continue to get conservation on the land and provide for maintenance of existing systems in the long term.

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