Social Capital: A Unifying Framework for Understanding Conservation Decisions

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Abstract

Agricultural pollution is believed to be a leading contributor to nonpoint source pollution. Whereas most industrial polluters are subject to state and federal environmental regulations, historically, agriculture has been exempted. Most states depend on voluntary participation in technical assistance and educational programs to promote best management practices (BMP) adoption. The decision of agricultural producers to engage in BMPs is shaped by a number of forces. Research indicates that two of the most significant factors influencing the adoption of BMPs are farm size and education.

However, social factors associated with the adoption of agricultural practices that improve water quality have received less attention. A notable exception is a 1998 survey of farm operators in the Mississippi Delta which highlighted the importance of institutional factors, such as the influence of information sources and attitudes toward government regulations, in the decision process.

This poster presents a literature review using a social capital framework to better understand the interplay between social, economic, and environmental factors affecting adoption of new agricultural technology and best management practices. The trust, reciprocity, information, and cooperation associated with social networks create value, or social capital, in the norms, shared values, and behaviors that bind people and communities together and make cooperative action possible. Understanding environmental stewardship decisions within the context of a social capital framework can assist policy makers promote participation in technical assistance and educational programs.

Introduction

Agricultural pollution is believed to be a leading contributor to nonpoint source pollution (Carpenter et al., 1998). Whereas most industrial polluters are subject to state and federal environmental regulations, historically, agriculture has been exempted. Most states depend on voluntary participation in technical assistance and educational programs to promote best management practices (BMP) adoption. Research indicates that two of the most significant factors influencing the decision of agricultural producers to engage in BMPs are farm size and education. Social factors associated with the adoption of agricultural practices that improve water quality have received less attention (Gill, 2001). Yet, as uncertainty continues among agricultural interests regarding water quality issues, cost-benefit implications, environmental benefit measurements, existing and potential regulations, available resources, and agency responsibilities: social dynamics warrant further investigation.

Review of Program Success Factors

Several factors contribute to the uneven success of programs advocating environmental stewardship in the agricultural community. Many producers are apprehensive about working within an environmental framework; they may agree that water quality problems attributable to agriculture exist, but do not recognize that their individual farms contribute (Christensen and Norris, 1983; Halstead et al., 1990; Lichtenberg and Lessley, 1992; Pease and Bosch, 1994; Napier and Brown, 1993). Motivation of farmers to address environmental issues through management varies. Negative strategies such as existing or proposed regulations are very influential in farmers adopting environmentally friendly production practices (Napier et al., 2000; Ribaudo, 1998). Other studies have shown that farmers often recognize that larger scale environmental issues are important for farmers to consider (Musser et al., 1994; Richert et al., 1995). For example, Supalla et al. (1995) found that factors influencing farmer environmental behavior regarding nitrogen fertilizer management were environmental attitudes, demographics, economic situation, and farm location. Specifically, they found that environmentally concerned, well educated, well informed, and younger producers with smaller acreages were more likely to apply nitrogen at or near recommended levels. Further, Fulgie and Kasacak (2001) found that education and farm size have significant and consistent effects on adoption of soil testing, integrated pest management, and conservation tillage by farmers. Higher levels of education are positively associated with higher adoption rates, but not necessarily post-secondary education as findings indicate that those with a high school education or more adopted these three practices more rapidly than those without a high school education (Fulgie and Kascak, 2001).

Implications for Program Design

Successful agricultural environmental stewardship education programs must include acknowledging and defining agricultural contribution to water quality problems (Elnagheeb et al., 1995; Ribaudo, 1998), demonstrating business value (Napier et al., 2000; Poe et al., 2001; Ribaudo, 1998; Ribaudo and Horan, 1999), and coordinating among agencies providing educational, technical, and financial assistance (Ribaudo, 1998; Forster and Rausch, 2002). Programs should be locally oriented due to differing soils, geology, and other watershed characteristics. In addition, other factors such as community attitudes and perceptions, and the predominant commodity and production infrastructure need to be considered in program development (Coughenour, 2003). Each state has unique watershed and commodity specific factors (such as environmental issue awareness, site-specific challenges, and opportunities) that influence individual decisions and actions.

Social Factors

Although several aspects of agriculture/environmental stewardship programs point to the importance of social factors, research related to educational outreach and conservation practices has primarily focused on individual farm and/or farmer characteristics. These approaches are based on traditional innovation, adoption, and diffusion models that explain the diffusion of new ideas from an economic perspective and an individual's willingness to assume risk. Concerned that traditional adoption and diffusion models may miss other influences, Gill (2001) studied sociological factors influencing adoption of BMPs as part of the Mississippi Delta Management Systems Evaluation Area (MDMSEA) interdisciplinary research effort. His review of the literature indicated that other factors may be important in the adoption process when water quality issues are at stake (see Rogers and Shoemaker, 1971; Christensen and Norris, 1983; van Es, 1983; Heffernan, 1984; Rikoon and Heffernan, 1989; Bouwer, 1990; Rikoon, 1991; Vogel, 1996). Furthermore, although social scientists have studied water quality issues within a broader natural resource context, Gill (2001, p.105) noted a lack of attention to social factors associated with adopting agricultural practices that improve water quality.

Gill (2001) used a mail survey to collect information from Mississippi Delta farmers for three categories: farm characteristics, demographics, and social/attitudinal characteristics. Specifically, farmers were surveyed on farm operation characteristics, awareness and use of BMPs, evaluation of information sources, attitudes, and socio-demographic characteristics. An innovation index based on 25 BMPs was developed to measure the extent to which practices had been used by each respondent (Table 1).

Table 1. Mississippi Delta Farm Operators Who Have Ever Used Particular Best Management Practices *(Practices represent the selected items for Innovation Index)*

Practice	n	%	Practice	n	%
Cover Cropping	159	48%	Custom Application of Lime	225	68%
Filter or Buffer Strips	70	21%	Variable Rate Fertilization	72	22%
Slotted Board Risers	163	49%	Variable Rate Liming	44	14%
Grass Waterways	65	20%	Variable Rate Pesticide Application	65	20%
Sediment & Water Retention Basins	55	17%	Yield Monitoring for Precision Agriculture	42	13%
Riparian/Wetland Zones	29	9%	Hooded Sprayers	76	23%
Land Formed Fields	234	70%	Integrated Pest Management	100	31%
Deep Tillage	276	84%	Baculovirus	10	3%
No Tillage	198	60%	Transgenic Cotton	153	47%
Minimum Tillage Stale Seedbed	244	74%	Transgenic Soybeans	141	43%
Custom Application of	287	85%	Transgenic Corn	13	4%

Other study variables included farm size, farm sales, land adjacent to a stream or creek, land adjacent to an oxbow lake, education (high school or less, some college, college degree), age, attitudinal scales on influence of information, support for soil conservation, barriers to BMP adoption, government regulation of agrichemicals, environmental concerns about the use of pesticides and fertilizer, and outdoor recreation behavior. Results from a Pearson's Correlation Coefficient analysis of farm and farmer characteristics indicated that farm sales and farm size were most strongly correlated with BMP adoption. The influence of information sources and education were also strongly correlated with BMP adoption.

Gill (2001) developed a set of regression models to further investigate variables related to higher BMP adoption levels. The innovation index served as the dependent variable and independent variables were grouped into three categories: farm characteristics, demographic characteristics, and social characteristics. The final reduced model included variables that were significant at the .10 level or less. Results indicated that variables pertaining to farm characteristics and attitudinal characteristics explained almost 33 % of the variance (Table 2).

Table 2: Block Regression Analysis for Variables Related to Adoption of Best Management Practices Among Mississippi Delta Farmers

	Model I		Model II		Model III		Reduced Model	
Variables	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.
Farm Characteristics								
Land adjacent to a stream or creek	.235	.000	.215	.000	.171	.000	.188	.000
Total farm sales	.223	.000	.189	.000	.178	.000	.211	.000
Land adjacent to an oxbow lake	.204	.000	.193	.000	.187	.000	.207	.000
Total acres farmed	.136	.012	.120	.026	.082	.116		
Demographic Characteristics								
Education			.121	.017	.053	.299		
Age			-.095	.050	-.024	.632		
Attitudinal Characteristics								
Influence of information sources					.137	.013	.154	.005
Attitudes toward government regulations					-.128	.008	-.147	.002
Attitudes toward adoption of BMPs					.116	.032	.121	.023
Outdoor recreation activities in MS Delta					.074	.134	.086	.067
R^2	.244		.267		.328		.323	

Adapted from Gill 2001, p. 112

Although farm characteristics accounted for about 24 % of the variance in BMP adoption levels, social characteristics were found to play an important role as well. As a group, the influence of information sources, attitudes toward government regulations and adoption of BMPs, and participation in outdoor recreation activities explained almost 20% of the variance in the level of innovation. These social/attitudinal variables contributed an additional 8% to the variance explained by the farm characteristics, increasing the explained variance from 24.4% to 32.3%.

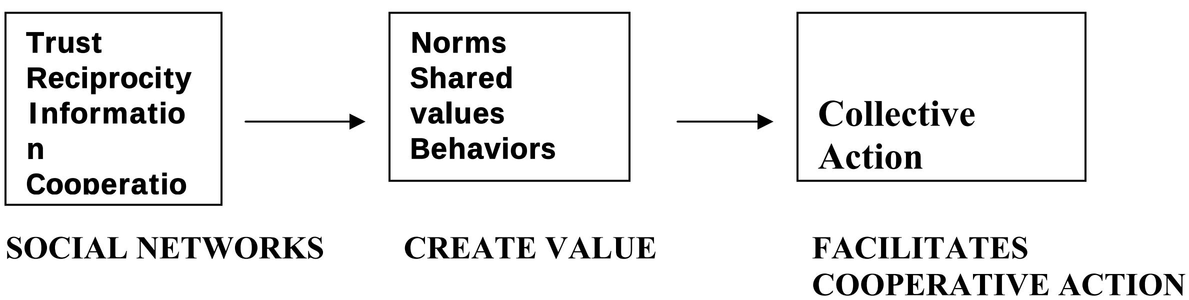
Gill situates the findings in a broader discussion of the social, cultural, political, and economic environment in which Mississippi Delta farmers operate. He notes the particularly important role of information sources and credits agencies such as the Mississippi State University Extension Service, Mississippi Soil and Water Conservation Commission, Natural Resource Conservation Service, Yazoo-Mississippi-Delta (YMD)

Joint Management District, and local soil and water conservation districts with being successful in encouraging farm operators to adopt BMPs, and urges these entities to continue their efforts to expand adoption of BMPs. Acknowledging the importance of economic factors, particularly farm sales, to the adoption of BMPs, Gill (p. 107) concludes that "programs that build upon social as well as economic factors must be developed to improve success of BMP adoption and thereby improve water quality in the MDMSEA."

Gill's research demonstrates that factors at the social/community level play an important role in shaping conservation decisions. A significant finding is that farmers who rely on agencies that provide educational programs and technical assistance used more BMPs. The role of information sources is in part related to communication channels, as traditional adoption-diffusion models suggest. However, exploring relationships between farmers, educational instructors, and technical assistance providers within a social context may aid policy makers in promoting participation in educational and technical assistance programs, and thereby expand BMP adoption. Social capital theory can inform these issues.

Social Capital

Social capital is generally defined as those resources inherent in social relations, which facilitate collective action (Bourdieu, 1983; Coleman, 1988; 1990; Lin, Cook, and Burt, 2001). Social capital resources include trust relations, norms, and networks of association. An underlying premise of social capital is that investments in social relations "yield expected returns" (Lin, Cook, Burt, 2001, p. 6). Although social capital can be treated at the individual level, the focus here is at the group level.



Trust Relations and Norms

As previously mentioned, voluntary education and technical assistance programs, along with conservation practice utilization subsidies have been primary strategies used by resource management agencies to influence land managment choices (Barrios, 2000; Hite et al., 2002). When implementation of government programs depends more on mobilizing policy stakeholders and less on authority and control, social capital becomes a key to success. According to Schneider and Ingram (1990, p. 517), capacity-building policy tools are appropriate where a target population may "lack sufficient resources or support (financial, organizational, social, political) to carry out [policy activity] with a reasonable probability of success." A critical assumption of this type of policy tool is that the potential target population(s) will welcome the information and assistance. Although a valid point of departure, such an assumption requires a very high degree of trust.[1]

Networks

Networks are mechanisms through which trust is developed, legitimacy is established, and information is exchanged. Networks are most effective when they are "diverse, inclusive, flexible, horizontal (linking those of similar status), *and* vertical (linking those of different status, particularly local organizations…with external organizations and institutions…" (Flora, 1998, p. 493). Knowledge networks build on and are linked to existing social networks. However, it is not clear that a causal relationship exists (Fesenmaier and Contractor, 2001).

Horizontal and Vertical Linkages

The term "social capital" has come to be widely used in the social sciences, especially in the discipline of rural sociology (Castle, 2002). Taylor (1996) uses a social capital framework to define good government, arguing that good government requires a cooperative approach to hierarchical government. Assuming government intervention is aimed to assist people in achieving their common purposes by overcoming collective action problems, cooperative hierarchies can help people to help themselves. Contrasted with coercive, top-down hierarchies, cooperative hierarchies are characterized by a recognition and respect for the capacity of subordinates to play a role in regulating their own behavior. Taylor defines this capacity found in the local community, networks, and organizations as horizontal social capital. In addition, cooperative hierarchical approaches feature long-term, repeated interaction, cooperation, reciprocity and trust - which may be described as vertical social capital. Thus, good government is supported by the important roles played by horizontal and vertical social capital. Unfortunately, scholars have paid little attention to how institutional arrangements affect levels of social capital (Schneider et al., 1997).

How local organizations relate to each other and to the larger society is an important area of research for rural sociologists, and in particular, community scholars. Drawing on 15 years of research on rural communities, Flora and Flora assert that social infrastructure is "the key to linking individual leadership to physical infrastructure (1993, p. 49). Warner (1999) also reports important links between social capital and the productivity and efficiency of community services. These authors conclude that strong social capital at the community level supports both formal and informal decision making processes and stimulates public involvement. In effect, it "provides organized spaces for interaction [and] networks for information exchange…" (Warner, 1999, p. 374).

Conclusion

A broad discussion of the social, cultural, political, and economic environment in which farmers operate is essential to advancing our understanding of conservation decisions.

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[1] Social capital distinguishes between trust experienced as a personal attribute and as a characteristic of the system (Baron, Field, and Schuller, 2000).

Further research is necessary to better understand the influence of social factors in the BMP adoption decision process. The role that information sources play is particularly important.

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