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CONSERVATION USE AND QUALITY OF LIFE IN A RURAL COMMUNITY: AN EXTENSION OF GOLDSCHMIDT'S FINDINGS*

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ABSTRACT

Agricultural conservation offers environmental benefits to farm families and others in the community as well as those living downstream. Studies of farmer conservation behavior have concluded that Best Management Practice adoption is not explained by innovation-diffusion, rational choice and farm structure models alone. As suggested by findings from the Sugar Creek Watershed, additional factors contribute to a land owner's motivation for implementing conservation practices that go beyond economic or self-interested behavior; these motivations extend conservation behavior to social acts of stewardship where adoption takes place more often on medium-sized family farms. In this paper, Goldschmidt's findings relating farm size and quality of life are tested in an exploratory analysis that evaluates conservation use as an indicator of quality of life. We perform this analysis by examining the relationships among the structural and social variables of farm size, enterprise type and intergenerational farm succession to ascertain their influence on land tenure. Conservation behavior and preferences for additional conservation practices, as elicited from participants through surveys, are added to the model to understand if and how they affect the discrimination of land tenure categories. Statistical analysis of these variables using analysis of variance (ANOVA) and discriminant analysis show the strength and, occasionally, directionality of these relationships, revealing a complex and interconnected reality that lends to a need for contextual explanation. Based on the conclusions of this paper, Buttel's finding of a bimodal distribution of farm sizes, when viewed in terms of the benefits attributed to the medium-sized farms of Goldschmidt's findings, reveal an area of concern when considering the future of conservation adoption.

Introduction

Agricultural Best Management Practices (BMPs) offer environmental benefits to farm families and others in the community as well as those further downstream.

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Quality of life in rural communities has been tied to the embeddedness of rural residents in households and communities as well as their equitable access to land and resources. Walter Goldschmidt (1978) "discovered" these relationships expressed in farm size[1] and quality of life in rural communities, finding that communities with greater numbers of medium-sized farms show higher indices of quality of life. Lyson, Torres, and Welch (2001) recently described the need to expand Goldschmidt's findings beyond materialist explanations to include Mills and Ulmer's civic community framework in accounting for quality of life. While Goldschmidt (1978) and Mills and Ulmer (1946, cited in Blanchard and Matthews 2006) took different approaches to understanding quality of life, it is the goal of this paper to include both approaches in conceptualizing farm size and conservation behavior as quality of life indicators.

Research findings have shown links between agricultural practices and human health regarding quality of life in toxicity studies of air and water emissions from industrial-scale animal and crop production systems (Clancy 1990; Donham and Thu 1993; Durrenberger and Thu 1996; Thu and Durrenberger 1998). Other findings link sustainability to environment and quality of life (Chiesura and de Groot 2003; Rapport, Costanza, and McMichael 1998; Stinner, Stinner, and Martsolf 1997). Researchers have demonstrated the influences of social networks on community well-being through social support (Forrester-Jones et al. 2004), care for the local environment (Lansing, Lansing, and Erazo 1998), and civic engagement (Lyson et al. 2001). Furthermore, conservation as a phenomenon has been investigated to understand the unique qualities of the people (and their farms) who choose to adopt BMPs on their land. Studies of farmer conservation behavior have concluded that adoption of BMPs is not explained by innovation-diffusion, rational choice, and farm structure models alone (Napier and Bridges 2002). Moreover, as indicated by findings from the Sugar Creek Watershed Project (Parker 2006; Parker, Moore, and Weaver 2007), additional factors (e.g., land tenure, presence of a farm heir, and social networks) contribute to an individual's motivation for implementing conservation measures, which go beyond economic or self-interested behavior and extend conservation behavior to social or community acts of stewardship. Conservation adoption in the Sugar Creek has taken place more often on the medium-sized farms of socially embedded families. In spite of these

[1]Walter Goldshmidt investigated farm size and the resulting farm structure of the community in which a less equitable distribution of land is associated with more people selling their labor to large farm managers or owners thereby expanding the class system. Only farm size will be included in this analysis.

findings, environmental quality is rarely used as a variable relating quality of life to farm scale, except for Buttel and Larson (1979), who emphasized environment in energy use and efficiency. Still, no studies are investigating community quality of life and conservation adoption that address Goldschmidt's issue of farm size.

This exploratory analysis seeks to extend Goldschmidt's findings regarding the relationship between farm size and quality of life to the area of conservation adoption and attitudes. This approach conceptualizes relationships among a set of social and structural variables found in the conservation adoption literature (farm size, farm income, enterprise type, and intergenerational farm succession), as well as a conservation ethic or behavior, as related to medium-sized family farms.

As interpreted from survey and interview data, farm households in the Sugar Creek Watershed that adopt BMPs generally exhibit the following qualities: they are generally medium-sized farms that have a mix of owned and leased land; these diversified farms are less integrated into larger networks of agricultural production; owners/operators predict a high level of intergenerational farm succession; and owner/operators express greater preferences for additional BMPs. Conservation behavior and attitudes and perceptions, as elicited from participants through surveys and interviews, are conceptualized as factors in assessing the local environment and community well-being in the Sugar Creek Watershed (Parker 2006; Parker et al. 2007). Implicit in this argument is that a person's concern for local land use and ecology stems not only from altruistic feelings of "doing the right thing," but also from that person having a cognitive model that embeds them in a local community with some aspects of a shared common vision, social networks, and concern for the local well-being of others.

In this paper, positive conservation attitudes (i.e., those that have adopted BMPs and show preferences for additional conservation practices) are viewed as positive indicators of quality of life. Furthermore, positive conservation attitudes compel residents to want to improve the watershed leading to a healthier environment, and stem from concerns for community that includes human and animal health in relation to water quality.

Using "conservation use" and "preferences for additional conservation practices" with the four social and structural variables related to quality of life, an analysis of variance (ANOVA) and discriminant analysis modeling approach are used to describe specific aspects of land tenure by exploring the areas where farm and conservation variables interact. Discriminant analysis was chosen because the authors believe that these variables are less effectively analyzed in isolation and should be analyzed together to identify the cumulative contribution of each. The findings demonstrate the strength and, occasionally, directionality of these relationships, revealing a complex and interconnected reality that shows a need for qualitative explanation, which is provided by interview data.

In subsequent sections of this paper, a literature review is presented, followed by a brief background of the study area to contextualize this research and a description of the methodology used. The interview, ANOVA, and discriminant analysis findings are then presented. The paper closes with a discussion of the models and a conclusion in which the broader issues of conservation and social organization in relationship to quality of life are addressed. Implications are presented for future farm household conservation adoption and potential program success.

Analytical Perspective and Literature Review

Since Goldschmidt published his findings, numerous scholars have examined connections between medium-sized family farms and quality of life in rural communities. A summary of the pre-1990 research is available by Lobao (1990) in which an overview of corroborating research demonstrates support for Goldschmidt's findings. Some findings among the studies cited by Lobao (1990:57) suggest that large-scale agriculture is associated with a variety of community disorders, including: "lower levels of living" (Goldschmidt 1978; Rodefeld 1974); lower income for working class labor and increases in income inequality and poverty (Flora, Brown, and Conby 1977; Goldschmidt 1968; Heady and Sonka 1974; Rodefeld 1974; Tetreau 1940; Wheelock 1979); "greater unemployment" (Marousek 1979); decreased community services (Fujimoto 1977; Raup 1973; Swanson 1980; Tetreau 1940); decreases in "social participation and integration of communities" and higher level of mental disorders (Goldschmidt 1978; Heffernan 1972; Martison et al. 1976; Poole 1981; Rodefeld 1974); less diversity and fewer trade and retail centers (Fujimoto 1977; Goldschmidt 1968; Heady and Sonka 1974; Marousek 1979; Rodefeld 1974; Skees and Swanson 1986; Swanson 1980); and "environmental pollution, depletion of energy resources" (Buttel and Larson 1979; Raup 1973; Tetreau 1940).

A brief accounting of Lobao's review (1990:60-64) reveals that half the studies (13 of 26) solidly support Goldschmidt's finding, nine offer mixed support, and four offer no support. The latter dissenting findings, according to Lobao, result from studies that may have been "framed narrowly in terms of theory and scope" (Lobao 1990:4). One potential source of methodological error is offered to account for findings offering mixed or no support is the reliance on secondary data sources rather than primary, first-hand accounts.

Since then, Durrenberger and Thu (1996) used secondary data to show correlations between the numbers of industrial hog farms with social and economic deterioration of rural communities in Iowa at the county level. Additionally, fewer farms, not just the presence of many hogs, related to increased social disorders. Other studies using similar data include Tolbert, Lyson and Irwin (1998) who found poor economic conditions associated with industrial agriculture operations. In states that have implemented anti-corporate farming laws, Welsh and Lyson (2001) found better indications of quality of life than those without such laws. More recently, the negative impacts of industrial agriculture on U.S. rural communities have been illustrated using a case study approach that focuses on social and material indicators of quality of life. (Bonanno and Constance 2000; Delind 1998; Kleiner 2002; Siepel et al. 1998; Siepel et al. 1999).

Conservation adoption has an extensive literature in the Rural Sociology and Natural Resource Management fields in which three main approaches are taken to understand the adoption process (Upadhyay et al. 2003). One is based on income and is directly related to classical economics that assumes the potential adopter will only adopt if there is a profit motive. Another is based on the diffusion of innovation literature (see Brown 1981; Rogers 1962) in which the emphasis is placed on the message and dissemination of information regarding the practice. The last approach emphasizes the utility of the practice and combines several aspects of the two former approaches in suggesting that farmers will adopt a practice if they receive adequate information, perceive it to be of benefit, and it will be profitable for them (Upadhyay et al. 2003). Each of these approaches has emphasized a technology intensive component in which conservation practices are treated as new technologies. Alternatively, a socially-informed approach to conservation adoption is presented in this article.

Research focusing on farmer conservation adoption has found that farm size can be a limiting factor in adoption and implementation of conservation measures (Battershill and Gilg 1997; McNally 2002; Morris and Potter 1995; Wilson 1997; Wilson and Hart 2000). Additionally, farm size affects the proportion of land used for conservation practices (Potter et al. 1991). According to Buttel (1983), farm sizes are increasingly bi-modally distributed across the United States. Farms are becoming either large or small with few in the middle, the size that historically supported rural communities.

Aldo Leopold spoke of the conservation mindset of his day (i.e., the 1940s) in saying, "the content of [conservation education] is substantially this: obey the law, vote right, join some organizations, and practice what conservation is profitable on your land; the government will do the rest" (Leopold 1949:207). Napier and Bridges' (2002) work shows that this remains the approach used by government agents in promoting BMP adoption adding that the United States Department of Agriculture has promoted voluntary approaches to on-farm conservation since the mid-20th. Century. Rational-choice and diffusion of innovation methods of disseminating BMP information were developed in this pattern following what Napier and Bridges (2002) describe as the information, education, technical assistance, and economic subsidies (IETS) model.

Technology adoption research has shown that conservation behavior is not measurable solely as to innovation diffusion, rational choice or economic utility models (Napier et al. 1984; Napier, Camboni, and Thraen 1986; Sommers and Napier 1993; Tucker and Napier 2002). Alternatively, researchers in Michigan found that aesthetics was a determining factor based on the type of conservation used (Erickson, Ryan and De Young 2002). In Iowa, Bultena and Hoiberg (1983) found adoption of certain conservation practices was dependent upon farmers' perception of neighbor attitudes toward a practice. Salamon et al. (1997) found that social organization, land tenure, and farm type were effective in understanding farmer conservation adoption behavior in the Midwest. Others considered farmer conservation behavior to be morally and socially grounded rather than purely economic and self-interested (Barlett 1993; Comstock 1987; Dudley 2000; Paolisso and Maloney 2000; Scott 1976).

Social Structure and Perception of Conservation

Anthropologists have documented the manner in which national and international levels of sociocultural integration (i.e., multiple levels or scales of society) influence local ecologies by way of changing social structure, organization, and land tenure (Geertz 1963; Rappaport 1984; Moran 1996; Steward 1955). Social networks help create an environment that affects mental health, social functioning and overall quality of life as experienced by individuals (Forrester-Jones et al. 2004). Social embeddedness (Granovetter 1985) of residents in local communities draws a frame of reference in social life that extends from the national level to the local level of neighborhood and household and affects household decision-making. Blanchard and Matthews (2006) found that a monopolistic civic structure, in which a small group holds power and effectively directs decision-making, creates a sense of apathy among local residents that resulted in less civic participation by the majority. Hughes (2006) states that quality of life studies focus too much on "affect" and "happiness," and that "meaning" may be a larger contributor to positive perceptions of life quality, he further states that meaning gives "coherence," "validity," "purpose," and "significance" to our lives and affect may not produce higher quality of life if meaning is low.

"Cognitive models" are used in natural resource management studies (Chiras and Reganold 2004) and have a long history of similar use in anthropology (Rappaport 1979; 1984), having been used interchangeably with terms such as "worldview" and "ethos." Cognitive models are used for understanding factors guiding individual perceptions, attitudes, and behavior.

Background

This research was conducted in the Sugar Creek Watershed, which is in north central Ohio, USA, predominantly in Wayne and Holmes counties, the leading dairy and family farm counties in Ohio (USDA 2002), with more than 70% of the land use in agriculture. It is in the headwaters of the Muskingum Basin, Ohio's largest hydrologic basin and headwaters to the Mississippi. There are approximately 500 farm households in the four sub-watersheds represented in this study.[2] In 1998, the Ohio Environmental Protection Agency found that the watershed was the second most impaired watershed in the state resulting from sedimentation, nutrient loading of phosphorus, nitrate-nitrogen and ammonium (P, NO_3-N, NH_4-N), low dissolved oxygen, high temperature, habitat loss, and high fecal coliform. The historic settlement patterns and geologic history have resulted in a gradient of variance in cultural and farm scale variables shifting from Mennonite, Apostolic, and other conventional farmers in the northern area (Parker 2006) to Old Order Amish farmers in the southern portions of the watershed (Bender 2003; Moore et al. 1999; Stinner, Paoletti, and Stinner 1989). The Anabaptist family structure that generally consists of strong extended family ties and community social networks are found among Apostolic, Brethren, Mennonite, and Amish households in the Sugar Creek

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[2]The number of households refers to the number of local landowners whose land has an agricultural designation in the Wayne County Auditor's landowner database. The authors would like to note that an exact number of farm households are unknown because watersheds are nonpolitical units and agricultural census data is aggregated to the county level. Additionally, there are numerous instances of farmers who lease land from multiple landlords to piece together their farm size within and across watersheds.

Watershed. This cooperative emphasis on community contributes to the mediation of external economic and social pressures and consequently lends to the presence and success of these family farms (Parker 2006; Parker et al. 2007). In 1998, Sugar Creek was identified by the Ohio Environmental Protection Agency as the second most impaired watershed in the State of Ohio. Since 2001, this watershed has been part of a community-based participatory watershed restoration project that used a collaborative approach called the "Sugar Creek Method" to build community support for water quality improvement and create capacity for similar future initiatives (Morton and Padgitt 2004; Parker 2006; Parker et al. 2007).

Methods

The units of analysis in this study are the household, land parcel and subwatershed hydrological unit (HU). The household is a unit of analysis for collecting social data in a community and because this is a study of conservation use, the land parcel in a private property society is a good spatial unit for understanding how human behavior interacts with the physical environment. The subwatershed, of which four were selected for inclusion in this study, is used as a unit of analysis because it is a recognized physiographic unit within which the terrestrial part of the aquatic cycle functions and through which water quality information can be ascertained.

Data used in this research were obtained from a survey conducted in four subwatersheds of the Sugar Creek Watershed. Data collection was conducted by identifying a population of landowners (N=726) with land on or adjacent to the stream in each of the four subwatersheds. For each participant, a household survey was conducted using a drop-off/pickup method (Riley and Kiger 2002). There were 498 survey responses–a 69% response-rate, of which 159 were from respondents who identify themselves as owning and/or operating a farm. These are called "farm respondents." Only farm responses were used in this analysis because of the emphasis on conservation behavior as indicated by Natural Resource Conservation Service (NRCS) BMPs. The survey data was coded and entered MS Access linked to SPSS v14.0 for use in ANOVA and discriminant analysis modules.

After completion of the initial surveys, thirty-five interviews were conducted using a spatial stratification sampling technique. Twenty-one of these interviews were conducted with farm respondents and are used in this analysis. Besides this, participant observation was conducted at various community events that included twenty farmer meetings, four "stream days," four "family days," and five BMP workshops. These additional methods were used to provide background for understanding social organization, community continuity, land tenure arrangements and land use, as well as perceptions and practices relating to farm conservation and stream ecology in the watershed.

Using the multivariate data analysis technique discriminant analysis in SPSS v14.0 statistical software package, two models are developed to test for significance in discriminating dimensions of the land tenure variable (see Table 1 for variable descriptions). Four independent variables are used in the first model (Model 1) to show the discriminating ability of these social and structural variables that have previously shown to affect adoption of BMPs; seven are used in the second (Model 2) to describe the ability of conservation adoption to enhance the predictability of Model 1. The four main variables found in both models are: one measure of farm type that uses a dichotomous measure of grain farm and non-grain farm; two measures of farm size as indicated by the total size of the farm in acres (owned and leased/rented) and household percent of off-farm income; and one measure of farm succession. These four variables are used in discriminating among the six categories of the dependent land tenure variable that represents the ratio of land owned to land that is leased. Thus, the model used is:

D(Model 2) = (a) * (farm success) + (b) * (farm type) + (c) * (farm size in acres) + (d) * (percent off-farm income) + (e) * (use of manure management) + (f) * (use of conservation tillage) + (g) * (conservation index)

Three additional variables are entered in the second model. They are: conservation index, conservation tillage use, and manure management planning. The conservation index is a combined indicator of current BMP use and preferences for additional BMPs (i.e., conservation preferences). The following BMPs were used to represent BMP use: buffer strips, no-till conservation tillage, grass waterways, and manure management. Preference for additional BMPs is represented by: forested riparian zones, grass waterways, buffer strips, wetlands, and erosion control. No-till conservation tillage and manure management are used separately as indicators of the interaction of farm type and a specific conservation practice in influencing land tenure (i.e., grain farms will report higher use of no-till conservation tillage while dairy farms will report higher use of manure management).

TABLE 1. KEY VARIABLE INFORMATION

VARIABLE	DESCRIPTION	CODING
Land tenure.	Six rank-ordered categories of various ratios of owned and leased land	1 = Lease 2 = Own 0% 3 = Own 1-32% 4 = Own 33-65% 5 = Own 66-99% 6 = Own 100%
Farm size.	Sum of owned and leased land	Total number of acres farmed
Farm type.	Two categories	0 = Other 1 = Grain
Farm succession index.	Three rank-ordered categories of ten-year future farm plan	1 = Keep in family 2 = Sell as farm 3 = Sell for development
Conservation index.	Three-point scale of BMP use and future preferences	1 = <3 2 = 3-5 3 = >5
Conservation use.	Three-point scale of conservation use	1 = Low 2 = Medium 3 = High
Off-farm income.	Ten-point scale of percentage of off-farm income	1 = 0-10% 2 = 11-20% 3 = 21-30% 4 = 31-40% 5 = 41-50% 6 = 51-60% 7 = 61-70% 8 = 71-80% 9 = 81-90% 10 = 91-100%

In the findings and discussion, farms are classified using the discriminant dimension into a typology that is based on Potter and Lobley (1996). Four basic farm classification labels are used for this analysis. "Stable" and "intensifying" farms are characterized as having less off-farm income and a higher probability of successful intergenerational farm transfer in which the farm household persists. No effort is made to distinguish the two types because the statistical techniques will not support a distinction. "Deintensifiers" are those farm operators that have a low probability of a successful intergenerational farm transfer and higher off-farm incomes. "Disengagers" are those farm owners who lease their land to others, have higher off-farm incomes, and do not have an heir. The twenty-one case studies used for interviews are divided into each of three categories discussed.

Interpretation of discriminant models uses several measures generated in the output for each variable. Within-groups correlation matrix is run to test for multicollinearity among independent variables to analyze variables for their unique contribution and to avoid the use of variables that measure the same dimension. Each resulting function is compared with the "group centroids" of the land tenure category to determine the dimension being discriminated and to describe the discriminating strength of each significant independent variable.

Finally, for each canonical discriminant function there are several statistics calculated that indicate significance and contributions of the independent variables. They include eigenvalues indicating the variance explained by the resulting function, the percentage of variance explained by the function, canonical correlations (Rc) indicating the strength of the function's correlation with the independent variable means, and both Wilks' lambda (WL) and chi-square test for significance of the function. Interpretive measures generated for each function are presented as Standardized Canonical Discriminant Function Coefficients, which indicates strength and direction of the relationship between variables along the dimension of the function. Only those functions that are found significant (α=.05) are presented in the analysis and discussion. The ratio of independent variables to cases is 1:20, so the dataset limits the maximum number of independent variables to seven.

Findings

This section begins with a summary of the interview and participant observation findings. Interviews with 21 of 35 households were with participants who stated they "owned and leased out" (five households, of which the members of two have mostly non-agricultural occupations) or "owned and operated" (16 households) their farms. Table 2 summarizes the farm size, and farm classification types (discussed in the methods section) of the interviewed households. In a county that reports the largest dairy and one of the most diversified agricultures in Ohio, it is understandable that there are more intensifying and stable farm households than there are deintensifying and disengaging households reported in the Sugar Creek household interviews. Yet, there are still slightly more than 40% of the households reporting decline for various reasons explained below.

The largest and the smallest farms dominate the disengaging and deintensifying farms. A closer look at the interview data shows that the mean and median sizes of the deintensifying farms show that they are often large. In addition, these are farm households with a short history and report minimal social support in the community. Evidence for this comes from their negative responses in interviews to discussions of the local farm economy besides social support and understanding of neighbors. The disengaging farms are all farms that do not have an heir. Two farm households are Amish, whose members have other occupations than farming, and have purchased the farm land from disengaging non-Amish farm households. The other two households are disengaging smallholders whose members have received the farm through inheritance, have no heirs, and are not themselves farmers.

Conversely, three of the stabilized farm households each have used extended community to ensure a farm heir; two of these are medium-sized and one is a small farm household. The fourth stabilized household has used family networks to pass the farm and is in the initial steps of reorganizing the enterprise to make it profitable.

Additionally, the intensifying farm households include two small Amish farm households whose members have been integral in the formation of an Amish organic cooperative. Three of the intensifiers are medium-sized Mennonite households who have persisted in the community for several generations using multiple methods to secure intergenerational farm succession. Another intensifier household is a medium-sized farm that has used an extensive family network to provide the land and labor base for a family operated dairy, ice cream and market business. The two large intensifier households have both used creative approaches to expanding their enterprises and adapting to a limited land market. One household has used an extended kinship network to secure land; the other saw the farm subdivided by the parent generation to pass a family dairy to three of the sons (this was done to manage internal family conflict among the three farming siblings). The three sons are responsible for the farm as one unit, but each household owns and operates a different part of the family dairy operation. The land, components

TABLE 2. FARM HOUSEHOLD INTERVIEW DATA CLASSIFICATION AND SIZES DATA.

Category	Farm Size (Total Acres Owned and Leased) Small < 100 acres	Medium 101-800 acres	Large > 800 acres	Total	Farm Size Mean	Farm Size Median	Farm Size Range
Intensify.......	2 (22.2%)	4 (50.0%)	2 (50.0%)	8 (38.10%)	541.13	500.00	73-1200
Stable...........	2 (22.2%)	2 (25.0%)	0 (0.0%)	4 (19.05%)	127.50	125.00	80-180
Deintensify..	1 (11.1%)	2 (25.0%)	2 (50.0%)	5 (23.81%)	583.00	640.00	99-1000
Disengage....	4 (44.4%)	0 (0.0%)	0 (0.0%)	4 (19.05%)	80.25	75.50	70-100
Total............	9 (42.86%)	8 (38.10%)	4 (19.05%)	21 (100.00%)			

and responsibilities of the enterprise are divided among relatives (extended family in the first example, and immediate family in the second) in both of the large intensifier households.

A summary of interviews show that most participants stated that their heritage is not only based on ethnicity or religiosity but is also community and place-based. Most farm households that moved to the area feel connected to the local heritage through identification with the dominant Anabaptist values of family and community; these are typically expressed through concern for neighbors and mutual aid. Social networks also play roles in land tenure by providing access to particular parcels of land and, at times, the cost of that access.

Although a feeling of a common local heritage exists in this area, between-group differences are evident, especially between the Amish and non-Amish residents. It is between these two groups that the greatest differences in social organization can be found. For example, the Amish practice of the multigenerational households [3] maintains continuity of expertise and expanded opportunities for socialization, while most non-Amish households consist of a nuclear family and, on occasion, a dependent relative. Thus, land tenure in the Sugar Creek Watershed varies in several ways. As reported by all 21 participants, access to land and passing of those access rights to future generations form the basis of this land tenure.

Familial relations and historical interfamily connections through social networks extending spatially and temporally form the foundation upon which contemporary social networks persist and provide the flexibility for them to adjust to future conditions. Social networks provide access or information regarding farmland and opportunities for successful intergenerational farmland transfer in the life cycle of a family farm household.

Analysis of Variance (ANOVA)

The ANOVA results show (Table 3) that Farm Size and Percent of Off-farm Income have statistically significant (* at the .05 level; ** at the .01 level) differences among the land tenure groups. Significant mean-differences indicate that households with medium-sized farms (Figures 1), relative to the watershed average of 197 acres, and those with less off-farm income (Figure 2) are more likely to use conservation practices. Non-significant mean-differences (Figure 3 & Figure 4)

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[3] It is important to distinguish between the sociological "household" and the "Amish" household. The Amish household refers to those people living in one house. It is common for multiple generations of an Amish family to live on the same farmstead and contribute to a common family income, but live in separate houses that are located very close to one another.

show low adoption among farm households with uncertain futures in addition to grain farms. These findings support previous research relating conservation use to farm size and income.

TABLE 3. ANALYSIS OF VARIANCE OF CONSERVATION USE (DEPENDENT) AND TENURE VARIABLES (INDEPENDENT).

		SUM OF SQUARES	DF	MEAN SQUARE	F	SIG
Farm Succession Index............	Between	0.54	2	0.27	.579	.562
	Within	63.42	136	0.47		
	Total	63.96	138			
Farm Type.	Between	0.18	2	0.09	.403	.670
	Within	25.48	114	0.22		
	Total	25.66	116			
Farm Size. ..	Between	911067.82	2	455533.91	5.849	.004
	Within	12150494.56	156	77887.79		
	Total	13061562.38	158			
% Off-farm Income.........	Between	108.57	2	54.29	3.719	.027
	Within	1984.96	136	14.60		
	Total	2093.53	138			

Discriminant Analysis

Two separate discriminant analysis models were run, Model 1 and Model 2 (jointly shown in Tables 4 and 5). Model 1 includes the four social and structural variables: farm succession status, farm type (grain/non-grain), farm size, and percent of off-farm income. Model 2 uses these same four variables and includes three measures of conservation: conservation tillage usage, manure management use and a conservation index. The discriminant functions represent a dimension of the variables that influence the land tenure category. Additionally, the centroids of each function indicate proximity and distance of each tenure category along the dimension of the function on which the tenure categories are found. The Standardized Discriminant Function Coefficients show the relative input

FIGURE 1. ANOVA FOR FARM SIZE AND CONSERVATION USE.

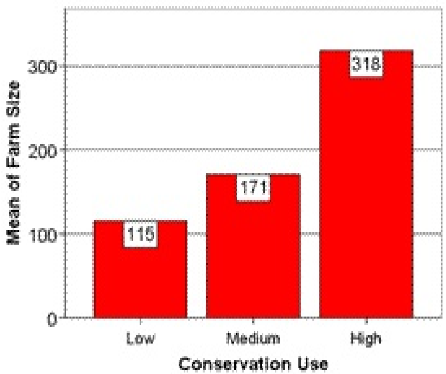
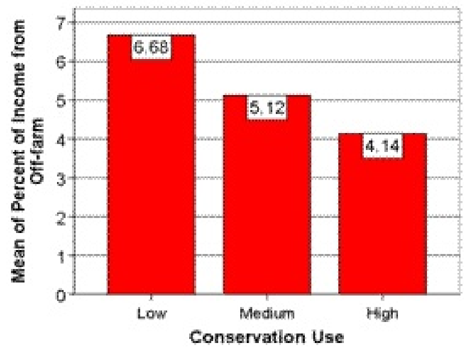


FIGURE 2. ANOVA FOR OFF-FARM INCOME AND CONSERVATION USE.



of the associated variable concerning the total contributions of the other variables. Of the five functions created in each model, two functions were significant in Model 1 and three in Model 2 ($\alpha = .05$). The canonical correlations show the relatedness of the variables among the six groups of land tenure patterns found in the Sugar Creek. In both models, the canonical correlation for each function indicates substantial relatedness of the variables to the social and structural dimensions of tenure explained in the functions.

Function 1, in both models, discriminates land tenure categories of Own 1-32% and Own 33-65% when farms are larger. As shown in the ANOVA results, these farms are not small by comparison while they also are not the largest. Moreover, these farms are characterized by mixed agriculture (combinations of grain, dairy, hog, poultry etc.), high farm succession indices, and lower levels of off-farm income and are strongly differentiated from the Lease Out group, and the other groups to a lesser extent. The addition of the conservation variables, in Model 2, further describes this dimension showing these households to have moderately greater levels of Conservation Tillage Use, greater Manure Management Use, and higher Conservation Index scores. These farms are labeled *stable* or *intensifying* and the contrasting farms are labeled *disengaging* because of their low succession probability, and higher levels of off-farm income, and leasing out of their land.

FIGURE 3. ANOVA FOR FARM SUCCESSION AND CONSERVATION USE

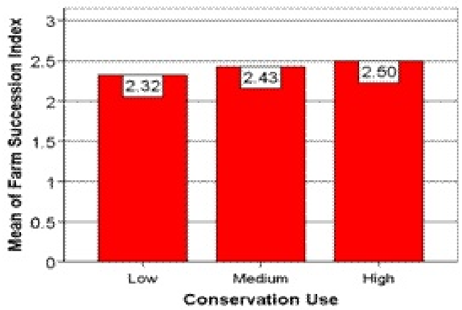
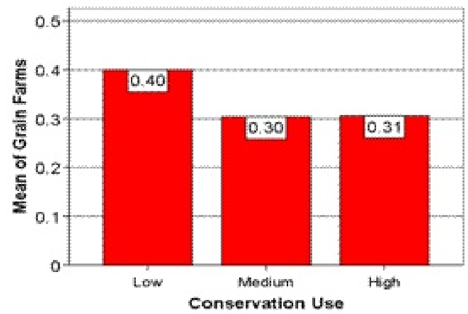


FIGURE 4. ANOVA FOR FARM TYPE AND CONSERVATION USE



Function 2, in both models, discriminates land tenure categories of Lease Out and Own 1-32% when farm sizes are large, farm success indices are low, off-farm income is higher, and a tendency toward more grain farms. This is differentiated from the Own 100% farms that are smaller, non-grain farms (dairy, meat, produce and mixed operations) with less off-farm income and high farm succession indices. In Function 2 farms, the farms represented in this function are characteristic of many Mennonite and Apostolic (both of Anabaptist origin) farms, but there still is uncertainty in this because the heritage index by itself did not discriminate significantly and was removed from the model. The addition of the conservation variables, in Model 2, further describes this dimension showing these households have a greater amount of Conservation Tillage Use and a negligible increase in Manure Management Use, but otherwise score lower in the Conservation Index. These farms are labeled *deintensifying* because of their low succession scores and higher off-farm incomes.

Function 3, in Model 2, explains >13% of the variance in Model 2 and indicates a division between Own 1-32% and the other leasing/owning categories. This is true when these farms are large, have higher off-farm income, use manure management, very little conservation tillage, and the differences in farm type and conservation preferences and use are negligible. The inclusion of the conservation variables in the model results in a strong tendency of low Conservation Tillage Use, increased Manure Management Use, and a negligible contribution of Conservation Index scores. These farms are also labeled *deintensifying* because of high levels of off-farm income and low succession scores.

TABLE 4. DISCRIMINANT ANALYSIS FOR LAND TENURE PATTERNS

	STANDARDIZED COEFFICIENTS					LAND TENURE CATEGORY MEANS					
	MODEL 1 FUNCTIONS		MODEL 2 FUNCTIONS								
ITEM	1	2	1	2	3	LEASE OUT	OWN 0%	OWN 1-32%	OWN 32-65%	OWN 66-99%	OWN 100%
Farm Succession.	.373	-.675	.393	-.484	-.411	2.00	2.80	2.75	2.86	2.71	2.69
Grain Farm.	-.205	.198	-.203	.123	.008	.60	.80	.38	.18	.35	.22
Farm Size.	.777	.668	.528	.400	.719	55.67	295.00	789.75	380.45	247.47	109.38
% Off-farm income.	-.246	.376	-.183	.293	.328	7.87	5.40	3.75	3.91	4.00	4.63
Manure Mgmt. BMP.			.174	.092	.445	.33	.60	1.00	.86	.47	.66
No-till BMP.			.255	.534	-.882	.40	.60	.75	.73	.59	.09
Conservation Index.			.314	-.422	-.009	1.80	2.20	2.63	2.68	2.35	2.34
Canonical Correlation.	.634	.479	.685	.526	.409						
% Variance Explained.	63.2	28.0	55.5	24.0	12.6						
Wilk's Lambda.	.422	.705	.284	.534	.738						
Chi-square.	80.261***	32.522***	115.275***	57.428***	27.846*						
% Correctly Classified.	50.9		58.50								

*p<.05, **p<.01, ***p<.001

TABLE 5. DISCRIMINANT ANALYSIS GROUP CENTROIDS FOR LAND TENURE CATEGORIES.

	Model 1 Functions		Model 2 Functions		
	1	2	1	2	3
Lease Out	-1.349	.813	-1.560	.888	.076
Own 0%	.000	.154	-.024	.364	-.315
Own 1-32%	1.669	1.074	1.612	.878	.957
Own 32-65%	.670	-.146	.954	.037	-.290
Own 66-99%	.092	-.173	.098	.012	-.602
Own 100%	-.295	-.481	-.376	-.724	.294

Discussion

Analysis of variance demonstrates support for previous findings showing relationships between conservation and farm size and income (Burton and Walford 2005) and support the medium-sized farm hypothesis (Goldschmidt 1978). The models show that the ratios of ownership to leasing, described in the Land Tenure variable, are discriminated by two functions in Model 1 and three functions in Model 2. In each model, the predictive ability of classifying land tenure was based on two tenure categories indicating that tenure is complex and that to understand it requires multiple angles of analysis.

The ANOVA mean differences and discriminant functions presented in the findings indicate that medium-sized farm operators are more likely to use conservation practices. This is an important contribution to a socially-informed model of adoption because the functions resulting from the discriminant analysis do not provide a direct ranking of farm sizes for comparison with respect to categories of large, medium or small farms. Without the ANOVA, the discriminant analysis coefficients would limit our interpretation to simply describing that one dimension is larger than another.

In both discriminant analysis models, the independent variables identified similar dimensions in categories of the land tenure variable. In the second discriminant analysis model, the addition of conservation measures shows that the stable and intensifying farms also adopt more conservation measures, while the disengaging farms of Function 2 and Function 3 adopt fewer. Function 3 indicates a division between deintensifiers and the other leasing/owning categories in which the Function 3 farms are large, have higher off-farm income, use manure management, very little conservation tillage, and the farm type and conservation use differences are negligible. These findings are contextualized by the interview data. The differences between Function 2 and Function 3 deintensifiers are that Function 2 deintensifiers have more grain farmers than Function 3, as inferred through the lower coefficient for farm type, and varying levels of conservation tillage (associated with grain farms) and manure management (associated with dairy) practices.

The classification results show that Model 1 correctly classifies 50.9% of the cases indicating a 34.2% increase over random assignment (i.e., 16.6%). The inclusion of conservation measures improves the discriminatory power of the model giving Model 2 a predictive advantage over Model 1 of 7.6% and an increase of 41.8% over random assignment. The advantage of Model 2, aside from the 7.6% increase in its classification ability of Functions 1 and 2, is that the addition of conservation measures allows for a third function to help in characterizing dimensions of land tenure categories. Specifically, the addition of Function 3, which further explores the range of heterogeneity in the Own 1-32% category, shows another dimension in the arrangements of land tenure that would otherwise be missing from the findings.

A surprise in the findings was the leasing connected to conservation in this analysis. Yet, higher rates of leasing are to be expected given the structure of Midwestern grain agriculture (Hart 1991) and the culturally accepted practice of leasing in the U.S., which is socially stigmatized in some societies (Salamon 1992). Furthermore, age, as a factor in conservation adoption (Burton 2006; Upadhyay et al. 2003), is also connected to farm family life-cycle (Burton 2006). This is the case when farms with more advanced life-cycles are less risk tolerant and thus less willing to make managerial changes, which includes adoption of new conservation practices (Upadhyay et al. 2003). Conversely, farm families early in their life cycle are more risk tolerant, and generally require more leased land because they are in the early stage of acquiring capital. Thus, new conservation adoption becomes a factor of the farm family life cycle. Many farmers report long-term use of traditionally prescribed BMPs promoted by conservation agents for multiple generations (e.g., contour strip cropping, conservation tillage) but report no additional BMP adoptions in recent years.

The analysis of conservation preferences and use as indicators of "quality of life" in predicting land tenure status was moderately successful. The predictive ability of the Discriminant Analysis land tenure model was increased nearly 8% by the addition of conservation measures to the understanding of the land tenure dimensions. If we accept conservation adoption as a "quality of life" measure, these findings are congruent with and support Goldschmidt's findings relating farm size to community well-being and necessitates the development of approaches to understanding conservation behavior that are based on a more socially-informed methodology by acknowledging the importance of social contexts and decision-making as well as the inefficacy of a one-size-fits-all national conservation agenda.

Conclusions

This research provides evidence showing that variables related to farm size and structure influence the adoption of conservation practices, such as agricultural BMPs, which consequently influences community quality of life. Previous research has linked conservation behavior to quality of life in previous studies, and Goldschmidt's findings are linked to farm size and farm structure. This, and the ability of the conservation variable to discriminate dimensions of land tenure in the Sugar Creek Watershed, provides support for its use as a quality of life indicator in a Goldschmidt framework.

Previous studies of on-farm conservation have taken a multivariate approach in viewing adoption strategies as a matter of rational choice, while others have focused on peer-group acceptance or perceived aesthetics of a practice as explanatory forces in the decision to adopt. This work is unique in its exploration of connections that couple farm size to a conservation adoption quality of life indicator. The socially-informed models presented here highlight the importance of making the link between the farm size and structure literature with that of conservation adoption and quality of life. Additional importance is given to understanding the diversity of farms within tenure categories (e.g., Own 1-32%) and how the details of farm size and structure relate to conservation adoption. This is achieved by highlighting the various dimensions of this category in which a continuum of social and economic arrangements are found. Along this continuum are households representing a diversity of enterprise strategies. This diversity can be seen in each function where conservation assists in discriminating intensifiers, deintensifiers, and disengagers among households in the Own 1-32% that demonstrates the complexity of land tenure and conservation.

Implications

The findings presented here may assist in moving additional research in the direction that Lockeretz (1990) suggested, in which a greater understanding of household conservation decision-making is achieved by employing both quantitative and qualitative techniques[4]. Implications of this research include the need to reevaluate the way community and conservation planners produce and implement local development projects. Recognizing the role of land tenure and social networks within and across communities and incorporating them into planning conservation initiatives is important for conservation planners. Knowing the details of local land tenure networks and the restrictions and benefits they offer will help adapt conservation and other development initiatives to a local community, which may increase their successful implementation.

If conservation behavior, land tenure, and quality of life are each linked to the other, then they may be linked systematically and with feedbacks in a complex system that requires much more than explanatory statements like "farmers who are more educated will adopt more conservation practices." If this is the case, there is a need to continue to evaluate the role of conservation in communities and the overall contribution toward quality of life that specific practices provide (i.e., the suitability of a practice in a given area). Moreover, farm size and farm structure may be correlated with specific types of conservation practices that go beyond those linked to farm type (e.g., manure management is most often correlated with animal agriculture, or no-till conservation tillage is correlated with larger scale farms). It is likely that most farm households are predisposed to one category of conservation practices over another. In this regard, learning the combinations of attributes that may predispose a household toward environmental conservation is important.

Finally, there are clearly feedbacks between human social and environmental systems (Berkes and Folke 1994) and that agriculture is the dominant human influence on the earth's ecosystems (Vitousek et al. 1997). This interconnectedness and the mounting evidence on global climate change (IPCC 2007) further compels us to understand patterns of social behavior especially as they relate to the environment. If one recognizes the effects of human social structure on the environment, agreeing that many of these problems require social rather than complex technological or expensive financial (e.g., subsidies and incentives)

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[4]Lockeretz (1990) suggested that researchers abandon narrow traditional approaches to understanding conservation behavior and begin a more socially-informed approach that incorporates a qualitatively informed quantitative methodology.

solutions seems reasonable. The current agricultural system, if expressed in terms using Flora's capitals (1998), is one structured heavily on financial (industrial and economic institutional dominance) and political capital (state and federal regulation and dominance over local autonomy) and relies less on natural (local ecosystem diversity), social (household and community social networks and institutions), human capital (local skills, knowledge, and vision) or other capitals. Future solutions may rely on policy that fosters the (re)development of local social networks and structures that are diverse and rely on diversity in agricultural scales, species, and management practices. There are potentially serious implications for the future efficiency of ecological services that societies receive from the environment if social diversity continues to be overlooked.

Future Research

It is uncertain if the strong community orientation of the Anabaptist people in the study area predisposes them to comparatively more successful stable or intensifying farms. Although the authors view the differences seen among the farm classifications (i.e., intensifiers, etc.) as aspects of scale and social networks that may be found in other communities, the high proportion of Anabaptist households in the study area warrants further research in other regions to strengthen this model. In future studies, we propose testing dimensions of conservation use through logistic regression. This statistical method would shift emphasis from an exploration using conservation adoption in predicting tenure dimensions to establishing if the independent variables have predictive power in determining which households will and will not adopt based on social and structural (i.e., tenure, income, size etc.) characteristics. Such a study will approach the topic of conservation more holistically.

As proposed by Lyson et al. (2001), the following dimensions of households and farms are suggested by the authors for inclusion in future studies of Goldschmidt's findings. Synthesizing aspects of the conservation adoption, quality of life, and civic engagement literature, and incorporating the interpretations of these findings, the following three social dimensions of conservation adoption are presented as operating together in influencing land tenure, farm structure, and local quality of life:

1. Social aspects of household: community interactions between household and external groups, social meaning attributed to these actions, probability of intergenerational succession, and social networks.

2. Material and economic dimensions of the farm: include farm size, land use, off-farm income, education, household life cycle stage;
3. And, the civic structure of the local community as affected by: sense of place, local individuals, and external levels of social integration that include interactions with civic organizations (Granges, Rotary, Masons, etc.), learning circles, and local and state government agencies (e.g., Extension).

It is conceivable that good environmental stewardship is conceptually more difficult to assess than an analysis of attitudes regarding the land. It is our belief that stewardship is interconnected with civic structure and other social and structural variables. While most people are embedded in some household structure and make decisions with the household in mind, embeddedness within and across communities varies. Locally disembedded residents may decide land use and land management practices based solely on household needs and decision-making criteria derived from social networks far outside the community. Decisions are then made without reference to local values (i.e., decision-makers may not reference local social and physical environmental conditions), which may have deleterious effects on the local social and physical environment thereby affecting the quality of life in some rural communities. In contrast, farmers who are embedded in a local community may choose to participate in social networks and make on-farm decisions concerning their local environment. These farmers may also derive meaning through their livelihoods of farming, rather than from external social forms that emphasize farm profit.

Returning to Goldschmidt's findings (1978), in light of Buttel's (1983) discussion of the bimodal farm distribution of small and large-scale farms, the contribution of conservation to our understanding of community well-being is troubling when considering the correlations of variables such as farm size with land tenure. Because of the scarcity of medium-sized farms, these findings complicate the long-term outlook for increased voluntary adoption rates of conservation practices, which are sorely needed to address mounting environmental problems. This new direction in conservation research will benefit agencies and farmers alike in striving to solve our more pressing environmental problems by addressing programs to current conditions and needs of communities. Time and money are required to investigate these relationships in a meaningful way that will provide useable results, but the cost of inaction and continued misdirection of policy that undervalues local differences is much greater.

References

Barlett, P. 1993. *American Dreams, Rural Realities: Family Farms in Crisis*. Chapel Hill, NC: University of North Carolina Press.

Battershill, M., and A. Gilg. 1997. "Socioeconomic Constraints and Environmentally Friendly Farming in the Southwest of England." *Journal of Rural Studies* 13:213-28.

Bender, M.H. 2003. "Animal Production and Farm Size in Holmes County, Ohio, and US Agriculture." *Journal of Alternative Agriculture* 18:70-9.

Berkes, F., and C. Folke. 1994. "Investing in cultural capital for sustainable use of natural capital." Pp. 128-49 in *Investing in Natural Capital*, edited by A.M. Jansson, M. Hammer, C. Folke, and R. Costanza. Washington, DC: Island Press.

Blanchard, T. and T. Matthews. 2006. "The Configuration of Local Economic Power and Civic Participation in the Local Economy." *Social Forces* 84:2241-57.

Bonanno, A. and D. Constance. 2000. "Mega Hog Farms in the Texas Panhandle Region: Corporate Actions and Local Resistance." *Research in Social Movements, Conflicts and Change* 22: 83-110.

Brown, L. 1981. *Innovation Diffusion: A New Perspective*. New York: Methuer.

Bultena, G.L. and E.O. Hoiberg. 1983. "Factors Affecting Farmers' Adoption of Conservation Tillage." *Journal of Soil and Water Conservation* 38:281-4.

Burton, J.F. 2006. "An Alternative to Farmer Age as an Indicator of Life-Cycle State: The Case for a Farm Family Age Index." *Journal of Rural Studies* 22:485-92.

Burton, J.F., and L. Walford. 2005. "Multiple Succession and Land Division On Family Farms in the South East of England: A Counterbalance to Agricultural Concentration?" *Journal of Rural Studies* 21:335-47.

Buttel, F.H. 1983. "Beyond the Family Farm." Pp. 87-107 in *Technology and Social Change in Rural Areas*, edited by G. Summers. Boulder, CO: Westview Press.

Buttel, F.H. and O.W. Larson. 1979. "Farm Size, Structure, and Energy Intensity: An Ecological Analysis of U.S. Agriculture." *Rural Sociology* 44:471-88.

Chiesura, A. and R. De Groot. 2003. "Critical Natural Capital: A Socio-Cultural Perspective." *Ecological Economics* 44:219-31.

Chiras, D., and J. Reganold 2004. *Natural Resource Conservation: Management For a Sustainable Future*. Upper-Saddle River, NJ: Prentice Hall.

Clancy, K. 1990. "Agriculture and Human Health." Pp. 655-65 in *Sustainable Agricultural Systems*, edited by C. Edwards, R. Lal, P. Madden, R. Miller and G. House. Ankeny, IA: Soil and Water Conservation Society.

Comstock, G. 1987. *Is there a Moral Obligation to Save the Family Farm?* Ames, IA: Iowa State University Press.

Delind, L. 1998. "Parma: A Story of Hog Hotels and Local Resistance" Pp. 23-38 in *Pigs, Profits, and Rural Communities*, edited by K.M. Thu and E.P. Durrenberger. Albany, NY: SUNY Press.

Donham, K.J. and K.M. Thu. 1993. "Relationships of Agriculture and Economic Policy to the Health of Farm Families, Livestock, and the Environment." *Journal of the American Veterinary Medical Association* 202:1084-91.

Dudley, K. 2000. *Debt and Dispossession: Farm Loss in America's Heartland.* Chicago: University of Chicago Press.

Durrenberger, E.P. and K. Thu. 1996. "The Expansion of Large Scale Hog Farming in Iowa: The Applicability of Goldschmidt's Findings Fifty Years Later." *Human Organization* 55:409-15.

Erickson, D.L., R.L. Ryan, and R. De Young. 2002. "Woodlots in the Rural Landscape: Non-Industrial Private Landowner Motivations and Management Attitudes in A Michigan Case Study." *Landscape and Urban Planning* 58: 101-12.

Flora, J.L. 1998. "Social Capital and Communities of Place." *Rural Sociology* 63:481-506.

Flora, J.L., I. Brown, and J.L. Conby. 1977. "Impact of Type of Agriculture on Class Structure, Social Well-Being, and Inequalities." Paper Presented at the annual meetings of the Rural Sociological Society, Burlington, Vermont.

Forrester-Jones, R., S. Jones, S. Heason, and M. Di'Terlizzi. 2004. "Supported Employment: A Route to Social Networks." *Journal of Applied Research in Intellectual Disabilities* 17:199-208.

Fujimoto, I. 1977. "The Communities of San Joaquin Valley: The Relationship Between Scale of Farming, Water Use, and Quality of Life." Pp. 480-500 in *U.S. Congress, House of Representatives, Obstacles to Strengthening the Family Farm System, Hearings Before the Subcommittee on Family Farms, Rural Development, and Special Studies of the Committee on Agriculture*, 95th Congress, 1st Session. Washington DC: U.S. Government Printing Office.

Geertz, C. 1963. *Agricultural Involution: The Process of Ecological Change in Indonesia.* Berkley, CA: University of California Press.

Goldschmidt, W. 1968. "Small Business and the Community: A study in the Central Valley of California on Effects of Scale of Farm Operations." Pp. 303-433 in *U.S. Congress, Senate, Corporation Farming, Hearings Before the Subcommittee on Monopoly of the Select Committee on Small Business*, U.S. Senate, 90th Congress, 2nd Session. May and July 1968. Washington DC: U.S. Government Printing Office.

_______. 1978. *As You Sow: Three Studies in the Social Consequences of Agribusiness.* Montclair, NJ: Allanheld, Osmun.

Granovetter, M.1985. "Economic Action and Social Structure: The Problem of Embeddedness." *American Journal of Sociology* 91:481-510.

Hart, J. 1991. "Part-Ownership and Farm Enlargement in the Midwest." *Annals of the Association of American Geographers* 81:66-79.

Heady, E.O. and S.T. Sonka. 1974. "Farm Side, Rural Community Income, and Consumer Welfare." *American Journal of Agricultural Economics* 5:534-42.

Heffernan, W.D. 1972. "Sociological Dimensions of Agricultural Structures in the United States." *Sociologia Ruralis* 12:481-99.

Hughes, M.L. 2006. "Affect, Meaning and Quality of Life." *Social Forces* 85:611-29.

IPCC (Intergovernmental Panel on Climate Change). 2007. *Climate Change 2007: The Physical Science Basis. Summary for Policymakers.* Geneva: World Meteorological Organization and UN Environment Programme. Retrieved on February 12, 2008 (http://ipcc-wg1.ucar.edu/).

Kleiner, A. 2003. "Where Hogs and Humanity Meet: The Impacts of Large-Scale Swine Operations on Community Satisfaction." Presented at the annual meeting of the Rural Sociological Society, July 27-29, Montreal, Canada.

Lansing, S.J., P.S. Lansing and J.S. Erazo. 1998. "The Value of A River." *Journal of Political Ecology* 5:1-22.

Leopold, A. 1949. *A Sand County Almanac.* New York: Oxford Press.

Lobao, L. 1990. *Locality and Inequality: Farm and Industry Structure and Socioeconomic Conditions.* Albany, NY: State University of New York Press.

Lockeretz, W. 1990. "What Have We Learned about Who Conserves Soil?" *Journal of Soil and Water Conservation* 45:517-23.

Lyson, T., R. Torres, and R. Welch. 2001. "Scale of Agriculture, Civic Engagement, and Community Welfare." *Social Forces* 8:311-27.

Marousek, G. 1979. "Farm Size and Rural Communities: Some Economic Relationships." *Southern Journal of Agricultural Economics* 11:57-61.

Martison, O., B. Eugene, A, Wilkening, and R.D. Rodefeld. 1976. "Feelings of Powerlessness and Isolation among 'Large-Scale' Farm Personnel." *Rural Sociology* 41:452-72.

McNally, S. 2002. "Are 'Other Gainful Activities' On Farms Good For the Environment?" *Journal of Environmental Management* 66:57-65.

Mills, C. and M. Ulmer. 1946. *Small Business and Civic Welfare. Report of the Smaller War Plants Corporation to the Special Committee to Study Problems of American*

Small Business. Document 135. U.S. Senate, 79th Congress, 2nd Session, Feb. 13. Washington DC: U.S. Government Printing office.

Moore, R., D.H. Stinner, D. Kline, and E. Kline. 1999. "Honoring Creation and Tending the Garden: Amish Views of Biodiversity. Pp. 305-9 in *Cultural and Spiritual Values of Biodiversity*, edited by Daryl Posey. London: Cambridge University Press.

Moran, E. 1996. *Transforming Societies, Transforming Anthropology.* Ann Arbor, MI: University of Michigan Press.

Morris, C. and C. Potter. 1995. "Recruiting the New Conservationists: Farmers' Adoption of Agri-Environmental Schemes in the UK." *Journal of Rural Studies* 11:51-63.

Morton, L.W. and S. Padgitt. 2004. "Selecting Socio-Economic Metrics For Watershed Management." *Environmental Monitoring and Assessment* 30:1-16.

Napier, T.L. and T. Bridges. 2002. "Adoption of Conservation Production Systems in Two Ohio Watersheds: A Comparative Study." *Journal of Soil and Water Conservation* 57:229-35.

Napier, T.L., S. Camboni, A. Gore, W. Goe. 1984. "Factors Affecting Adoption of Conventional and Conservation Tillage Practices in Ohio." *Journal of Soil and Water Conservation* May-June:205-9.

Napier, T.L., S.M. Camboni., and S. Thraen. 1986. "Environmental Concern and the Adoption of Farm Technologies." *Journal of Soil and Water Conservation* March-April:109-13.

Paolisso, M. and R.S. Maloney. 2000. "Farmer Morality and Maryland's Nutrient Management Regulations." *Culture and Agriculture* 22:32-9.

Parker, J.S. 2006. "Land Tenure in the Sugar Creek Watershed: A Contextual Analysis of Land Tenure and Social Networks, Intergenerational Farm Succession, and Conservation Use Among Anabaptist Farmers of Wayne County, Ohio." Ph.D. Dissertation, Department of Anthropology, The Ohio State University.

Parker, J.S., R. Moore, and M. Weaver. 2007. "Land Tenure As A Variable in Community Based Watershed Projects: Some Lessons From the Sugar Creek Watershed, Wayne & Holmes County, Ohio." *Society and Natural Resources* 20:815-33.

Poole, D.L. 1981. "Farm Scale, Family Life, and Community Participation." *Rural Sociology* 46:112-27.

Potter, C., P. Burnham, A. Edwards, R. Gasson, and B. Green. 1991. *The Diversion of Land: Conservation in A Period of Farming Contraction.* New York: Routledge.

Potter, C., and M. Lobley. 1996. "The Farm Family Life Cycle, Succession Paths and Environmental Change in Britain's Countryside." *Journal of Agricultural Economics* 47:172-90.

Rappaport, R. 1979. *Ecology, Meaning, and Religion.* Richmond, CA: North Atlantic Books.

_______. 1984. *Pigs For the Ancestors.* Cambridge, MA: Cambridge University Press.

Rapport, D., R. Costanza, and A. McMichael. 1998. "Assessing Ecosystem Health." *TREE* 13:397-402.

Raup, P.M. 1973. "Needed Research into the Effects of Large Scale Farm and Business Firms on Rural America." In *U.S. Congress, Senate, Committee on Small Business, Hearings Before the Subcommittee on Monopoly,* 92nd Congress, 1st and 2nd Sessions, Role of Giant Corporations. Washington DC, U.S. Government Printing Office.

Riley, P.J. and G. Kiger. 2002. "Increasing Survey Response: The Drop-off/Pick-Up Technique." *The Rural Sociologist* 22:6-9.

Rodefeld, R.D. 1974. "The Changing Organizational and Occupational Structure of Farming and the Implications for Farm Work Force Individuals, Families, and Communities." Ph.D. Dissertation, The University of Wisconsin.

Rogers, E. 1962. *Diffusion of Innovations.* New York: The Free Press.

Salamon, S. 1992. "Prairie Patrimony: Family, Farming and Community in the Midwest." Chapel Hill, NC: University of North Carolina Press.

Salamon, S., R.L. Farnsworth, D.G. Bullock, and R. Yusuf. 1997. "Family Factors Affecting Adoption of Sustainable Farming Systems." *Journal of Soil and Water Conservation* 52:265-71.

Scott, J. 1976. *The Moral Economy of the Peasant: Rebellion and Subsistence in Southeast Asia.* New Haven, CT: Yale University Press.

Seipel, M, M. Hamed, J.S. Rikoon, and A.M. Kleiner. 1998. "The Impact of Large-Scale Hog Confinement Facility Sitings On Rural Property Values." Pp. 413-8 in *Animal Production Systems and the Environment: 1998 Conference Proceedings.*

Seipel, M., K. Dallam, A.M. Kleiner, and J.S. Rikoon. 1999. "Rural Residents' Attitudes Toward Increased Regulation of Large Scale Swine Production." Paper Presented at the annual meetings of Rural Sociological Society, August 15, Chicago.

Skees, J.R. and L.E. Swanson. 1986. "Examining Policy and Emerging Technologies Affecting Farm Structure in the South and the Interaction Between Farm Stricture and Well-Being of Rural Areas." Pp. 373-495 in

Journal of Rural Social Sciences, Vol. 23 [2008], Iss. 1, Art. 10

Technology, Public Policy and the Changing Structure of American Agriculture, Volume 2, Background Papers, Part D: Rural Communities. Washington DC: Office of Technology Assessment.

Sommers, D.G. and T.L. Napier. 1993. "Comparison of Amish and Non-Amish Farmers: A Diffusion/Farm Structure Perspective." *Rural Sociologist* 58:130-45.

Steward, J.H. 1955. *Theory of Culture Change: The Methodology of Multilinear Evolution*. Urbana, IL: University of Illinois.

Stinner, D.H., M.G. Paoletti, and B.R. Stinner. 1989. "Amish Agriculture and Implications For Sustainable Agriculture." *Agriculture Ecosystems and Environment* 27:77-90.

Stinner, D.H., B.R. Stinner and E. Martsolf. 1997. "Biodiversity As An Organizing Principle in Agroecosystem Management: Case Studies of Holistic Resource Management Practitioners in the USA." *Agriculture, Ecosystem and Environment* 62:199-213.

Swanson, L. 1980. "A Study in Socioeconomic Development: Changing Farm Structure and Rural Community Decline in the Context of the Technological Transformation of American Agriculture." PhD. Dissertation, University of Nebraska, Lincoln.

Tetreau, E.D. 1940. "Social Organization in Arizona's Irrigated Areas". *Rural Sociology* 5:192-205.

Tolbert, C.M., T.A. Lyson and M.D. Irwin. 1998. "Local Capitalism, Civic Engagement, and Socioeconomic Well-Being." *Social Forces* 77:401-28.

Thu, K. and E.P. Durrenberger. 1998. *Pigs, Profits, and Rural Communities.* Albany, NY: State University of New York Press.

Tucker, M. and. T.L. Napier. 2002. "Preferred Sources and Channels of Soil and Water Conservation Information Among Farmers in Three Midwestern US Watersheds." *Agriculture Ecosystems & Environment* 81:297-313.

Upadhyay, B., D. Young, H. Wang and P. Wandschneider. 2003. "How Do Farmers Who Adopt Multiple Conservation Practices Differ From Their Neighbors?" *American Journal of Alternative Agriculture* 18:27-36.

USDA (United States Department of Agriculture). 2002. *Census of Agriculture.* Washington DC: U.S. Government Printing Office.

Vitousek, P.M., H.A. Mooney, J. Lubchenco, J.M. Melillo. 1997. "Human Domination of Earth's Ecosystems." *Science* 277:494-9.

Welsh, R. and T.A. Lyson. 2001. "Anti-Corporate Farming Laws, the Goldschmidt Hypothesis and Rural Community Welfare." Paper Presented at the annual meetings of The Rural Sociological Society, Albuquerque, NM.

Wheelock, G.C. 1979. "Farm Size, Community Structure and Growth: Specifications of a Structural Equation Model." Paper resented at the annual meetings of the Rural Sociological Society, Burlington, Vermont.

Wilson, G. 1997. "Factors Influencing Farmer Participation in Environmentally Sensitive Areas Scheme." *Journal of Environmental Management* 50:67-93.

Wilson, G. and K. Hart. 2000. "Financial Imperative Or Conservation Concern? EU Farmers' Motivations For Participation in Voluntary Agri-Environmental Schemes." *Environment and Planning A* 32:2161-85.