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Non-Industrial Private Forest Landowner Use of Information Sources Concerning Management of Their Woodland on the Tennessee Northern Cumberland Plateau

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Abstract: Recent studies have pointed towards non-industrial private forest landowners being underserved. This article presents data collected on the Tennessee Northern Cumberland Plateau in 2005 by the University of Tennessee to assess landowner use of information sources and employs an econometric model to assess landowner characteristics and how they affect what sources of information landowners are most likely to use. Results reveal that landowners have mostly used friends, family, and neighbors as information sources. Multinomial logistic regression results reveal that landowners may be motivated to actively manage their forestland but are not necessarily interested in Extension information.

Introduction

It is important to identify the best methods of delivering information to non-industrial private forest landowners so that Extension agents, foresters, and other land managers and agencies can better assist them. This is especially important with the increasing changes in the dynamics of land and landowner

characteristics (Bardon, Hazel, & Miller, 2007).

The Tennessee Northern Cumberland Plateau is a region experiencing these changes at present as land use land change increases and the population continues to increase. In other recent studies, there is evidence that the South may be increasingly important to ensuring a sustainable supply of timber to the United States (Arano & Munn, 2006; Zhang & Nagubadi, 2005), which will require active forest management. Therefore, it is especially necessary in this region to provide information to landowners increasing their knowledge about forest practices and commercial harvesting.

Knowledge may assist in sustaining this increased need for timber and other goods and services provided by woodland. As pointed out in Kittredge (2004), "[s]egmentation of the family owner audience into different types, and targeting of outreach . . . , may improve our ability to reach this important audience" (p. 15). Kittredge also makes the important point that unless these family forest land owners are effectively reached this land will be lost to conversion or harvested unsustainably.

Results from a study in North Carolina (Bardon et al., 2007) indicated three important groups of landowners who should be targeted in different ways with information concerning their forestland. The first group was "snail-mailers," who prefer direct mail or information from print (newsletters and information pamphlets). This group was mostly over the age of 66 and was comprised of approximately 21% of respondents. The second group was "short-mailers," who were also likely to use information received in the mail but also would be interested in workshops/short-programs, and the majority of this group had received information from the state forestry agency. This group of landowners was slightly younger than the "snail-mailers." Short-mailers represented approximately 24% of respondents. The third major group was the "Web-mailers," who, as the name implies, prefer Internet-based resources. This was the youngest group of landowners and had the highest education level. Web-mailers were approximately 25% of survey respondents.

Cartmell, Orr, and Kelemen (2006) focused on landowners with 50 acres of land or less in a single county of Oklahoma. They included variables that measured age, income, education, and acreage. Their results revealed that direct mail was the most preferred method of information dissemination.

Rodenwald (2001) surveyed agriculture and natural resource Extension agents in Ohio to determine what they perceived to be the most effective way of disseminating information concerning wildlife management. Results suggested that printed media was preferred over Web-based technology. In her study, online-information was preferred fourth after printed fact sheets, printed bulletins and/or manuals, and newsletters. Rodenwald's conclusion, however, was not that Extension focus entirely on older methods of delivery, but instead that diversification of materials continues so as to reach all extension clientele.

In West Virginia, Steele, McGill, Chandran, Grafton, and Huebner (2008) examined characteristics of landowners who had received information concerning invasive plants. Results of this study revealed that the majority of landowners received information from friends (70%) followed by the state department of agriculture (48%), Extension agents (37%), local newspaper (26%), foresters (21%), Internet (10%), television (5%), and radio (3%). The results of this study showed that roughly half of landowners received information from agency and/or media sources. They concluded that there was a need for means that are both broad and target specific to reach landowners and that some of the most effective tools may be workshops and traditional one-on-one contact with assistance providers.

The purpose of this article is to assess what information sources are being used and to categorize landowners on the Tennessee Northern Cumberland Plateau. As pointed out by Kittredge (2004), "[f]amily forest owners do not make decisions about their land in a vacuum. They are influenced not only by their own attitudes and circumstances, but by the context in which their land is located" (p.16). For this reason, it is important to

understand these contexts by looking at the land and landowner characteristics and motivations for owning woodland.

Methods

Data were obtained from the Initiative for Future Agricultural and Food Systems survey conducted in 2005 by the Human Dimension Laboratory at the University of Tennessee Department of Forestry, Wildlife and Fisheries. This survey was a two-stage mail out survey using the Dillman method (also cited in Kaetzel, Hodges, Houston, & Fly, 2008). The survey had a 55% response rate (n=504); however, in this article observations with missing data were dropped for a sample of (n=335). A multinomial logistic (mlogit) regression is employed in STATA to assess what land and landowner characteristics influence what information source landowners are likely to use. This model was chosen due to the nominal dependant variable meaning the outcomes cannot be ranked in any meaningful way (Gujarati, 2003).

The dependent variable, *information*, is coded as a 0 for landowners who have received information from a government agency or a forester, 1 for landowners who have received information from the media (i.e., television, radio, paper, Internet) or friends, and 2 for all other information sources (e.g., environmental groups) (Table 1). The base group was set to 2, all other information sources, for the mlogit regression so that the results for groups 0 and 1 could be easily interpreted.

The model has four independent variables (Table 1) that were influenced by previous studies (Bardon et al., 2007; Cartmell et al., 2006). The first independent variable *educ* is a dummy variable used to measure whether landowners have or have not graduated high school. *Harvest* is a dummy variable that measures whether landowners have previously commercially harvested timber from their woodland. Independent variable *motutil* is a measure of a landowner's motivation to actively manage their woodland. This may include owning woodland for timber production, collecting firewood, etc. The final independent variable is *retire* and is used to measure whether a landowner is retired or still employed (part or full-time).

Table 1.
Dependent and Independent Variables for Mlogit Regression

Dependent Variable	
information	0 = Have received information from government agencies or a forester
	1 = Have received information from some form of media or a friend
	2 = Have received information from other sources or none at all
Independent Variables	
educ	0 = Less than high school education
	1 = High school education or greater
harvest	0 = Landowner has not harvested timber from woodland
	1 = Landowner has harvested timber from woodland
motutil	Continuous
retire	0 = Not retired

	1 = Semi/Fully retired
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Variables were assessed for collinearity by analyzing their variance inflation factors (VIFs). VIFs were calculated following an ordinary least squares regression (Gujarati 2003). Finally, odds ratios were calculated and plotted to indicate the ratio of the probability that an event occurs $\hat{\alpha}$ in this case how a landowner has received information (Gujarati, 2003).

Results

The numbers of landowners who use various information sources are presented in Table 2. The top two sources for landowners concerning managing their woodland are books and magazines (33.13%) and friends, relatives, and neighbors (31.55%). Farm suppliers, county Extension, and Farm Bureau are also being used. The Internet was used by 12.30% of landowners. Finally, environmental groups (7.14), Natural Resource Conservation Service (6.15%), and landowner associations (2.18%) were the least used sources of information. Approximately 90% of landowners have completed high school, approximately 50% of landowners have harvested timber from their woodland, and 38.17% of landowners are retired.

Table 2.
Number of Landowners Who Used Various Information Sources in Study Area

Source	Have Used	Have Not Used	% Have Used
Tennessee Department of Environment and Conservation	61	443	12.10
United States Department of Agriculture	58	446	11.51
Natural Resource Conservation Service	31	473	06.15
Farm Bureau	84	417	17.26
Soil and Water Conservation District	60	444	11.90
Forester	66	438	13.10
Logging contractor	44	460	08.73
County extension	91	413	18.06
Internet	62	442	12.30
Book and magazines	167	337	33.13
Television, radio, newspaper	72	432	14.29
Friend, relatives, neighbors	159	345	31.55
Environmental groups	36	468	07.14
Farm Suppliers	103	401	20.44
Landowner associations	11	493	02.18

VIFs calculated indicated that multicollinearity is not an issue in the data. The highest VIF was 1.10 for the independent variable *motutil*. VIFs less than 10 are generally accepted as having no issues with collinearity (Gujarati 2003).

Results of the regression (Table 3) reveal two significant variables ($p > .05$) correlated with landowners assigned a 0 for the dependent variable (have received information from government agencies or a forester). Likewise, results reveal three significant variables ($p > .10$) correlated with landowners assigned a 1 for the dependent variable (have received information from media or a friend). The goodness of fit for this model, measured by the LR Chi² for mlogit regressions, was significant at the 95% level.

Table 3.
Results from Multinomial Logistic Regression

	Government Agency of Forester	Media or Friend
educ	0.3477	-0.5083
	(1.1607)	(1.0938)
motutil	-0.4382**	-0.5098**
	(0.2044)	(0.2005)
harvest	0.9297	1.0537*
	(0.6339)	(0.6232)
retire	-1.3126**	-0.9748*
	(0.5878)	(0.5739)
constant	2.1813*	3.2775***
	(1.2213)	(1.1567)
Observations	335	335
Pseudo R ²	0.1478	
LR Chi ²	16.64**	
Standard errors in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%		

For the case that the dependent variable equals 0, results reveal significant negative relationships between both independent variables *motutil* and *retire* and the dependent variable. These results show that landowners with increasing motivation towards managing their woodland are less likely to have used information from government agencies or a forester (this includes county Extension agents). Landowners who have retired are also less likely to have used information from government agencies or a forester.

For the dependent variable equals 1, there were two significant negative relationships between independent variables *motutil* and *retire* and the dependent variable ($p > .05$ and $p > .10$ respectively). There was one positive significant relationship ($p > .10$) between *harvest* and the dependent variable. This implies that as

landowners' motivation for managing their woodland increases they are less likely to have used information from media sources or friends, relatives, and neighbors. Also, retired landowners are less likely to have used information from these sources. However, landowners who have harvested timber in the past were more likely to have used information from media or friends, relatives, and neighbors.

The odds ratios calculated after the regression reveal a few interesting insights. Landowners who are retired are approximately 1/3 more likely to use information from media/friends than from government agencies. Landowners who had previously harvested timber were approximately 2.4 times more likely to have received information from government agencies/foresters, or 2.8 times more likely to have received information from media/friends rather than landowner associations and environmental groups.

Discussion

The results from Table 2 reveal that landowners have mostly used information from media sources and friends, family, and neighbors. This is in agreement with the results of Steele et al. (2008), who found that the majority of landowners received the majority of information from friends. Results also reveal that landowners are using information from government agencies, foresters, Extension agents, and farm bureau sources. Also, in agreement with Cartmell et al. (2006) and Rodenwald (2001), written and mail sources were also fairly highly used in the study area (books, magazines, and newspapers).

Model results indicate a negative correlation between people with a motivation to manage their land and using information from either government agencies/foresters or media/friends. Landowners who had conducted a commercial timber harvest before were shown to have a significant positive relationship with receiving information from friends/media. The high percentage of high school graduates and the majority of landowners surveyed still working full or part-time may give us some insight into why landowners are using the information sources they are. These landowners may be akin to the "short-mailers" in Bardon et al. (2007). These landowners are not opposed to direct mail, but would prefer personal contact through workshops or contact with government agencies. The Internet was not highly used overall among forestland owners in the study. However, the Internet was a fairly highly used source compared to other sources, which may be among younger forest landowners in the study area, as pointed out in Bardon et al. (2007).

Conclusion

This article reports what sources of information landowners in the study used concerning their forestland and presents an econometric model that examines land and landowner characteristics and how they are correlated with what information sources landowners have used. Results reveal that landowners who have used information sources have mostly used friends, family, and neighbors. Landowners have also used government agencies, foresters, Extension agents, etc. concerning the management of their woodland.

Using the results from the model, we can posit that landowners who may have a motivation to manage their land may still have no interest in Extension information. This is a salient issue as the South becomes more necessary as a timber-basket for the country. Increased efforts should be made by resource professionals to disseminate information. To echo Rodenwald (2001), we should continue to diversify Extension materials in this region— especially concerning media outlets such as books and magazines— to reach mostly non-retired landowners.

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