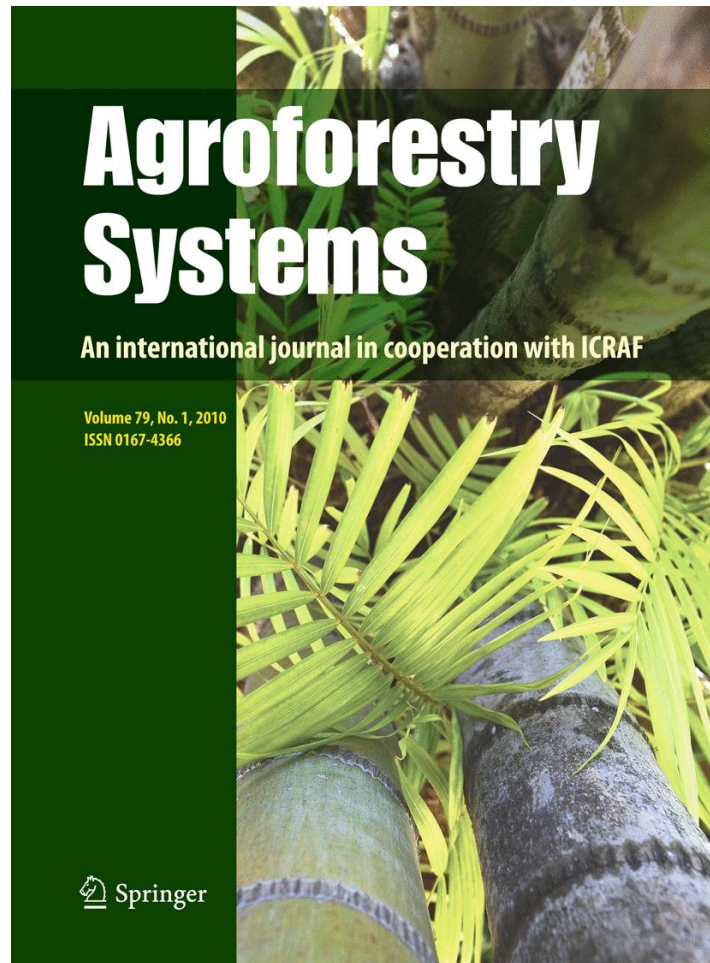


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Recreational Multifunctionality and its implications for agroforestry diffusion

Carla Barbieri · Corinne Valdivia

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Abstract Recreational Multifunctionality refers to those farms providing at least one recreational service to members of the farm household or the public. Based on the types of recreational services offered, two types of landowners have been identified: *Productivists* and *Ruralists*. They differ on their extent of Recreational Multifunctionality, farm household attributes and farm representation. Both types of landowners also have different behavior and understanding of agroforestry. This study builds on the Recreational Multifunctionality construct to identify message content, channels and agencies that can better facilitate the diffusion of agroforestry. In 2006, 353 randomly selected landowners from Missouri were interviewed and clustered in two groups: *Productivists* (38.0%) and *Ruralists* (62.0%). These groups were examined to identify differences regarding their perceptions of being a good farmer (i.e.,

message content); their preferred source of information (i.e., communication channel); and their preferred agencies for learning purposes (i.e., communication agencies). Study results show differences between *Productivists* and *Ruralists* in all three aspects of diffusion examined (i.e., message content, channels and agencies), suggesting that all landowners should not be approached in the same way when promoting agroforestry. Messages conveyed to *Productivists* should emphasize the economic benefits of agroforestry, while messages to *Ruralists* should emphasize the conservation benefits of agroforestry. Touring farms with active tree management is a good way to disseminate agroforestry practices among *Productivists* while state and federal extension agents appear to be more suitable to approach *Ruralists*. Both groups can effectively be reached using printed materials, especially through official conservation magazines.

Keywords Adoption · Agritourism · Hierarchical cluster analysis · Recreation

The authors Carla Barbieri and Corinne Valdivia have equally contributed.

C. Barbieri (✉)
Department of Parks, Recreation & Tourism, University of Missouri, 105 Anheuser Busch Natural Resources Building, Columbia, MO 65211, USA
e-mail: BarbieriC@missouri.edu

C. Valdivia
Department of Agricultural Economics, University of Missouri, 214 D Mumford Hall, Columbia, MO 65211, USA

Introduction

Agriculture is multifunctional because it provides different services (i.e., *functions*) to society in addition to the production of food and fiber (Bernardo et al. 2004; Marsden and Sonnino 2008; Ploeg et al. 2000). Many of these services are intangible and may not even be included in the pool of tradable goods.

Nonetheless, these services are very important for the farm household and society. For example, these may include the provision of environmental services (e.g., carbon sequestration, infiltration enhancement, control of wind erosion), the preservation of the agri-biological diversity, wildlife and native plants, and the conservation of rural heritage. *Recreational Multifunctionality* describes the recreational services that landowners commonly provide to their family members or the public with or without entrepreneurial purposes (Barbieri and Valdivia 2009).

Promoting the adoption of agroforestry practices using different messages is important because these practices can help to realize different landowners' interests. A hierarchical cluster analysis conducted over the types of recreational services provided on the farm resulted in the identification of two types of landowners: *Productivists* and *Ruralists*. Both groups differ in the meanings they assign to their farmland (either as production unit or as a means for rural lifestyle), their perceptions of the values of agroforestry and the types of barriers preventing further agroforestry adoption (Barbieri and Valdivia 2009). The occurrence of two types of landowners valuing their farmland and agroforestry practices in different ways suggests that they need to be addressed with different messages. Further, it suggests that different channels and agencies for disseminating agroforestry need to be explored to persuade *Productivists* and *Ruralists*, as they will respond differently based on their own interests and preferences. This manuscript has two objectives: (1) it furthers the characterization of *Productivists* and *Ruralists* by examining their perceptions of being a 'good farmer' to construct a message that can better persuade landowners to adopt agroforestry practices; and (2) it identifies ways that can be used to effectively reach both types of landowners for the purpose of informing them about and promoting agroforestry practices.

The adoption of agroforestry is important for *Productivists* to increase their agricultural revenues. This is especially important for many small family farms that are adopting different strategies, such as off-farm employment, development of on-farm enterprises and crop diversification, to remain in business or retain their lands (Barbieri et al. 2008; Hoppe 2001; Hoppe et al. 2007; Knutson et al. 1998; Valdivia and Poulos 2009). For the *Ruralists*, agroforestry adoption is important as a means to increase

the non-economic values of their lands, such as landscape beautification and maximization of their recreational enjoyment. The overall adoption of agroforestry can amplify the positive impacts of small family farms on rural well-being and society including the preservation of agriculture heritage, beautification of rural scenery, and protecting wildlife resources and habitats (Barbieri and Valdivia 2009; Hoppe et al. 2007; Lambert et al. 2006; Valdivia 2007).

Literature review

Agriculture and Recreational Multifunctionality

Multifunctionality is frequently used to holistically assess the many values of farming outputs, including environmental amenities, agritourism opportunities, food quality, landscape management, and preservation of biodiversity (Marsden and Sonnino 2008). This holistic approach is important given that research suggests that on-farm functions and enterprises do not operate in isolation; there are interactions among them (Barbieri et al. 2008; Ploeg et al. 2000). This is especially true for on-farm recreation related enterprises that appear to be more synergistic than other functions. On-farm recreation serves to amplify the values within the farm household as it assists in promoting and encouraging the sales of other farm specialties, or value-added products and services (Barbieri 2009). For example, facilitating orchard tours can stimulate the direct sale of the farm agricultural or value-added products (e.g., fresh fruits, jellies), and delivers benefits associated with outdoor recreation (e.g., stress relief) and with landscape preservation (e.g., having an aesthetically appealing orchard).

Agriculture has traditionally provided recreational opportunities to the farm household members and to the public. The first dude ranches were developed in the early 1900s in the western US (Limerick 2001) and there is evidence that Missouri started promoting the development of agritourism to supplement farm business in the 1960s (Bird 1963). On-farm recreational services produce benefits: (1) to the business unit by increasing farm revenues; (2) to the landowner by accomplishing different entrepreneurial goals; and (3) to society and rural well-being by

preserving agriculture landscape and heritage and providing benefits associated with outdoor recreation participation (McGehee and Kim 2004; Hegarty and Przezbórska 2005; Wicks and Merrett 2003).

In an effort to capture the recreational services provided by farms, Barbieri and Valdivia (2009) developed the *Recreational Multifunctionality* construct, defined as at least one recreational service provided by the farm to members of the household or the public with or without the intended purpose of attracting visitors to the farm. Eight recreational activities that commonly occur within the farmland were used to develop this construct: hunting, fishing, gathering wild edibles (e.g., berries, mushrooms), wildlife or nature contemplation, walking or hiking, use of off-road recreational vehicles, horseback riding and camping. These activities were selected as they do not necessarily imply an economic return. In this way, *Recreational Multifunctionality* is different from agritourism. The latter is by definition entrepreneurial in nature as it is developed either to maximize economic gains (e.g., revenue generation, better use of farm resources, cross marketing of farm products, reduction of covariant risks), or to satisfy various entrepreneur's intrinsic goals (Barbieri and Mahoney 2009; McGehee and Kim 2004; Ollenburg and Buckley 2007; Hegarty and Przezbórska 2005). On the other hand, *Recreational Multifunctionality* focuses on the recreational value of the farmland for the landowner, family, and others. In this sense, *Recreational Multifunctionality* extends beyond agritourism, capturing the essence of the recreational function of the farmland independently from the economic or entrepreneurial pursuits that this activity could entail.

Landowners' classification efforts: *Productivists* and *Ruralists*

Efforts to profile and classify farmers and landowners are not longstanding and still underway. For example, in a pioneering study on this topic, Gasson (1973) found that farmers have a special core of values associated with being or remaining a farmer, such as belonging to a farming community. More recently, internal farm household attributes, such as operator's motivations and objectives, have been used for similar purposes (e.g., Barbieri and Mahoney 2009; Raedeke et al. 2003; Schucksmith 1993; Valdivia

et al. 2009). For this study, it is especially relevant to emphasize the distinction between landowners farming primarily to pursue commercial agriculture opportunities and those not constrained by the profitability of their land, as a significant share of their income is derived from off-farm activities or on-farm entrepreneurial ventures (Valdivia et al. 2009; Valdivia and Konduru 2004).

Barbieri and Valdivia (2009) identified two types of landowners in Missouri: *Farming Life-style landowners (FLL)* and *Rural Life-style landowners (RLL)* with distinctive characteristics in their socio-demographic composition and production unit attributes. Importantly, both groups also differed in their understanding of agroforestry in terms of perceived knowledge and their willingness to implement agroforestry practices on their land. *FLL* were mostly full and part-time farmers who own their land for the farming business; hence they provided fewer recreational services, mostly those that have traditionally been linked to agriculture such as fishing and hunting. *RLL* mainly own their land for their non-economic values (e.g., nature escapism, scenic beauty, recreation); hence, they offer a diversity of recreational services mostly associated with enjoying the rural setting (e.g., hiking and nature contemplation) and have a greater understanding of agroforestry practices. This study concluded that *RLL* provided a great opportunity for agroforestry implementation because they were more knowledgeable about these practices and had increased their farmed acreage in the past 5 years.

Agroforestry practices

Agroforestry is an intensive land-use management practice, where trees and/or shrubs are deliberately combined with crops and/or livestock and incorporated into the agricultural landscape (Gold and Garrett 2009). The biophysical interactions between the trees/shrubs and crops/livestock occurring in agroforestry practices produce various physical, biological, ecological, economic and social benefits (Dobbs and Pretty 2004; Gold and Garrett 2009). The economic benefits include an increase on farm revenue through the optimization of land production (Gold and Garrett 2009; Gold et al. 2009). Agroforestry also produces important environmental benefits including control of wind erosion, reduction of

run-off and non-point source pollution, stabilization of stream banks, improvements in internal drainage and infiltration, and enhancement of aquatic and terrestrial habitats and connective travel corridors (Gold and Garrett 2009).

This study focuses on the five agroforestry practices promoted in temperate regions (Gold and Garrett 2009). *Alley Cropping* is the practice of planting trees combined with agricultural or horticultural crops cultivated in the alleyways between the tree rows. *Windbreaks* refer to the practice of planting trees or shrubs to reduce wind speed. *Riparian* and *Upland Buffers* are strips of trees, shrubs, and grasses between agricultural land and water bodies (riparian) or placed along the contour within agricultural crop lands (upland). *Forest farming* is the practice of cultivating high-value specialty crops under the protection of a forest overstory that has been modified and managed to provide the appropriate microclimate conditions. *Silvopasture* is the combination of trees with forage (pasture) and livestock production.

Adoption and diffusion of farming practices

According to the actor theory, the farmer will ultimately make the decision to adopt the practice or a business path that seems most consistent and appropriate to achieve their goals or interests (Rob and Burton 2004; Barlas et al. 2001; MacFarlane 1996). Farmers make those decisions after assessing different farm internal resources (e.g., household composition, farm size) and external conditions (e.g., incentive policies, market prices) (Bateman and Ray 1994; Fuglie and Kascak 2001). For example, Lockeretz (1990) reported that internal resources in terms of farmers/farms attributes, institutional connections, attitudes, and the land's physical potential for erosion influence the decision to adopt conservation practices. In turn, Featherstone and Goodwin (1993) exemplified the influence of external conditions on farmers' decision-making processes suggesting that debt, income and other economic attributes drove farmers' decisions to adopt soil conservation practices during the 1980s farm crisis.

Internal and external conditions also play a role in the adoption of agroforestry practices. For example, Pattanayak et al. (2003) found that demographic characteristics, intra-household homogeneity, resource assets, market incentives, biophysical factors, and risk

and uncertainty were determinants for agroforestry adoption. Flower (2004) found that lifestyle attitudes, agroforestry knowledge and farm-structure attributes also determined the adoption of riparian buffers and forest farming. Similarly, Valdivia and Poulos (2009) found that physical properties of the landscape, such as bank stream erosion, influenced the adoption of riparian buffers. The influence of economic motivations, a commonly examined internal factor, is not conclusive in the adoption of agroforestry. Fregene (2007) found that the economic benefits of agroforestry had a positive and significant effect in adopting agroforestry while Valdivia and Poulos (2009) found that they were not a driving factor. Regarding external forces, the value of the land for future development was found to be an important element in deciding whether to plant trees or grasses as riparian buffers (Lynch and Brown 2000).

The influence of various internal and external conditions in the adoption of agroforestry practices suggests that farm household attributes and the farmers' perceptions of the practice of farming (i.e., land producers, land stewards) need to be incorporated into diffusion efforts. In this regard, Camboni et al. (1990) suggest that information needs to be designed and targeted to different farm interest groups, delivering specific information on how innovations will affect these groups. Arbuckle et al. (2009) suggest that promoting agroforestry practices should emphasize economic performance among landowners with strong financial motivations while the focus should be on non-economic motivations among landowners placing high value on the environment and recreation.

Data and methods

This study was conducted in four Missouri counties: Boone, Howard, Crawford, and Phelps. Those counties were selected to represent the state's central agricultural region and Ozark landscapes. The valid sample frame included 728 landowners with at least 10 acres, excluding those that the enumerators were unable to contact. This sample was randomly drawn with an automatic number generator with replacement from four counties Tax Assessor's Lists in Missouri. The survey was conducted in 2006 and produced 353 completed surveys (48.5% response

rate). The final questionnaire comprised 93 questions inquiring about involvement with farming, land resources and use, participation in programs and contact with organizations, experience and attitudes towards trees, marketing, environmental problems, sources of information, social networks, perceptions of farming, non farm land use questions, agroforestry practices, attitudes, knowledge and adoption, and personal background information.

The purpose of this study is to identify the message content, channels and agencies that can better persuade landowners to adopt agroforestry practices on their land. A hierarchical cluster analysis over on-farm recreational services was performed to classify responding landowners. Cluster analysis has also been used to identify potential adopters of agroforestry (Strong and Jacobson 2005, 2006). A series of Chi-Square goodness of fit (significance level at 10%) and analysis of variance (significance level at 10%) tests were used to examine statistical differences between types of landowners regarding: (a) recreational services provided; (b) farm household and farm characteristics; (c) their interest in adopting six types of agroforestry practices; (d) perceptions of being a good farmer (i.e., diffusion message); and (e) preferred sources of information agencies facilitating learning (i.e., diffusion channels). Perceptions of “being a good farmer” were measured on a 5-point Likert scale anchored in strongly disagree (1) and strongly agree (5). Principal component factor analysis with varimax rotation was used to reduce these nine perceptions into fewer dimensions. Mean imputation was used to treat missing values given the small sample size. Eigenvalues over 1 and factor loadings over .5 along with the scree-plot interpretation were used as thresholds to determine the factors. Cronbach’s alpha reliability tests were conducted to examine acceptable internal consistency among the variables loaded in the model (Nunnally and Bernstein 1994).

Results

Profile of study participants

The majority of respondents were male (72.3%). The average age was 57 years old, and the majority (62.7%) were at least 50. On average, the education

of respondents was slightly higher than high school. About half (45.0%) of respondents had a maximum of 12 years of education corresponding to a high school graduate; less than a fifth (18.8%) had more than 16 years of education, which translates to a college degree. On average respondents estimated their total assets to be at least \$300,000. A relatively low proportion (25.3%) estimated their assets at less than \$200,000, while a third (33.1%) reported over \$500,000 in assets. Over a third of the respondents (34.0%) identified themselves as farmers, either part-time (25.6%) or full-time (8.4%); the majority (66.0%) were non-farmer landowners. While on average respondents have been farming for 17.7 years, 3.9% had been farming for more than 25 years and 28.8% were new to farming (less than 1 year farming). The majority (51.7%) had occupied their farm for more than 20 years (mean = 33.7 years), while 24.4% had occupied it for less than 1 year. Over a third of respondents (4.8%) thought they were likely or very likely to pass their farm to the next generation.

The vast majority of participants (92.4%) provided at least one recreational service to household members and outsiders (Table 1). On average, responding landowners were simultaneously offering about four of these services (mean = 3.8 services). The services provided most frequently included hunting (72.2%), gathering mushrooms, berries or other wild edibles (64.6%), wildlife observation or nature contemplation (56.7%) and walking or hiking (53.5%), showing a blend of consumptive and non-consumptive recreational uses. Horseback riding (28.6%) and camping (19.5%) were the least frequently offered recreational activities. In contrast to recreation, there was a low incidence of agroforestry adoption among respondents. Less than a third (3.9%) of all respondents were employing at least one of the five agroforestry practices most frequently adopted in the US (mean = .41 practices). The agroforestry practice most frequently adopted was windbreaks (17.3%), closely followed by riparian or stream bank plantings (15.9%). Adoption of other practices was very limited, especially alley cropping (.6%).

A recreation-based taxonomy of landowners: *Productivists and Ruralists*

The hierarchical cluster analysis conducted over the eight recreational services examined in this study

Table 1 Incidence of recreational services and agroforestry practices among responding landowners

	All respondents ($n = 353$)
Recreational services	
Hunting	72.2%
Gathering of mushrooms, berries, or other wild edibles	64.6%
Wildlife observation/nature contemplation	56.7%
Walking/hiking	53.5%
Fishing	44.2%
Use of off-road recreational vehicles	42.6%
Horseback riding	28.6%
Camping	19.5%
Overall (offering at least one service)	(92.4%)
Rec. index (number of recreational services offered)	(3.8)
Agroforestry practices	
Windbreaks	17.3%
Riparian or stream bank plantings	15.9%
Silvopasture	4.8%
Forest farming	1.4%
Alley cropping	.6%
Overall (adopting at least one practice)	(3.9%)
AF index (number of agroforestry practices adopted)	(.41)

resulted in two types of landowners. Since there is not a standard classification rule for this analysis (Arimond and Elfessi 2001; Hair et al. 1998), two to six clusters solutions were tested. The two-cluster solution was the best fit providing an optimal distribution of respondents. The final cluster sizes were 122 (Cluster 1) and 199 cases (Cluster 2), representing 38 and 62% of the respondents, respectively. Table 2 describes the overall occurrence of the eight recreational services used in the cluster analysis and the differences among clusters regarding the types and extent of these recreational functions. As might be expected, both clusters were significantly different in the types and amount of recreational services provided. Overall, Cluster 1 was less multifunctional in terms of number of recreational services provided (mean = 2.99) than Cluster 2 (mean = 4.87) ($F = 116.68$, $df = 320$, $P < .001$). Further, the occurrence of extractive recreational services (e.g., hunting) was higher among Cluster 1 while contemplative activities (e.g., walking/hiking and nature/wildlife contemplation) were more frequently observed among Cluster 2 ($P < .05$). According to these definitional differences, the clusters were labeled *Productivist* and *Ruralist*, respectively.

To better characterize both types of landowners and validate the clusters obtained, statistical analyses were conducted to examine differences between groups in key variables related to farm and landowner characteristics. Results showed that *Productivists* were mostly full and part-time farmers (47.1%) while *Ruralists* were mainly non-farmers (72.5%) as shown in Table 2 ($\chi^2 = 24.76$, $P < .001$). Although the overall incidence of off-farm jobs was high, the proportion was statistically smaller among *Productivists* compared to *Ruralists* (53.8 vs. 71.7%; $\chi^2 = 6.56$, $P = .010$). In 2005, a larger proportion of *Productivists* (36.3%) hired farm labor than *Ruralists* (21.5%; $\chi^2 = 4.96$, $P = .026$). A fifth of *Ruralists* (2.0%) had increased their farmland during the last 5 years compared to 16.1% of *Productivists* ($\chi^2 = 6.07$, $P = .048$). These results suggest different farmland representations between groups. Farms represent a production unit for *Productivists*, while they are a source of non-economic values (e.g., nature escapism, recreation) for *Ruralists*.

Overall, *Productivists* were significantly less interested (45.9%) than *Ruralists* (65.6%) in adopting agroforestry ($\chi^2 = 11.86$, $P < .001$) (Table 3). Differences between groups were more pronounced in

Table 2 A comparison of farm household and farm characteristics between *Productivists* and *Ruralists*

	Productivist (n = 38%)	Ruralist (n = 62%)	Sig. ^a
On-farm recreational services			
Hunting	84.4%	74.9%	$\chi^2 = 4.09, P = .043$
Gathering of wild edibles	54.9%	79.4%	$\chi^2 = 21.62, P < .001$
Nature/wildlife contemplation	13.1%	91.5%	$\chi^2 = 196.40, P < .001$
Walking/hiking	11.5%	87.4%	$\chi^2 = 179.85, P < .001$
Fishing	51.6%	45.7%	$\chi^2 = 1.06, P = .304$
Use of off-road recreational vehicles	38.5%	51.3%	$\chi^2 = 4.93, P = .026$
Horseback riding	35.2%	29.1%	$\chi^2 = 1.31, P = .253$
Camping	9.8%	28.1%	$\chi^2 = 15.18, P < .001$
Recreational Multifunctionality index ^b	(2.99)	(4.87)	$F = 116.68, df = 320, P < .001$
Type of landowner			
Full-time farmer	16.0%	3.1%	$\chi^2 = 24.76, P < .001$
Part-time farmers	31.1%	24.5%	
Non-farmers living on the farm	36.9%	59.6%	
Non-farmers living away the farm	16.0%	12.8%	
Hired labor in 2005			
Farms with hired labor	36.3%	21.5%	$\chi^2 = 4.96, P = .026$
Farms without hired labor	63.7%	78.5%	
Landowner off-farm pluriactivity			
Currently working off-farm	53.8%	71.7%	$\chi^2 = 6.56, P = .010$
Do not work off-farm	46.2%	29.3%	
Farmed acres change—last 5 years (in %)			
Farmed acreage increased	16.1%	2.0%	$\chi^2 = 6.07, P = .048$
Farmed acreage remained the same	62.5%	74.5%	
Farmed acreage decreased	21.4%	5.5%	

^a Critical value $P < .10$

^b Average number of recreational services provided on regular basis

forest farming and alley cropping practices. Only a fourth of the *Productivists* (25.4%) were interested in adopting forest farming compared to about half of *Ruralists* (47.2%; $\chi^2 = 15.07, P < .001$). With a similar two-fold difference, only 1.7% of the *Productivists* were interested in adopting alley cropping compared to 22.3% of the *Ruralists* ($\chi^2 = 7.00, P = .005$). There was not consistency with the practices both types of landowners were most interested in adopting. While riparian/stream bank plantings was the practice *Productivists* were most willing to adopt (27.9%), it was ranked third by the *Ruralists* (34.5%). In turn, *Ruralists* were more interested in forest farming (47.2%), a practice that was ranked third by the *Productivists* (25.4%).

Implications of the Recreational Multifunctionality typology for agroforestry diffusion

To increase adoption, diffusion efforts should be designed to address the internal characteristics and perceptions of different types of landowners (Arbuckle et al. 2009; Camboni et al. 1990; Strong and Jacobson 2005, 2006). This study examined three diffusion indicators (i.e., message content, channels and agencies) that can best influence the adoption of agroforestry among *Productivists* and *Ruralists* landowners in Missouri. The examination of message content was constructed with answers from landowners about perceptions of “being a good farmer”;

Table 3 A comparison of interest for adopting agroforestry practices between *Productivists* and *Ruralists*

Agroforestry practices (<i>n</i> = 319)	Productivist (<i>n</i> = 38%)	Ruralist (<i>n</i> = 62%)	Sig. ^a
Agroforestry practices—overall			
Interested to adopt agroforestry	45.9	65.6	$\chi^2 = 11.86, P < .001$
Not interested to adopt agroforestry	54.1	34.5	
Alley cropping			
Interested to adopt	1.7	22.3	$\chi^2 = 7.00, P = .005$
Not interested to adopt	89.3	77.3	
Windbreaks			
Interested to adopt	26.2	35.5	$\chi^2 = 3.00, P = .053$
Not interested to adopt	73.8	64.5	
Riparian/stream bank plantings			
Interested to adopt	27.9	34.5	$\chi^2 = 1.53, P = .132$
Not interested to adopt	72.1	65.5	
Forest farming			
Interested to adopt	25.4	47.2	$\chi^2 = 15.07, P < .001$
Not interested to adopt	74.6	52.8	
Silvopasture			
Interested to adopt	22.1	28.4	$\chi^2 = 1.55, P = .132$
Not interested to adopt	77.9	71.6	

^a Critical value $P < .10$

communication channels were examined based on the preferences among six sources of information; and communication agency was analyzed through their preferred agencies to learn about agroforestry.

Perceptions of 'Being a Good Farmer': the diffusion message

Factor analysis of the nine indicators of what represents “being a good farmer” resulted in a significant model of two factors (total variance = 55.3%; $\alpha = .689$; $P < .001$) (Table 4). The first factor obtained was labeled “Land Producer” (F1) because it comprised those perceptions associated with the land as a means for agriculture production, including: well established in the farming community, able to pass the farm to the next generation, owns his/her land, continues to expand the farm operation, and makes the most money. This factor had an eigenvalue of 2.5 and explained 36.0% of variance. The second factor obtained, “Land Steward” (F2), explained 19.3% of variance and had an eigenvalue of 1.4. The two perceptions loaded in this factor are related to the stewardship role of the farmer that include improving the land (“Leaves the

land better that s/he found it”) and being concerned with its aesthetic value (“Is concerned with the scenic beauty of the area”). Two perceptions, “is willing to experiment” (mean = 4.13) and “produces the best crops or livestock” (mean = 4.27) did not load in any factor; hence, they were excluded from further analysis. Overall factor means were calculated for each factor based on the means of the original variables comprised in each factor.

Results show that *Productivists* and *Ruralists* had different perceptions of the meaning of being a good farmer. *Productivists* perceived that being a good farmer means to make the land produce, either for immediate outcome (e.g., making the most money) or for future generations (e.g., being able to pass it onto future generations). As Table 5 shows, *Productivists* had significantly higher perceptions than *Ruralists* on the overall mean score ($F = 9.35, df = 316, P = .002$) and on the four of the five items loaded in the “Land Producer” Factor (F1): Is able to pass the farm to the next generation ($F = 3.54, df = 313, P = .061$); owns his/her land ($F = 6.39, df = 316, P = .012$); continues to expand his/her farm operation ($F = 7.10, df = 316, P = .008$); and is making the most money ($F = 3.71, df = 316, P = .055$). No

Table 4 Mean and rotated factor matrix of the practices perceived to define a “good farmer”

Factors and perceptions ^a	Mean ^b	Factor loadings	Explained variance (%)	Eigenvalue
Land producer (F1)			36.04	2.52
Is well established in the farming community	4.01	.622		
Is able to pass the farm to the next generation	4.00	.704		
Owns his/her land	3.47	.753		
Continues to expand his/her farm operation	3.39	.798		
Is making the most money	3.17	.656		
Land steward (F2)			19.28	1.35
Leaves the land better that s/he found it	4.72	.759		
Is concerned with the scenic beauty of the area	4.02	.760		
Total variance explained ^c			55.32	

^a “Is willing to experiment” (mean = 4.13) and “Produces the best crops or livestock” (mean = 4.27) did not load in any factor

^b Measured using a 5-point *Likert*-type scale from (1) = strongly disagree; (3) = undecided; and (5) = strongly agree

^c Overall Cronbach’s alpha reliability coefficients ($\alpha = .689$)

Table 5 A comparison of the perceptions of being a good farmer between *Productivists* and *Ruralists*

Perceptions of being a good farmer ^a	Productivist (n = 38%)	Ruralist (n = 62%)	Sig. ^b
Land producer (F1)			
Is well established in the farming community	4.11	3.95	$F = 2.34, df = 313, P = .127$
Is able to pass the farm to the next generation	4.14	3.91	$F = 3.54, df = 313, P = .061$
Owns his/her land	3.69	3.34	$F = 6.39, df = 316, P = .012$
Continues to expand his/her farm operation	3.60	3.26	$F = 7.10, df = 316, P = .008$
Is making the most money	3.34	3.07	$F = 3.71, df = 316, P = .055$
Overall F1 mean	(3.78)	(3.49)	$F = 9.35, df = 316, P = .002$
Land steward (F2)			
Leaves the land better that s/he found it	4.63	4.77	$F = 3.33, df = 316, P = .069$
Is concerned with the scenic beauty of the area	3.83	4.14	$F = 1.76, df = 317, P = .001$
Overall F2 mean	(4.23)	(4.45)	$F = 1.99, df = 317, P < .001$

^a Measured using a 5-point *Likert*-type scale from (1) = strongly disagree to (5) = strongly agree

^b Critical value $P < .10$

significant differences were found regarding being established in the farming community ($F = 2.34, P = .127$). In contrast, *Ruralists*, perceived that being a good farmer was associated with their responsibility as stewards of the land. This group had significantly higher perceptions than the *Productivists* on the overall mean score for the second factor ($F = 1.99, df = 317, P < .001$) and on its two loading items: leaving the land better than it was found ($F = 3.33, df = 316,$

$P = .069$) and was more concerned with the scenic beauty of the area ($F = 1.76, df = 317, P = .001$).

Preferred sources of information: the diffusion channels

Overall, the *Productivists* were significantly ($P < .01$) less inclined to receive information about agroforestry through a diversity of sources compared

Table 6 A comparison of the preferred sources of information to learn about agroforestry between *Productivists* and *Ruralists*

Preferred diffusion sources	Productivist (<i>n</i> = 38%)	Ruralist (<i>n</i> = 62%)	Sig. ^a
Information channels about agroforestry ^b (<i>n</i> = 316)			
Printed information	1.82	2.44	$F = 21.09, df = 315, P < .001$
Agent visiting their land	1.54	2.10	$F = 18.19, df = 313, P < .001$
Computer/web-based information	1.54	2.04	$F = 15.05, df = 298, P < .001$
Demonstration site on public land	1.58	2.06	$F = 15.50, df = 314, P < .001$
Tours to farm managing trees	1.69	2.03	$F = 6.91, df = 313, P = .009$
Networking with other farmers/landowners	1.50	1.86	$F = 9.33, df = 311, P = .002$
Most useful subscribed magazines (<i>n</i> = 319)			
Official conservation magazine(s)	38.5%	58.4%	$\chi^2 = 19.91, P < .001$
Farming related	21.3%	8.1%	
Other magazines ^c	4.1%	7.6%	
None	36.1%	25.9%	
Agencies to learn about planting/managing trees (<i>n</i> = 319)			
State agency	23.8%	36.5%	$\chi^2 = 1.54, P = .061$
University extension	35.2%	26.4%	
Other farmers/landowners	12.3%	13.7%	
Federal agency	9.0%	11.2%	
Nobody	11.5%	5.1%	
Forestry and farming related agencies	8.2%	7.1%	
Agencies to learn about conservation practices (<i>n</i> = 314)			
State agency	26.9%	47.1%	$\chi^2 = 3.49, P < .001$
Federal agency	28.6%	34.4%	
University extension	3.2%	1.8%	
Other agencies ^d	7.6%	5.6%	
Nobody	6.7%	2.1%	
Agencies to learn about innovative agricultural practices (<i>n</i> = 309)			
University extension	49.6%	45.8%	$\chi^2 = 1.06, P = .901$
Other farmers/landowners	17.1%	17.7%	
Federal agency	15.4%	15.1%	
State agency	9.4%	13.0%	
Nobody	8.5%	8.4%	

^a Critical value $P < .10$

^b Measured using a 4-point *Likert*-type scale where 1 = uninterested and 4 = very interested

^c Other include hunting, environmental or rural lifestyle related magazines

^d Other include learning from other farmers/landowners and from input suppliers

to the *Ruralists* (Table 6). Among the six sources of information that were examined on a 4-point Likert scale (1 = uninterested to 4 = very interested), printed information was the most preferred source for both types of landowners. However, a similar consistency was not evident for the second preferred information source. After printed information,

Productivists preferred to learn about agroforestry by touring a farm already managing trees (mean = 1.69), while *Ruralists* preferred an agent visiting their land (mean = 2.44). Because *Productivists* pursue commercial agriculture opportunities, their preference to see evidence of the production benefits from managing trees makes perfect sense.

A significantly larger proportion of *Productivists* (36.1%) did not find any magazine subscription useful for obtaining information on farming related issues as compared to *Ruralists* (25.9%) ($\chi^2 = 19.91$, $P < .001$). A combination of official conservation and farming related magazines appeared the most effective way to reach *Productivists* as these are perceived as the most useful (38.5 and 21.3% respectively) for this type of landowner. In turn, the most effective way to reach the *Ruralists* is through official conservation magazines, as the majority (58.4%) found them a useful source of information.

Learning about agroforestry: the diffusion agents

Different agents (e.g., state/federal agencies, other farmers) were examined as potential sources of information about planting/managing trees, conservation and innovative agriculture practices. Because they reflect three different aspects of agroforestry, the following topics were examined to identify trusted sources of information on planting trees for timber production (e.g., high-value wood and byproducts), for conservation purposes (e.g., erosion control), and for specialty crop agriculture (e.g., shitake mushroom production). The majority of *Productivists* (59.0%) and *Ruralists* (62.9%) preferred to learn about planting and managing trees from University Extension and their State agency. However, the rank of preference is significantly different between groups ($\chi^2 = 11.30$, $P = .061$). *Productivists* stated that they would prefer to learn from state agencies (23.8%) and from University Extension (35.2%). This proportion was inverted in the case of *Ruralists* who reported preference for University Extension (36.5%) followed by their state agency (26.4%). More pronounced statistical differences ($\chi^2 = 3.49$, $P < .001$) between groups were found concerning conservation practices. The majority of *Productivists* stated their preferences for learning about conservation practices from University Extension (3.2%), federal agencies (28.6%) or their state agency (26.9%). *Ruralists*, on the other hand, preferred to learn about those practices from state (47.1%) and federal (34.4%) agencies. A very low proportion of the latter group would choose to learn from University Extension agents (1.8%). University Extension was the most preferred agency to learn about innovative agriculture ($\chi^2 = 1.06$, $P = .901$) for both groups.

Summary and discussion

This study adds to the existing knowledge of agriculture multifunctionality, furthering the construct of Recreational Multifunctionality by describing the recreational services that farms provide to the members of the farm household and visitors with or without an entrepreneurial purpose (Barbieri and Valdivia 2009). Based on these recreational services, this study identified two types of landowners (*Productivists* and *Ruralists*) who significantly differ in the types and amount of recreational services provided, their demographic and farmland attributes, and their willingness to adopt agroforestry. *Productivists* were preponderantly full and part-time farmers for whom the farm was a production unit. Accordingly, they provided few recreational services to their family members or outsiders, mostly associated with recreation linked to the farming lifestyle, such as hunting. *Ruralists* were mostly composed of non-farmers who appear to own a farm for non-farming benefits and services, such as recreation; hence they provide a wide variety of recreational services mostly associated with the rural life-style, such as hiking and nature contemplation.

This study also found that both types of landowners differed on their willingness to adopt agroforestry on their lands. Overall, *Productivists* were less receptive to adopting agroforestry on their land than *Ruralists*. There were no similarities in the types of practices these types of landowners were most interested in, confirming that the adoption of agroforestry practices is congruent with the meaning that landowners place on their land and the practice of farming as reported before (Flower 2004; Valdivia et al. 2009). As a case in point, *Productivists* were more interested in riparian/stream bank plantings because of the economic value of this practice, including the value of stabilizing stream bank erosion and reducing loss of cropland. Similarly, *Ruralists* reported preferring to adopt forest farming because that practice builds a habitat that is ideal for various wildlife (e.g., turkey, deer, songbirds), increasing opportunities for non-economic enjoyment of the farmland.

The purpose of this manuscript was to identify different strategies for agroforestry diffusion, tailored to different types of landowners to better inform and facilitate the adoption of agroforestry. This study

examined the message content and the communication channels and agents that can most effectively reach *Productivists* and *Ruralists*. Results showed that interest in adoption of agroforestry is low among *Productivists*, and a greater effort is needed to inform them about practices in line with their objectives as farmers. Efforts to disseminate messages to this group should emphasize the multiple economic benefits of agroforestry, such as the generation of direct revenues and optimizing returns to the land, for they perceive their farmland as a production unit and the good farmer as the producer. Printed materials, especially information in official conservation and farming related magazines, appeared to be good channels to reach *Productivists*. Touring farms actively managing trees was another way of reaching this group of landowners because tours can demonstrate the economic benefits of implementing agroforestry. State and University Extension agents were preferred as sources of information about managing and planting trees. In turn, efforts to approach *Ruralists* should emphasize the intrinsic benefits of agroforestry practices as this group has a strong perception of their role as stewards of the land and they are not constrained by its economic utility (i.e., farming). Although this group was more open to being informed about agroforestry through a variety of channels, they reported printed materials (e.g., brochures, fact sheets) as their preferred channel of communication. Official conservation magazines can be a good option in this context to convey the benefits of agroforestry, as the majority of *Ruralists* perceived them as very useful for obtaining information. State and University Extension agents can also effectively persuade *Ruralists* to adopt agroforestry, especially if promoting the conservation function of agroforestry (e.g., enhance/restoration of wildlife habitats, carbon sequestration). Because they trust Extension for innovation, information on innovative ideas from agroforestry could have a potential for diffusion.

This study concludes that efforts for agroforestry diffusion should not approach all landowners in the same way and that different message content, channels and agencies should be employed to target *Productivist* and *Ruralist* landowners. However, agroforestry advocates need to negotiate operational and budgetary challenges to transfer this research into practice. The operational challenge is that both types of recreational landowners need to be identified prior

to the formulation and implementation of the agroforestry diffusion efforts. The budgetary challenge relates to the increased cost of developing and implementing two sets of materials for both types of landowners, but it is key to target their trusted information sources. This study is valuable and can be readily applied if differences and similarities between groups are considered in the diffusion of agroforestry. University Extension agents and printed materials, especially articles in official conservation magazines, need to include even amounts of information on the recreational, conservation and economic benefits of agroforestry.

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