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RESEARCH PAPER

# Time and Distance: Comparing Motivations Among Forest Landowners in New England, USA

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**Abstract** Parcelization and shifting landownership are critical forces reshaping forested ecosystems in the USA and elsewhere. These forces create a mosaic of new and long-time landowners as well as differences in residency. Using survey data (n = 879) of landowners in Massachusetts and Vermont, USA, we begin the process of sorting out time (i.e., length of landownership) and distance (i.e., distance of primary residence from forest holding), and their relationships to motivations for continued landownership and management. Both time and distance, and their interaction were significant in explaining three motivations for landownership: enjoyment, production, and protection as well as the number of neighbors with which respondents were acquainted. Distance is the statistically more important factor—negatively related to all dependent variables, but time and its interaction with distance offer the more useful insights for intervention.

**Keywords** Private forest landowners · Absentee ownership · Length of ownership · Motivations · Neighbors

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## Introduction

Parcelization and shifting landownership are critical forces reshaping forested ecosystems across much of the United States of America (USA) (USDA Forest Service 2007a; Gobster and Rickenbach 2004). Parcelization has allowed more people to own a piece of the forest than ever before, and these lands remain a limited and potentially diminishing resource. Development is a perennial concern, but high demand for agricultural products (i.e., food and energy) may reverse forest gains from decades of agricultural abandonment. Regardless of causation, as ownership changes, so does the mosaic of motivations and behaviors that define privately owned landscapes. For example, where once a single landowner guided the management of a 100-ha property, five, 10, or more different neighboring landowners may now bear responsibility for the same area. This situation is further complicated by the fact that these landowners, while owning neighboring properties, may actually reside great distances from one another. Parcelization both with and without subsequent land use change (e.g., development, conversion) has been associated with deleterious economic, ecological, and social outcomes (e.g., Breunig 2003; USDA Forest Service 2007a). If nothing else, smaller landholdings reduce the landowners' economies of scale to accomplish desirable (e.g., timber sale) or needed (e.g., invasive species control) management activities. At broader scales, subdivision and influxes of new landowners challenge the capacity of natural resource professionals to accommodate both individual landowner objectives and landscape concerns such as habitat fragmentation, maintenance of biological diversity, and regional timber supply.

Parcelization in an industrialized economy is not unique to the USA: many European countries have undergone parcelization for decades or centuries based on societal or cultural patterns of inheritance (e.g., Germany, Switzerland, France; Grayson 1993). In addition, more rapid parcelization is evident in transitional economies of Eastern Europe as land reverts to private ownership (e.g., Medved 2005). It is estimated that 65% of Europe's forests are privately owned by roughly 12 million families that provide 54% of the wood supply produced in Europe (Jeanrenaud 2001). Wiersum et al. (2005) report very small ownerships throughout Europe (e.g., from 1.3 ha in Greece to 4.5 ha in Spain), with roughly one-third of owners still economically dependent on their land. Karppinen and Hanninen (2006) found a shift from farm forest ownership to increased absentee and urban ownership during the 1990s in Finland. One result of this parcelization in Europe that is absent in the USA is the formation of a variety of associations and cooperatives intended to overcome the economic scale and/or other management limitations imposed by small and varied ownerships (Jeanrenaud 2001, Kittredge 2005).

Private woodlands are important to timber supply (and by extension local economies), the aesthetics that shape recreational opportunities, and myriad other ecosystem services that sustain human populations. The changing structure of landownership will likely produce different management and land use outcomes that collectively reshape forested landscapes and the array of benefits provided. In this study, we begin the process of sorting out time (i.e., length of landownership) and distance (i.e., distance of primary residence from forest holding), and their

relationships to motivations for continued landownership and management toward assisting natural resource professionals and policymakers better understand this altered landscape. Using survey data from landowners in Massachusetts and Vermont, we consider two questions. First, *how do landowners' motivations differ by time, distance, and their interaction?* Second, *what are the implications of these and other differences for those seeking to understand or influence landowner behavior and landscape outcomes?* In terms of this second question, our findings will be of most interest to those seeking to advance both forest management and land protection.

Not surprisingly, new landowners bring new ideas and perspectives to how land might be used (see e.g., Finley and Kittredge 2006; Rickenbach et al. 2005; Boon et al. 2004; Egan and Luloff 2000). Some studies indicate that more recent arrivals may be more amendable to environmental outcomes and protection, and less inclined to harvest timber commercially (Rickenbach et al. 2005; Kendra and Hull 2005). In terms of residency, anecdotal accounts from conversations with practicing professionals suggest that landowners' interest in timber production declines as the distance from the landowner's primary resident increases, but in terms of other motivations there is no clear guidance. More importantly, perhaps, potential interactions between time and distance have not been explicitly considered. For example, are long-time, absentee landowners similar or different from recent arrivals that are also absentee?

Given the influence of parcelization on the potential for landscape management (e.g., Schulte et al. 2008), connections between landowners are also important. Numerous studies identify the importance of local social relationships to achieving multi-property or landscape scale management (e.g., Bergmann and Bliss 2004; Rickenbach and Reed 2002; Gass et al. in press). However, little is known about how well landowners are connected to their neighbors. Gass et al. (in press) found that landowners did not know their neighbors and saw this as a barrier to cross-boundary coordination. In other qualitative work, Sisock (2008) found that most landowners had limited connections to others in the landscape. In terms of time and distance, both recent arrivals and absentee landowners would appear to be at a disadvantage in making connections to neighbors, particularly in comparison to long-time residents. While intuitive, the literature has been silent on neighborly relationships in large quantitative studies.

## Materials and Methods[1]

### Study Areas

We studied private forest landowners in southern Vermont and western Massachusetts, USA. Our study areas are dominated by forestland cover (approximately 75% of

[1] The findings in this study are a post hoc analysis of previously collected data. As such the survey instrument was not tailored to the research questions posed, but provided a convenient (and inexpensive) way for us to investigate them.

total landscape) and non-industrial, private ownership (roughly 75% of all forestland). They are relatively rural, with population densities of 5,000–7,500 $km^{-2}$. However, these places also support a considerable number of second home or vacation ownerships due to their forested setting, attractive natural aesthetic, the presence of outdoor recreation opportunities such as ski areas and high quality rivers, and relative proximity to urban areas like Boston and New York (2–4 h drive by interstate highway).

## Data Collection

We conducted a mail survey of randomly selected landowners in the summer of 2006 (1,700 surveys to landowners in Southern Vermont; 1,200 to landowners in Western Massachusetts). Names and addresses were obtained from local town halls or purchased through a private service. We followed an abbreviated Dillman method (2000), using a combination of two waves of questionnaire mailing, interspersed with reminder post cards. Our approach yielded a response rate of 45%.

We followed the mail survey with a telephone survey of non-respondents to explore possible response bias. Telephone calls were placed to 235 people who did not respond, resulting in 98 phone conversations in which three questions from the mail questionnaire were posed. Those who chose not to return the mail survey owned significantly less land than respondents ($\alpha = 0.05$). Massachusetts and Vermont ownerships averaged 25.6 and 25.4 ha respectively, whereas non-respondents average ownerships were 17.7 and 18.1 ha. Non-responders were significantly less likely to participate in their state's property tax incentive program for forestland that provides tax reduction in return for a 10-year commitment to develop and follow a forest management plan (Massachusetts: 13 vs. 32%, Vermont: 10 vs. 20%). Lastly, non-respondents were asked to react to one Likert scale statement: "Land must provide a return to cover the expenses associated with ownership" and indicate their level of agreement or disagreement on a scale of 1–5. In both Vermont and Massachusetts, non-respondents scored this statement significantly lower than mail respondents (means of 2.5 vs. 3.0). These results imply that those who returned the mail survey were landowners of larger parcels and, were more inclined than non-respondents to participate in management programs and expect an economic return from their land. Thus, our results should not be extrapolated to imply what landowners in general believe, but to those with larger properties and a tendency toward and financial interest in forest management.

## Data Reduction

Respondents were asked to rate twelve potential reasons for continued forestland ownership on a 5-point importance scale (i.e., Not at all, Not very, Somewhat, Very, and Extremely; Table 1). Our list of reasons was adapted from previous studies of New England forest landowners (Finley et al. 2006; Belin et al. 2005). To reduce the dimensionality of these data for subsequent analysis, we applied principal component analysis using ones as prior communality estimates following Hatcher (1994). We used the principal axis method to extract components and subsequent

**Table 1** Rotated component scores of "reasons for ownership" using principal components analysis

| Items | Component | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| a. Income from timber | -.06 | -.15 | **.75** |
| b. Income from agriculture | -.03 | .03 | **.79** |
| c. Personal recreation | .14 | **.74** | .03 |
| d. To obtain firewood | .04 | .36 | **.68** |
| e. To make maple syrup | .09 | .10 | **.72** |
| f. As a place to live | .06 | **.78** | .17 |
| g. To enjoy the scenery | .32 | **.80** | -.01 |
| h. To protect land from development | **.80** | .27 | .13 |
| i. To provide wildlife habitat | **.83** | .29 | .12 |
| j. To have privacy | .38 | **.68** | .00 |
| k. To protect the environment | **.84** | .31 | .07 |
| l. To leave land unmanaged | **.61** | -.02 | -.22 |

Bolded factor loadings indicate on which component an item loaded (n = 832)

rotations using varimax. Three components had eigenvalues >1. The scree plot test and Hatcher's interpretability criteria (Hatcher 1994, p 50) verified that these three were meaningful and, thus, retained for rotation. Taken together, these components accounted for 64% of the total variance. A reason for continued forestland ownership was defined as loading on a particular component if the factor loading was >0.40 for that component and <0.40 for any other component (Table 1). For all three components, four items loaded on each.

We created additive component scores (i.e., we summed the importance ratings for each reason for ownership that loaded on a particular component) and then rescaled the component scores to a 5-point scale to aid in interpretation. To ensure the reliability of the derived factor loadings, we calculated Cronbach's $\alpha$ for each (Table 2). In all cases, the initial reliability estimate exceeded the typical threshold of 0.70 (Hatcher 1994). However, we found that the reliability of component 1 could be increased from 0.81 to 0.88 by removing "to leave land unmanaged." This item was removed from the calculation of component 1. The removal of this item had the added benefit of increasing the number of usable survey responses from 832 to 879. Reviewing the final components and their constituent items, we labeled components 1, 2, and 3, "PROTECT", "ENJOY", and "PRODUCE", respectively as these labels convey the general sense of the combined items (Table 2).

## Data Analysis

Broadly, our analysis investigates the effects of two ownership characteristics—duration of ownership ("TIME") and distance from main residence to forest landholding ("DISTANCE")—and their interaction while controlling for potential differences by state ("STATE"). TIME and DISTANCE each have two levels (Table 3). For landowners owning forestland $\leq$10 yr, TIME was defined as "recent," while >10 yr was considered long-time ("long"). DISTANCE was

**Table 2** Final component loadings, labels, and reliability scores

| Component | Label | Items | Standardized Cronbach's α |
|---|---|---|---|
| 1 | PROTECT | h. To protect land from development | 0.88 |
| | | i. To provide wildlife habitat | |
| | | k. To protect the environment | |
| | | ~~l. To leave land unmanaged~~[†] | |
| 2 | ENJOY | c. Personal recreation | 0.80 |
| | | f. As a place to live | |
| | | g. To enjoy the scenery | |
| | | j. To have privacy | |
| 3 | PRODUCE | a. Income from timber | 0.73 |
| | | b. Income from agriculture | |
| | | d. To obtain firewood | |
| | | e. To make maple syrup | |

[†] Deleting this item increased the reliability of the resulting component from 0.81 and provided a clearer interpretation of the component (n = 879, reflecting inclusion of those who did not answer item "l", but all other ones)

**Table 3** Distribution of respondents across factors (n = 879)

| TIME (yr) | DISTANCE (km) | |
|---|---|---|
| | Near (<16) | Far (≥16) |
| *Massachusetts (n = 362)* | | |
| Recent (≤10) | 87 | 10 |
| Long (>10) | 216 | 49 |
| *Vermont (n = 517)* | | |
| Recent (≤10) | 99 | 61 |
| Long (>10) | 212 | 145 |

defined as "near" if the primary residence was on or <16 km from the forestland and "far" if ≥16 km. These categories were established post hoc based on our experiences working with landowners.

In terms of specific analyses, we simultaneously compared the mean component scores for all three motivational components by TIME, DISTANCE, and their interaction while controlling for STATE using an unbalanced multivariate analysis of variance (MANOVA). We also compared average ownership size ("HECTARES") and neighbor acquaintanceships (i.e., the number of neighbors respondent's reported personally knowing; "NEIGHBORS") for the same effects using an unbalanced analysis of variance (ANOVA). The sample size for NEIGHBORS is only 689 due to non-response to that questionnaire item. The MANOVA and ANOVA models used the more conservative type III sums of squares. When models were significant, pairwise comparisons of least squared means (LSMs) were tested using the SIDAK method. Lastly, we calculated simple correlations among different land management

options that a landowner might consider and the dependent variables present in this study. Significance for the purposes of this study was defined as $\alpha = 0.05$, except for the correlations for which we set $\alpha = 0.01$. Data were analyzed using SAS 9.1.3.

## Results

Across all respondents, ENJOY and PROTECT had mean component scores of 4.1 and 4.0, respectively that correspond to "very important" on the original 5-point Likert scale (Table 4). PRODUCE, on the other hand, had a mean score of 2.1 that corresponds to "not very important." All three component scores spread the entire range of the rating scale (i.e., 1–5). On average, respondents reported that they owned 25.2 ha and were acquainted with 2 or 3 of their neighbors. Ownership size ranged from 4 to 688 ha and was skewed with most owning smaller parcels. In terms of neighbor acquaintanceships, 16.6% reported that they knew none, while 64.0% knew 1 to 3 neighbors.

### Motivations for Continued Landownership

The MANOVA model of motivations (i.e., ENJOY, PRODUCE, and PROTECT) for continued landownership found that all main effects and the one interaction tested (i.e., STATE, TIME, DISTANCE, and TIME * DISTANCE) were significant (Table 5). Subsequent pairwise comparisons of main effects found a mix of significance and non-significance. DISTANCE was significant for all three motivations: those who lived near their land indicated higher importance than did

**Table 4** Dependent variable descriptive statistics

| Variable | n | Mean | Standard deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| ENJOY | 879 | 4.1 | 0.83 | 1 | 5 |
| PRODUCE | 879 | 2.1 | 0.83 | 1 | 5 |
| PROTECT | 879 | 4.0 | 0.95 | 1 | 5 |
| HECTARES | 879 | 25.2 | 44.8 | 4 | 688 |
| NEIGHBORS | 689 | 2.3 | 1.9 | 0 | 15 |

**Table 5** Simultaneous multivariate analysis of variance (MANOVA) model for mean score differences for ENJOY, PRODUCE, and PROTECT by state, time, distance, and time * distance

| Factors | Wilks' $\lambda$ | F-value | *P*-value* |
|---|---|---|---|
| STATE | 0.980 | 5.97 | **0.0005** |
| TIME | 0.959 | 12.37 | **<0.0001** |
| DISTANCE | 0.937 | 19.58 | **<0.0001** |
| TIME * DISTANCE | 0.982 | 5.31 | **0.0013** |

MANOVA had 3 Numerator DF and 872 Denominator DF and used type III sums of squares (n = 879)

* Bold *P*-values are significant at $\alpha = 0.05$

those who lived away (Table 7). TIME was significant for ENJOY—recent arrivals reported higher importance than did long-time landowners—but was not for PROTECT and PRODUCE. There were differences between respondents in Massachusetts and Vermont for all three motivations. Vermont respondents reported higher importance for ENJOY and PROTECT, while Massachusetts respondents reported higher importance for PRODUCE.

Pairwise comparisons for the TIME * DISTANCE interaction effect yielded at least one significant difference between LSMs for each motivation. Long-time respondents who lived away from their land rated ENJOY less important than all other respondents (Table 7). For PRODUCE, importance was lowest for long-time respondents who lived away and statistically different from those who lived near (both recent and long-time). Those long-time respondents who lived near had the highest importance for PRODUCE and were different from those respondents who lived away (both recent and long-time). Recent respondents spanned these differences (Table 7). Long-time respondents who live away rated PROTECT as less important than did both near long-time and near recent landowners. Recent respondents who lived away spanned these two differences (Table 7).

### Ownership Size

The unbalanced ANOVA to explain differences in ownership size (HECTARES) was significant, but only one main effect was significant: TIME (Table 6). Long-time respondents' LSM was 29.5 ha, while more recent arrivals owned just 18.8 ha (Table 7). This would appear to reflect, at least in part, parcelization over time. Older landowners pass portions of their land to heirs and/or put portions of the land on the market.

### Neighbor Acquaintanceships

For neighbor acquaintanceships, the unbalanced ANOVA found that all main effects and the one interaction were significant (Table 6). DISTANCE was significant: near respondents knew 2.6 neighbors, while those living away knew 1.4 (Table 7).

**Table 6** Analysis of variance (ANOVA) models for mean score differences for hectares and neighbors by state, time, distance, and time * distance

| Factors | *df* | HECTARES (n = 879) | | NEIGHBORS (n = 689) | |
|---|---|---|---|---|---|
| | | F-value | *P*-value* | F-value | *P*-value* |
| STATE | 1 | 0.98 | 0.3223 | 5.09 | **0.0244** |
| TIME | 1 | 8.53 | **0.0036** | 8.04 | **0.0047** |
| DISTANCE | 1 | 2.05 | 0.1521 | 55.22 | **<0.0001** |
| TIME * DISTANCE | 1 | 0.15 | 0.7018 | 6.47 | **0.0112** |
| MODEL | 4 | 3.73 | **0.0051** | 26.39 | **<0.0001** |

Both models used type III sums of squares

* Bold *P*-values are significant at $\alpha = 0.05$

**Table 7** Least squared mean (LSM) comparisons of significant direct and interaction factor effects for ENJOY, PRODUCE, PROTECT for the MANOVA, and the individual ANOVAs for HECTARES and NEIGHBORS; LSMs with different subscripts are statistically different at $\alpha = 0.05$; Non-significant comparisons are presented for completeness only

| Factors | MANOVA DEPENDENTS | | | HECTARES | NEIGHBORS |
|---|---|---|---|---|---|
| | ENJOY | PRODUCE | PROTECT | | |
| STATE | | | | | |
| Massachusetts | $4.1^{a}$ | $2.1^{a}$ | $3.9^{a}$ | 25.8 | $1.8^{a}$ |
| Vermont | $4.2^{b}$ | $2.0^{b}$ | $4.1^{b}$ | 22.6 | $2.1^{b}$ |
| TIME | | | | | |
| Recent | $4.3^{a}$ | 2.1 | 4.0 | $18.8^{a}$ | $1.7^{a}$ |
| Long | $3.9^{b}$ | 2.0 | 3.9 | $29.5^{b}$ | $2.2^{b}$ |
| DISTANCE | | | | | |
| Near | $4.3^{a}$ | $2.2^{a}$ | $4.1^{a}$ | 26.9 | $2.6^{a}$ |
| Far | $3.9^{b}$ | $1.8^{b}$ | $3.8^{b}$ | 21.5 | $1.4^{b}$ |
| TIME * DISTANCE | | | | | |
| Recent * Far | $4.2^{a}$ | $2.0^{a,b}$ | $3.9^{a,b}$ | 22.2 | $1.4^{a}$ |
| Recent * Near | $4.4^{a}$ | $2.2^{a,c}$ | $4.2^{a}$ | 15.4 | $2.1^{b}$ |
| Long * Far | $3.6^{b}$ | $1.7^{b}$ | $3.8^{b}$ | 31.5 | $1.4^{a}$ |
| Long * Near | $4.2^{a}$ | $2.3^{c}$ | $4.0^{a}$ | 27.5 | $3.0^{c}$ |

Recent arrivals had fewer neighbor acquaintanceships than did long-time respondents (1.7 versus 2.2). By STATE, Vermont respondents had slightly more acquaintanceships than those in Massachusetts.

Simultaneous pairwise comparisons for the TIME * DISTANCE interaction effect found that nearby long-time respondents knew significantly more neighbors than did all other groupings (Table 7). Nearby recent arrivals were acquainted with the second most (although it was less than the overall mean), which was different from all other groups as well. Responding landowners living away, whether recent arrivals or long-time, were similar in the number of neighbors known.

## Links to Behavior

To understand the importance of our dependent variables to potential action, we inspected the correlations (by STATE) among these variables and possible land ownership decisions (i.e., selling timber, establishing a conservation easement, and selling land) that respondents may have considered in the prior 6 months (Table 8). Given that such decisions are likely considered infrequently, we expected relatively weak correlations, but believe that significance ($\alpha = 0.01$) and sign might be instructive. Selling land was negatively correlated with PROTECT and ENJOY, particularly for Vermont respondents. Selling land was also negatively correlated with neighbor acquaintanceships for respondents in Massachusetts. Not surprisingly, selling timber was positively associated with PRODUCE and the size of the landowner's property. We also found a significant positive correlation between

**Table 8** Correlation coefficients among respondents' willingness to consider different actions and key dependent variables considered in this study by state

| Action considered | Dependent variables considered in the this study | | | | |
|---|---|---|---|---|---|
| | PROTECT | ENJOY | PRODUCE | HECTARES | NEIGHBORS |
| *State = Massachusetts* | | | | | |
| Selling timber | 0.01 | −0.02 | 0.23** | 0.14** | 0.03 |
| Establishing a conservation easement | 0.16** | 0.03 | 0.03 | 0.07 | 0.09 |
| Selling land | −0.18** | −0.16** | −0.10 | 0.00 | −0.13* |
| *State = Vermont* | | | | | |
| Selling timber | 0.01 | 0.01 | 0.18** | 0.27** | 0.13* |
| Establishing a conservation easement | 0.18** | 0.07 | 0.02 | 0.15** | 0.04 |
| Selling land | −0.26** | −0.27** | −0.06 | 0.07 | −0.09 |

* Significant at $\alpha = 0.05$

** Correlation is significant at $\alpha = 0.01$

neighbor acquaintanceships and recent consideration of selling timber among Vermonters. Considering a conservation easement with positively associated with PROTECT for both Massachusetts and Vermont respondents, and with ownership size for Vermont respondents.

## Discussion

This analysis verifies some already observed trends in landowner motivations. Enjoyment and environmental protection are commonly cited as more important reasons for ownership than producing income from the land (e.g., Butler and Leatherberry 2004). It also begins to quantify how TIME and DISTANCE relate to landownership motivations and neighbor acquaintanceships, and how motivations relate to recent consideration of different behaviors that affect the disposition of forestland. As we discuss below, DISTANCE is the most influential explanatory variable, but it may be of limited practical value in designing interventions to alter landowner behavior. To effect change, TIME may offer a more viable pathways to outreach and technical assistance design. We also consider the implication of neighbor acquaintanceships, as this under-explored relationship may be a factor in shaping behavior in a landscape context.

Before diving into those topics, though, it is worth spending some time on our sample. We detected a distinct response bias. Respondents were more likely than non-respondents to have a management plan for their land and to expect income from its management. Even this biased respondent population, predisposed to management and harvesting, rated enjoyment and environmental protection as substantially more important than producing timber. This fits with the view of landowner behavior (Kittredge 2004) that suggests that land provides less consumptive, more passively

derived benefits, and that these benefits are more important than the periodic opportunity or need to sell timber. This finding likewise fits with recent ownership segmentation studies (Boon et al. 2004; Kendra and Hull 2005; Finley and Kittredge 2006) identifying a sizable segment of landowners primarily interested in non-consumptive benefits, but not actually being opposed to harvesting.

### Too Far Away

Returning to our specific research questions, we set out to explore how landowners' motivations differ by time, distance, and their interaction. Our results suggest that distance is the stronger influence: Those who lived near their land indicated higher importance for PRODUCE, ENJOY, and PROTECT than did those who lived away (Table 7). Weaker motivations among those living away have intriguing implications for the sizable portion of forestland in absentee ownership—32% in the region surrounding our study area (Butler and Leatherberry 2004). Our results suggest these absentee landowners have less intense motivations for landownership. As the contemplated sale of land is negatively correlated with two of the three motivations, disinterested absentee landowners who are more likely to consider land sale as opposed to management may challenge land management and protection efforts. This is intuitive (i.e., people living further away are less interested in their land), but our results begin to quantify the relative strength of this relationship and suggest that additional work is required to better understand how shifting motivations affect decisions about the disposition of land.

Notably, away respondents seem particularly disinterested in timber production (Table 7), implying a potential impact on available timber supply. Unlike parcelization that might strand timber on properties too small to economically manage (e.g., Kittredge et al. 1996), absenteeism may strand timber on properties owned by people too distant—both physically and motivationally—from their land. However, motivations and intentions are not always closely tied to behavior, so resource professionals need to better understand absenteeism and its relationship to timber harvesting and other behaviors. Our results imply, though, that efforts to reach landowners living away from their land face challenges not only in actually reaching them (either when on their property or through distance learning technology), but also require greater effort to overcome the motivational hurdle to land management and protection.

### Time Still Matters

DISTANCE was the more important statistical factor in our analysis, but there is very little that management and protection advocates can do about it. People generally live where they live for reasons unrelated to (and often more important than) the presence or absence of forests, such as employment, family, medical access, school quality, etc. As a result, TIME still matters. Recent arrivals, regardless of whether they lived near or away, were statistically similar in their motivations for ownership (Table 7). In addition, TIME provides a "targetable" audience, as records on land purchases are public and relatively easy to access in

many locations. Moreover, recent arrivals are highly motivated by enjoyment and may not have formulated strong attitudes and intentions about land management and protection. Although additional confirmatory research is needed, recent arrivals—whether nearby or from away—may be more open to appropriately structured messages related to the future disposition and use of their land.

That said, the landholdings of recent arrivals are smaller than those of long-time residents, and total area was positively correlated with considering both the sale of timber and conservation easements. A key task of future research is to better sort out size thresholds that might guide resource professionals in targeting outreach and technical assistance programs toward specific economic and ecological outcomes. Bigger is likely better, but that must be balanced with landowner motivations.

### Local Connections

Recent arrivals from away, though, pose a potential challenge to this strategy in that their connections to neighbors are limited (Table 7). We believe that neighbor (and other locally-based) acquaintanceships are important, since they can be key information sources when landowners are faced with a decision about the future of their land (e.g., Sisock 2008; Rickenbach et al. 2005; West et al. 1988). Especially for recent arrivals, neighbors may act as role models for management or conservation behavior either positively or negatively (i.e., neighbors implementing a degrading practice can either enforce the importance of not acting similarly or provide a definition of what is an acceptable practice). This potential "neighbor" influence may explain some of the behavioral correlations (Table 8), whereby there is a negative correlation between the sale of land and neighbor acquaintanceships in Massachusetts, and the positive one between neighbor acquaintanceships and the sale of timber in Vermont. If future work extends these findings, a key aspect of interventions may be to connect landowners (and others) locally. While perhaps easier for those living on their land, all recent arrivals may offer a "clean slate" to leverage and link their enjoyment to connections with the local community. One might, based on our findings, hypothesize that acquaintanceships cannot withstand the unraveling or deleterious effects of distance. However, our data are not longitudinal and, thus imply only that those who live away do not have as many neighbor acquaintanceships. Perhaps, such acquaintanceships can be established and maintained over time, but that is left to future study.

## Conclusions

Many forested landscapes throughout the industrialized world are dominated by hundreds of thousands of relatively small, private landholdings. This patchwork of parcels is anything but static, and shifts as landownership evolves, landowners pass away, and decisions are made about the future of land. In the USA, we know these decisions to be largely reactive in nature and not based on conscious planning or professional advice (e.g., Butler and Leatherberry 2004; Kittredge 2004). Elsewhere, land-use regulation and other social institutions (perhaps) support more

active decision-making (Kittredge 2005; Grayson 1993). Regardless of professional and/or institutional support, relationships among landowners also play a role in conservation decision-making and, hence, the future land use trajectory of an ecosystem (SFFI 2008; Sisock 2008; Rickenbach et al. 2005). In forested ecosystems, a number of biophysical effects or disturbances (e.g., nutrient deposition, wind storm intensity and frequency, herbivory, invasive exotic species) impose change, and influence the species composition, successional trajectories, and structure of forest stands and landscapes. In cases where thousands of landowners with varied motivations and socioeconomic circumstances influence the fate of their holdings, these social factors can likewise pose a significant influence on the future of the land. If landowners are acquainted with one another, the opportunity exists to share their interests regarding their land and its future. Such discussion can increase the possibility of cross-boundary cooperation that can be more compatible with ecosystem-level patterns and processes (e.g., habitat, watershed processes; Gass et al. in press; Schulte et al. 2008). Where landowners are less acquainted, discussion is less likely and the possibility of randomized, reactive and small-scale actions further fragmenting the landscape is higher.

In the broader sense, though, time is an important factor since landscapes continue to be developed and converted. Breunig (2003) estimates that Massachusetts loses 16 ha of unprotected open space per day to development. The USDA Forest Service has recently released its strategy for open space protection (USDA Forest Service 2007b), following its national analysis of land use change (USDA Forest Service 2007a). They predict housing density will increase significantly throughout the eastern USA by 2030. Some involved in land protection in Massachusetts estimate that there remains perhaps 20 years before most of the landscape is either developed or protected via easement, and some call for bold strategies for land protection (e.g., Foster et al. 2005). While distance is a powerful and influential variable at the scale of the individual landowner, time and ongoing development and conversion remain meaningful variables at the landscape scale that will shape both the productive and ecological context.

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