



## Personal networks and private forestry in Minnesota



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### ARTICLE INFO

#### Article history:

Received 26 December 2012

Received in revised form

22 October 2013

Accepted 5 November 2013

Available online 2 December 2013

#### Keywords:

Private forests

Social network analysis

Landowners

Extension

Education

Nonindustrial private forest

NIPF

### ABSTRACT

Personal networks affect the flow information and behavior through social groups. We investigated the role of personal relationships in the flow of information and adoption of sustainable forest management behavior by private forest landowners. Among the 1767 owners of 20 or more acres of Minnesota forest land surveyed, 90% have received forestry information from at least one source including 65% from a peer and 53% from a professional forester. Forestry information personal network size ranged from 0 to 14 with a mean of 2.92. Network diversity, expressed as the number of different types of information sources within the network, was relatively high relative to network size, suggesting that most landowners value diverse perspectives, despite reporting fairly small networks. Larger acreage owners, management plan holders, and frequent visitors to their forest land had significantly larger and more diverse networks. Network size and diversity were statistically unrelated to ownership tenure, landowner age, and resident/absentee status. Significantly more respondents named a peer or a professional as their most helpful source than other source categories. Satisfaction with forestry information networks was positively associated with network size and diversity, further suggesting that landowners prefer information from a variety of different sources. The results suggest that landowner education designed to foster peer learning and relationship building between landowners, foresters, loggers, and other groups may promote adoption of sustainable forest management practices.

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### 1. Introduction

Families and individuals own approximately 264 million acres of forest land in the United States, 35% of the total forest land area (Butler, 2008). These private lands provide public benefits such as clean water, wildlife habitat, scenic beauty, sequestration and storage of atmospheric carbon, and forest products to support rural economic activity. Decades of research and practice have sought policy interventions to promote private land conservation practices that maintain or enhance these public values (Skok and Gregersen, 1975; Alig et al., 1990; Kluender et al., 1999; Kilgore and Blinn, 2004). Many of these interventions are designed to promote sustainable forest management through technical assistance, landowner education, or financial incentives (Kilgore and Blinn, 2004). While these programs tend to be effective (Henly et al., 1988; Cabbage et al., 1996; Moulton and Esseks, 2001), only a small percentage of private forest landowners enroll in them. As an example, fewer than 4% of forest landowners nationwide have a written

management plan (Butler et al., 2012) despite years of promotion through federal and state programs. Reviews of financial incentive programs likewise found them to have limited influence due in part to a lack of landowner awareness of the programs' existence (Salmon et al., 2006; Kilgore et al., 2007; Petrzelka, 2012).

Continuing a trend described by Egan (1997) as a shift in focus "from timber to forests and people," recent studies have seen landowners as embedded in and influenced by a complex social and ecological system rather than motivated primarily by economic self-interest (Fischer et al., 2010). These studies have investigated intrinsic drivers of conservation management including personal values and identity (Bliss and Martin, 1988), gender (Lidestav and Ekstrom, 2000; Redmore and Tynon, 2011), and personal benefits derived from the land (Salmon et al., 2006). Being a diverse population, different landowners seek, trust, and adopt information differently based on the information's source (West et al., 1988; Baughman, 2002; Schraml, 2003; Kittredge, 2005; Hujala and Tikkanen, 2008; Knoop and Rickenbach, 2011; Ferranto et al., 2012; Kueper et al., 2013a). Surendra et al. (2009) found that rural landowners were more likely to have received information via personal communication from professional foresters, other landowners, or peers than urban landowners were. Ma et al. (2012a) found a positive relationship between receiving advice from a

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variety of sources and enrolling in a cost-share program. Relationships form the core of Everett Rogers' Diffusion of Innovations theory (Rogers, 2003), which is a cornerstone of landowner conservation education. Social learning through observation of neighbors' behavior and personal interaction with trusted others can lead to increased knowledge and technical skills, and ultimately adoption of conservation behavior (Rogers, 2003; Muro and Jeffrey, 2008; Kueper et al., 2013a).

Extension programs increasingly focus on relationships and building collaborative learning networks to further conservation goals (Jordan et al., 2003; Ma et al., 2012b; Kueper et al., 2013a; Sagor et al. in press). Some landowner education programs target a relatively small group of opinion leaders (Rogers, 2003) to serve as bridges between formal (e.g. expert) and informal (e.g. personal) networks (Isaac et al., 2007) and pass information actively or passively to their peers (Kueper et al., in press). This approach has proven effective at increasing adoption of new conservation behaviors (Muth and Hendee, 1980; Finley and Jacobson, 2001; Allred et al., 2011). New landowners in particular may favor conservation information delivered through peers and personal networks rather than from professionals (West et al., 1988; Jacobson, 2002; Brook et al., 2003; Kendra and Hull, 2005; Rickenbach et al., 2005; Gootee et al., 2010).

### 1.1. Social network analysis

Building relationships between a natural resource professional and a landowner figures prominently in landowner assistance and education programs (e.g. Finley and Jacobson, 2001; Reed, 2001). However, personal networks, including relationships between landowners and their peers as well as natural resource professionals, have received little direct attention in private forestry research. As a consequence, relatively little is known about the size or composition of private forest owners' personal networks or relationships between landowner networks and land management behaviors.

Social network analysis (SNA) may provide useful insights. SNA is both a set of theories and analytical tools focusing on relationships among social entities and on the patterns and implications of these relationships (Wasserman and Faust, 1994). Social networks include both nodes (e.g. individuals or organizations) and relationships, or connections, among them. Personal, or egocentric, networks are defined as a central actor (ego) and others (alters) sharing a defined type of relationship with that individual. For example, a landowner's forestry information network might include a public agency forester, a sibling who also owns forest land, the neighboring landowner, and members of a social group. Personal networks influence a variety of behaviors, both public and private (Granovetter, 1985; Burt, 1980; Kohler et al., 2001). This influence can occur via information flow through weak ties, which are infrequent acquaintances that provide technical or other information such as friends of friends (Granovetter, 1973; Friedkin, 1982) or through pressure exerted by strong ties like close friends or family members to conform to group norms (Marsden and Friedkin, 1993).

Most landowners lack the specialized knowledge, skills, and equipment to plan and implement their own forest management activities and thus depend on others for information and assistance. However, there is variation in landowner awareness of existing sources, preferred information formats, perceived need for assistance at any given time, and perceived alignment between their value orientation and those of local service providers (Davis and Fly, 2010; Gootee et al., 2010). This suggests that larger and more diverse information networks would increase landowners' ability to advance their conservation goals. Knot and Rickenbach (2011) found a positive relationship between personal network size and application of best management practices during timber harvest

operations. Rickenbach (2009) described personal networks within a small Wisconsin forest owner co-operative, finding that information shared by co-operative staff was often passed by members beyond the co-operative membership network. Baumgart-Getz et al. (2012) found that participation in agency and local networks predicts adoption of agricultural best management practices, suggesting an important public value of relationships between professional service providers and landowners. Korhonen et al. (2012) identified a variety of types of information networks used by Finnish forest landowners during recent timber sales, including differences between "independent timber traders" and "relationship builders." Kittredge et al. (2013) characterized the personal networks of a small sample of landowners who had recently either obtained a conservation easement or sold timber, finding that both peers and professionals were frequently viewed as influential sources of information. Allred et al. (2011) reported that landowners who met and received information from a trained New York Master Forest Owner were more likely to engage in a variety of behaviors consistent with sustainable forest management. Kueper et al. (2013a) found that the flow of information through personal relationships and access to both peer and expert perspectives were of particular value to participants in peer learning programs, motivating continued participation. At the community level, common SNA measures may indicate a community's capacity for adaptive management. For instance, higher network density (the number of existing relationships as a proportion of the total possible number of relationships) enables the flow of information more quickly across the network, delivering information when and where it is needed (Bodin et al. 2006). Network range, or diversity, is a meaningful measure in this context as well given landowners' preference for information from a variety of different perspectives (Kueper et al., 2013a).

### 1.2. Research questions

The problem of low landowner awareness and enrollment in education and assistance programs constrains adoption of sustainable forest management (Kilgore et al., 2007). Relationships between information networks and land management behavior are complex and remain poorly understood. Greater understanding of these relationships could inform the design of new policy strategies and educational interventions to encourage sustainable private forest management. In this context, we investigated three primary research questions: what are the attributes of Minnesota forest landowners' forestry information networks; how do those attributes vary in relation to ownership size, tenure, land management activities, residence distance from forest land, and other landowner characteristics; and how does satisfaction with the quality of information obtained vary with network attributes?

## 2. Methods

A stratified random sample of private owners of 20 or more acres (about 8 ha) in property tax classifications including forested land was drawn from tax records in heavily forested northern Minnesota (Fig. 1). The 20-acre minimum ownership size matched a common requirement of regional landowner assistance programs. After consolidating parcels into ownerships based on address and family name, we stratified the sample by ownership size to ensure adequate representation of a range of ownership sizes. Public, industrial and corporate forest landowners were excluded from the sample.

A 19-item questionnaire was administered by mail using a 5-wave process consistent with Dillman's Tailored Design Method (Dillman et al., 2009). Instructions requested completion of the questionnaire by the individual most involved in forest

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