Dissertationes Forestales 169

Forest owners' social networks – possibilities to enhance knowledge exchange

Katri Hamunen
School of Forest Sciences
Faculty of Science and Forestry
University of Eastern Finland

Academic dissertation

To be presented, with the permission of the Faculty of Science and Forestry of the University of Eastern Finland, for public examination in the auditorium BOR100 of the University of Eastern Finland, Yliopistokatu 7, Joensuu on 5th December 2013, at 12 o'clock noon.

Title of dissertation: Forest owners' social networks – possibilities to enhance knowledge exchange

Author: Katri Hamunen

Dissertationes Forestales 169

http://dx.doi.org/10.14214/df.169

Thesis supervisors:
Dr. Mikko Kurttila
Finnish Forest Research Institute, Joensuu, Finland
Professor Timo Pukkala
School of Forest Sciences, University of Eastern Finland, Joensuu, Finland

Pre-examiners:
Docent Pekka Ripatti
Energy Market Authority, Helsinki, Finland
Professor David B. Kittredge
Environmental Conservation, University of Massachusetts, Amherst, USA

Opponent:
Professor Mark Rickenbach
Department of Forest & Wildlife Ecology, University of Wisconsin-Madison, Madison, USA

Cover photo: Harri Mäenpää, Studio Korento

ISSN 2323-9220 (print)
ISBN 978-951-651-428-7 (paperback)

ISSN 1795-7389 (online)
ISBN 978-951-651-427-0 (pdf)

2013

Publishers:
The Finnish Society of Forest Science
Finnish Forest Research Institute
Faculty of Agriculture and Forestry of the University of Helsinki
School of Forest Sciences of the University of Eastern Finland

Editorial Office:
The Finnish Society of Forest Science
P.O. Box 18, FI-01301 Vantaa, Finland
http://www.metla.fi/dissertationes

Hamunen, K. 2013. Forest owners' social networks – possibilities to enhance knowledge exchange. Dissertationes Forestales 169. 48p. Available at:
http://dx.doi.org/10.14214/df.169

ABSTRACT

Forest owners' decision making is influenced by the people around them. In this thesis, social network approach was used to examine owners' relationships with different individuals and organisations. The motivation of the thesis was to detect effective information channels that reach owners and the network structures that support owners' decision-making.

Social network data from Finnish, small-scale forest owners were collected with a mail questionnaire and by phone interviews in two decision-making situations, timber trade (n=753) and voluntary biodiversity protection (n=44). For examining owners' peer networks, data were collected via forest owners' and forest professionals' focus group interviews (n=43) and by interviewing and observing a study circle (n=7). Characteristics of egocentric networks were calculated with quantitative methods of social network analysis. Protection processes and owners' mutual interactions were analysed with qualitative theory driven content analysis.

Results indicate that several owners have one trusted professional with whom they deal both in timber trade and in voluntary protection. When owners have large holdings or significant decisions to make, such as permanent protection, their networks are large and diverse. To keep owners actively making forest-related decisions, it is important to transfer functioning channels between the professional and the owner to the next generation of owners. A forest management plan is a way to promote activities other than silviculture, such as biodiversity protection.

Owners' peer networks particularly exist among families and in the countryside between neighbours. In urban areas, owners meet mainly in expert-led extension events, where they have only a little space for mutual communication. One of the few owner-led practices is forest owner clubs. To strengthen forest owners' identities, owner-driven and sufficiently homogenous peer groups that focus on diverse and interesting topics need to be created. Moreover, it is important to support the delivery of forest-related knowledge among families and via mentor owners.

Keywords: decision-making situations, homogeneity, peer learning, non-industrial private forest owners, social network analysis, social position

Tiivistelmä: Metsänomistajien sosiaaliset verkostot – mahdollisuus tiedonkulun vahvistamiseen

Metsänomistajan ympärillä olevat henkilöt vaikuttavat omistajan päätöksentekoon. Tässä tutkimuksessa tarkasteltiin metsänomistajien yhteyksiä eri henkilöihin ja organisaatioihin sosiaalisen verkostoanalyysin avulla. Pyrkimyksenä oli määritellä sekä tehokkaita tiedonsiirron kanavia omistajien tavoittamiseen että näiden omaa päätöksentekoa tukevia verkostorakenteita.

Tietoa suomalaisten yksityismetsänomistajien sosiaalisista verkostoista kerättiin postikyselyllä ja puhelinhaastatteluilla kahdessa eri päätöksentekotilanteessa, puukaupassa (n=753) ja vapaaehtoisessa metsien monimuotoisuuden turvaamisessa (n=44). Tutkimuksessa määritettiin vertaisoppimisen käsite metsänomistajien keskuudessa ja tarkasteltiin vertaisverkostojen olemassaoloa ja kehittämismahdollisuuksia. Vertaisoppimisen aineisto kerättiin metsänomistajien ja metsäammattilaisten fokusryhmähaastatteluissa (n=43) sekä havainnoimalla ja haastattelemalla omistajien oppimispiiriä (n=7). Sosiaalisen verkostoanalyysin kvantitatiivisilla menetelmillä laskettiin omistajien egosentristen verkostojen tunnuksia. Suojeluprosessia ja omistajien keskinäistä vuorovaikutusta tarkasteltiin laadullisilla teorialähtöisillä analyyseillä.

Tulosten mukaan monilla omistajilla on yksi luottoammattilainen, kun he tekevät puukauppaa tai vapaaehtoista suojelusopimusta. Omistajan sosiaalinen verkosto on tyypillisesti laajempi, jos hän omistaa paljon metsää. Verkosto on laajempi myös silloin, kun metsänomistaja tekee merkittävän päätöksen kuten pysyvän suojelusopimuksen. Omistajasukupolven vaihtuessa on tärkeää pyrkiä säilyttämään olemassa olevat suhteet aiemmin tilan hoitoon osallistuneisiin ammattilaisiin, jotta metsiä koskeva päätöksenteko on aktiivista. Monimuotoisuuden suojeluprosessit osoittivat, että metsäsuunnitelma on keino edistää myös muita kuin puuntuotantoon tähtääviä toimenpiteitä.

Omistajien keskinäisiä vertaisverkostoja löytyy etenkin perheistä ja maaseudulta naapureiden keskuudesta. Kaupungeissa omistajat tapaavat toisiaan pääasiassa asiantuntijoiden järjestämissä tapahtumissa. Näissä tilaisuuksissa on vain vähän tilaa omistajien keskinäiselle kommunikaatiolle. Metsänomistajakerhot ovat harvoja omistajien itsensä ylläpitämiä käytäntöjä. Jotta omistajien omistajaidentiteetti vahvistuu, olisi tarpeen kehittää omistajien itsensä ylläpitämiä, tarpeeksi homogeenisia vertaisryhmiä. Vertaisryhmien aiheiden tulee keskittyä erilaisiin omistajia kiinnostaviin asioihin. On tärkeää tukea metsään liittyvän tiedon siirtymistä myös perheiden sisällä ja mentor-omistajien kautta.

Avainsanat: homogeenisuus, päätöksentekotilanne, sosiaalinen asema, sosiaalinen verkostoanalyysi, vertaisoppiminen, yksityismetsänomistajat

ACKNOWLEDGEMENTS

Writing this PhD thesis has been a huge learning experience. It has opened a door to the multi-disciplinary scientific world. Besides my original interest in forestry, studying forest owners has aroused my interest in the disciplines of sociology and even psychology.

First, I would like to thank the "fathers" of the idea for the thesis, my supervisor Dr. Mikko Kurttila and Dr. Teppo Hujala, a member of my steering group. Warm thanks to both Mikko and Teppo for their significant participation in the whole process. Further, I acknowledge my debt to my supervisor, Professor Timo Pukkala from the University of Eastern Finland. I also thank Dr. Jukka Tikkanen and Professor Heimo Karppinen for their participation in the steering group. I want to express my gratitude to the co-authors Juha Hiedanpää, Outi Virkkula, Lotten Westberg, Nadarajah Sriskandarajah, Marie Appelstrand and Lelde Vilkriste.

I am grateful to the Finnish Forest Research Institute METLA for the use of study facilities. Moreover, I thank the Graduate School in Forest Sciences for financing the thesis, with warm thanks to the Niemi Foundation for additional financial support.

I would like to express my gratitude to Professor David Kittredge and Dr. Pekka Ripatti for pre-examining the thesis. I thank Don Welsh for assisting me in translations. Special thanks also to Harri Mäenpää (Studio Korento), Hilkka Sissonen, Paavo Ryhänen ja Janne Korhonen for the cover of this book.

Thanks to Sanna for being an example in proceeding towards a doctoral dissertation. Besides Sanna, I also thank those who have brought joy to my leisure time: Juhani and Mirja for lunch-time company, and Karsu members, for sports company.

My initial interest in studying forestry derives from my home farm and village. I'm grateful to my parents Risto and Iiris for showing me a path to the world in which forest in all forms plays a significant role. Thanks to my dear sisters Inkeri, Ritva and Rauni for "girl power". And Heikki, my husband, your support and love during these years has been invaluable, thank you.

Joensuu, November 2013

Katri Hamunen

LIST OF ORIGINAL ARTICLES

This thesis consists of a summary and the following studies, referred to in the text by their Roman numerals I-IV:

I Korhonen K., Hujala T. & Kurttila M. 2012. Reaching forest owners through their social networks in timber sales. *Scandinavian Journal of Forest Research* 27: 88–99.
doi: 10.1080/02827581.2011.631935

II Korhonen K., Hujala T. & Kurttila M. 2013. Diffusion of voluntary protection among family forest owners: Decision process and success factors. *Forest Policy and Economics* 26: 82–90.
doi: 10.1016/j.forpol.2012.08.010

III Hamunen K., Appelstrand M., Hujala T., Kurttila M., Sriskandarajah N., Vilkriste L., Westberg L. & Tikkanen J. 2013. Defining peer-to-peer learning – from an old "art of practice" to a new mode of forest owner extension? Manuscript.

IV Hamunen K., Hiedanpää J., Virkkula O., Hujala T. & Kurttila M. 2013. 'Communities of practice' among forest owners – diversifying extension? Manuscript.

Articles I and II are reproduced with the kind permission of the publishers, while Studies III and IV are the author versions of the submitted manuscripts.

Authors' contributions

Katri Hamunen, née Korhonen, is a corresponding author in all four papers and fully responsible for the data analysis and writing of this thesis. She was responsible for collecting the data in Studies I and II and she participated in data collection in Studies III and IV. Mikko Kurttila and Teppo Hujala participated in the planning, data collection and writing of all four studies (I-IV). Jukka Tikkanen participated in the data collection and writing of Study III. Marie Appelstrand, Lotten Westberg and Nadarajah Sriskandarajah collected the study circle data in Sweden for Study III, pre-analysed the data and gave comments for the manuscript. Moreover, Lelde Vilkriste gave comments for manuscript III. Juha Hiedanpää contributed in the planning and writing of Study IV, and Outi Virkkula participated in collecting the data and writing Study IV.

TABLE OF CONTENTS

INTRODUCTION

Forest owners and their social environments are changing

Individuals seldom act independently, but are instead influenced by other people around such as kin, friends and co-workers, who all have direct or indirect effects on their opinions and actions (Fisher 1982). Social network describes these relationships with different individuals or organisations (Wasserman and Faust 1994). Even though it is an individual's own decision which company they wish to pursue and which to ignore, the pool of people around them is largely constrained by the daily environment that essentially defines whether relationships can be created and maintained (Fisher 1982). In Finland, there are 350,000 private forest holdings, each one of which is over two hectares, and nearly twice as many private non-industrial family forest owners (later referred to as forest owners) (Leppänen and Sevola 2013). This voluminous group of forest owners plays a significant role in the use of Finland's forests, possessing between them 60% of the productive forest land (Karppinen and Hänninen 2006) and with an annual cutting removal share of approximately 80% (Finnish Forest Research Institute 2011). Forest owners can be seen as individuals who receive support, information and advice from people and stakeholder groups around them – from their social network (Knoot and Rickenbach 2011). The available contacts, as well as the amount and style of communication, affects forest owners' decision making. Studying the structure of owners' social networks can indicate, for example, successful channels for policy makers to implement new forest-related policies. Moreover, research on social networks can reveal additional people whose opinion owners take into account when making forest-related decisions, or whether owners feel that they are informed enough to make decisions. Therefore, owners' social networks are worth exploring.

The structures of social networks are not constant, and changes in society have an effect on them. During the past decades, especially in Europe and in the northern U.S., forest ownership structure has diversified and owners' values have changed (Butler and Leatherberry 2004; Wiersum et al. 2005; Butler 2008; Butler and Ma 2011). In Finland, the average age of owners has been rapidly increasing; during the years 1990-1999 the average age rose from 54 to 60 (Hänninen et al. 2011). In the past, most of the owners were farmers living on their holdings, whereas nowadays, only 16% of forest owners are farmers and the largest socioeconomic group is pensioners (45%) (Hänninen et al. 2011). Owners tend to have their careers outside the forest and farming sectors and therefore their everyday living may not be economically dependent on cutting incomes. Most of the new owners are already near to retirement when they inherit their forest holding, and at this stage of their lives extra income from timber trade is not necessarily needed (Kuuluvainen et al. 2011). These trends of urbanization and ageing are expected to bring significant challenges to the forest industry's timber procurement (e.g. Karppinen and Hänninen 2006).

According to previous network research, urbanization has an effect on social networks (Fisher 1982). When moving to cities, people's personal networks become more versatile

consisting of several separate networks dealing with different topics (Wellman 1979). Living in rural and agricultural communities enables frequent exchange of forest information between neighbouring owners who make up homogenous networks. Owners living in cities may not get support or information from other forest owners that easily. On the other hand, connections through the Internet enable even worldwide networks (e.g Wellman et al. 1996).

Besides the changes in ownership structure and living environment, new uses of forests are affecting forest owners' social environment. Ecosystem services are widely recognised and they are increasingly producing monetary incomes for forest owners, whilst simultaneously setting societal requirements regarding the use of renewable natural resources from private lands (Elands and Wiersum 2001; Millennium Ecosystem Assessment 2005). For example, owners can get compensation from biodiversity protection (e.g., Kauneckis and York 2009; Ma et al. 2012). In addition, there is increasing demand for woody biomass to produce bioenergy (Shivan and Mehmood 2010). Moreover, some experiments to compensate nature-based recreational goods and services exist (Vedel 2010). Due to new uses of forests it can be supposed that owners need to have more diverse contacts to help them make their forest-related decisions.

Forest owners' extension – need for a change?

The aim of forest owners' extension is to engage and encourage owners to make informed decisions regarding their forests and act accordingly (Sim and Hilmi 1987; Ma et al. 2012). Extension considers delivery of information to forest owners through different channels and instruments. The great challenge of forest extension provided by forest professionals has always been to engage enough owners in the sphere of guidance (Salmon et al. 2006) which would enable owners to make informed decisions. At the moment, this task is even more demanding due to new uses of forests, diversified ownership structure and varied objectives of owners (Wiersum et al. 2005). Forest owners have even been blamed for being passive regarding cuttings and silvicultural actions in the forests.

When considering the passivity of owners, it is important to distinguish "intentional" and "unintentional" passivity (Ruseva 2013). Intentionally passive owners make informed and conscious decisions not to act, for example not to harvest. In contrast, unintentionally passive owners are either indifferent or unable to make decisions regarding their forests. So far, the forest owners' extension model has been top-down knowledge-transfer, similar for all owners (Steyaert et al. 2007; Ma et al. 2012). Especially in Finland, professional extension has strong roots and owners are well guided by the professionals. The state-funded Forestry Centre (FC) and the forest owners' own Forest Management Associations (FMAs) have the main responsibility for the extension. A total of 85% of forest owners have been in contact with a forest professional during the past five years and 45% of forest owners have a forest management plan (Hänninen et al. 2011). In contrast, in the US, for example, only 15% of owners have sought management advice and just 4% of owners have a management plan (Butler 2008). Even though these percentages in Finland are high, the variety and urbanization of forest owners bring challenges for the extension and require a consideration of new ways to reach owners.

New models of forest owners' extension and information services could support the present extension practices and bring more owners in the sphere of guidance (Johnson et al. 2006; Follo 2011; Ma et al. 2012; Kueper et al. 2013). When adopting and evaluating forest-related information, owners' willingness to adopt new information is highly dependent on their perceptions of the person delivering the information (Gootee et al. 2010). Therefore, forest owner extension should emphasise the mutual respect and non-hierarchical structures of information exchange. The importance of peers in information delivery has been highlighted already by West et al. (1988), and, recent studies from the US suggest that peer forest owners have a distinct and meaningful role in owners' decision making (Knoot and Rickenbach 2011; Ma et al. 2011; Kueper et al. 2013; Sagor 2013). Peer learning (Topping 2005; Ma et al. 2011) or peer exchange (Kueper et al. 2013) attracts inexperienced owners and increases knowledge of reasonable sources of forest information. In peer learning, it is possible to learn about the variety of approaches and to "adopt and adapt" them into each individual situation (Kueper et al. 2013). Only observing the actions of other owners might have a significant influence on decision making (Schubert and Mayer 2012), and the research related to peer learning networks suggests that owners are highly willing to share the information that they have received from extension activities to their neighbours, friends and other landowners (Ma et al. 2011). Therefore, peer learning may be an effective way to reach unintentionally passive and indifferent owners, who would not otherwise get engaged to make decisions. In Finland, recent studies have shown that most forest owners have diverse objectives and they are willing to learn, which implies that there would be demand for new forms of education (Hujala et al. 2009; Hujala et al. 2013).

In social science, there are long traditions to analyse social relationships and the effects of networks on individual behaviour (e.g. see synthesis by Knipscheer and Antonucci (1990)). Social network analysis (SNA) is an approach that can be used for examining the relationships among individuals (Wasserman and Faust 1994), and it has recently been utilised in nature resource and environmental management researches (Prell et al. 2011). The research on private forest owners has mainly focused on "cases by variables" data. For example, information about forest owners' characteristics, as well as their objectives and values, has been studied (Karppinen 1998; Ní Dhubháin et al. 2007; Butler and Ma 2011; Hänninen et al. 2011) but so far, forest owners' relational data and social networks have remained rather unexplored, except for a few studies conducted in the US (Rickenbach 2009; Knoot & Rickenbach 2011; Ruseva 2013). In addition, until now the research on Finnish forest owners' extension has focused on the interaction and communication between forest owners and forest professionals (Hujala and Tikkanen 2008; Hokajärvi et al. 2009), and there is no information about owners' network structures or mutual communication, even though the idea of studying forest owners' interaction and communication dates back several years (Hujala and Tikkanen 2008).

Objectives of the thesis

The focus of this thesis is on Finnish forest owners who make formally independent decisions regarding their own forest property. In addition to prevailing norms and legislation, their decisions may, however, be largely influenced by the "invisible" and

informal social network. The thesis aims to reveal the structures of this social network in owners' decision making situations. Moreover, the focus is on forest owners' mutual communication, peer networks, and the possibility of complementing traditional guidance with peer advice. On one hand, social networks can be considered as information flow channels to reach and engage forest owners (Knoot and Rickenbach 2011), the results of which can serve forest policy makers, private companies and other actors who want to influence forest owners' decision making. On the other hand, the structure of "social support system" is believed to influence individuals' success and satisfaction (Fisher 1982). Networks can be viewed from the forest owners' perspective when the aim is to define suitable structures of the network for various forest owners to make informed decisions regarding their forests.

The two main objectives (1-2) of this study are divided into four more specific study questions (a-d). The objectives of the study are as follows:

1) Define forest owners' social network structures and the roles of the contacts in their decision making situations.
    a) What are the most typical social networks in the timber trade? (I)
    b) What kind of social networks do owners have in voluntary biodiversity protection and how has the information of the new programme been disseminated to forest owners? (II)
2) Identify possibilities and difficulties when promoting peer learning among forest owners.
    c) What is peer learning among forest owners? (III)
    d) Do forest owners' peer networks exist and how to promote them? (IV)

These aims are responded to in four separate articles (I-IV).

THEORETICAL POSITIONING OF THE STUDY

Basics of social network analysis

In this study, SNA is a part of the theoretical background, and, more broadly, a way to approach the issue of interest: the social reality of forest owners. SNA has its mathematical basis in graph theory that is applied when studying the quantitative properties of networks (Wasserman and Faust 1994). The network consists of lines that connect separate entities. Network data can be presented either by adjacency matrices, such as sociomatrices, or visually by graphs, such as sociograms (Moreno 1934; Wasserman and Faust 1994). In SNA, entities represent individuals or organisations and the lines describe their relationships with each other (Figure 1). Entities are called 'actors' and the lines between them are 'ties' (Wasserman and Faust 1994). Ties describe existing relationships, such as friendship, authority, or flows of different resources, such as information (Haythornthwaite 1996; Borgatti et al. 2009). Ties can be directed or undirected. Direction of a contact

describes, for example, activity in creating or maintaining the tie. Ties can have different strengths that describe, for example, contact occasions between two actors.

In social sciences, SNA is used to search explanations for social phenomena, both at the micro (individual) and macro level (whole network perspective) (Borgatti et al. 2009). At the micro level, the focus is on individuals, or 'egos'. An egocentric network consists of an individual's relationships with other people, or 'alters' (Figure 2). The macro level describes all the relationships of the whole network (Figure 1). A traditional example of a whole network includes pupils' friendship ties in an elementary school class (Moreno 1934). When analysing the network structure, different measures, describing the characteristics of actors and characteristics of the whole network, are calculated (Wasserman and Faust 1994). In an egocentric network the measures that can be calculated are limited (Hanneman 2000; Prell 2011 p.33). One of the most usual SNA measures is a degree that describes the amount of ties that one actor has with other individuals of the network. Moreover, SNA data can be merged with cases by variables data when network measures can be used as dependent or independent variables in quantitative statistical analysis, such as regression analysis.

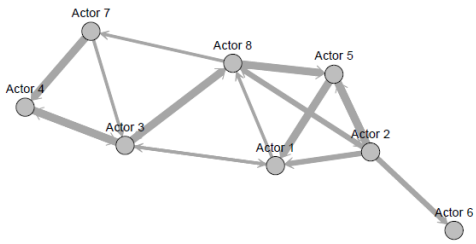

Figure 1. An example of a sociogram that describes all the relationships between actors. The strength of a relationship is indicated by the thickness of the tie and the direction of relationship with arrows.

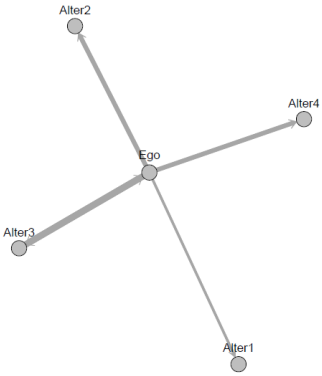

Figure 2. Egocentered network includes only the ego's relationships with its alters.

In this thesis, the focus is on forest owners' egocentric networks. The amount of ties (degree) that owners (egos) have are calculated in two decision-making situations (I & II). The interest is especially on intangible resources that the network can provide, such as information, social support and influence. Moreover, cases by variables data and statistical analysis are used to define the differences in owners' background characteristics within different network structures (I).

Reasons for and consequences of the network structure

To broaden the examination of forest owners' social networks, theories and theoretical concepts from the social sciences, social psychology, and educational sciences are used in this thesis (Borgatti et al. 2009). Theoretical concepts are divided into those that affect social network structure and those that describe network structure. The structure of networks affects network performance (Reagans and McEvily 2003) and therefore the concepts that are affected by the network structure are also listed. The list of theoretical concepts is not comprehensive, but it describes the ones that are used in Studies I-IV and applied in this summary (Figure 3).

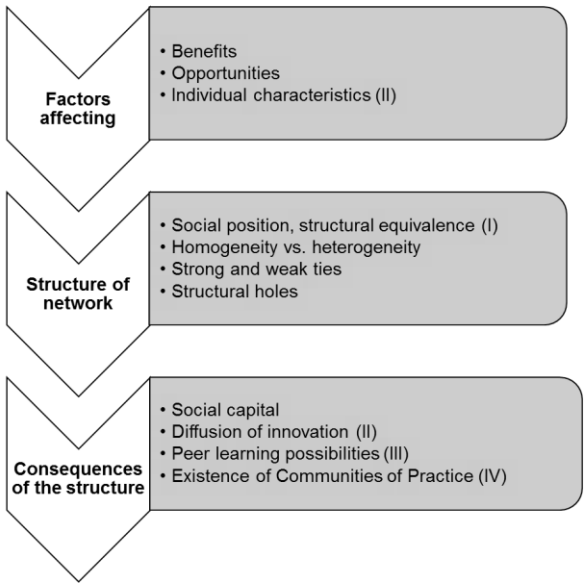

Figure 3. Theoretical concepts can be divided into those that affect social network structure, those that describe network structure, and those that are affected by the network structure (consequences). The concepts that are used in individual studies are indicated with respective roman numerals, the other listed concepts are applied in this summary.

From the *benefit*–based point of view, social relationships can be explained by utility maximization and discomfort minimization principles (Borgatti et al. 2009) (Figure 3). The consistence of networks is a balance between the utility of the network and discomfort of relationships. The more relationships, the more channels an individual has to gather information and, therefore, a better position in the network. At the same time, there is the task of creating and maintaining the relationships, which requires time, energy and even money (Fisher 1982; Borgatti et al. 2009). In other words, the profits that the relationships produce for an individual depend on the benefits gained and costs required (Johanson and Uusikylä 1998).

The structure of a social network can also be explained by the *opportunities* to create relationships (Borgatti et al. 2009) (Figure 3). One of the basic theoretical cognitions is that people build relationships with those similar to themselves. In their daily environment, at work, at home or at free time, people are surrounded by similar people and creating relationships with them is easier than with dissimilar people (Granowetter 1973; Fisher 1982). Therefore, the formed networks or even subcultures include people who are *homogenous* with respect to socio-demographic, behavioural, or intrapersonal characteristics (McPherson et al. 2001). In homogenous networks, transfer of information and knowledge is easy due to common background and the "same language" (McPherson et al. 2001; Reagans and McEvily 2003). In more *heterogeneous* networks the lack of similar characteristics and a common knowledge base make it difficult to create and maintain relationships. To some extent, individuals' network structures can be explained also by the *characteristics of an individual*, such as shyness (Fisher 1982) (Figure 3). The theory of *innovation diffusion* suggests that people who are innovative, venturesome, and able to cope with uncertainty have more relationships, especially with those "out of the local circle of peer networks" (Rogers 2003 p. 282).

Social position or social role describes the set of relationships or patterns of relationships that an individual possesses (Hanneman 2000) (Figure 3). For example, the term 'husband' describes a social position that has relationships with other social categories such as wife and child. Two actors have the same social position if they are connected with the same actors (Burt 1976). People who have the same social position are *structurally equivalent* and they can be assumed to face similar social environments (Lorrain and White 1971; Borgatti et al. 2009). Usually, the structural equivalence is defined when the whole network data is possessed but it can be used also in egocentric networks (Hanneman 2000). Social position has an influence on an individual's *social capital* (Coleman 1988; Burt 2005), which refers to the benefits that an individual receives through interpersonal ties and especially via co-operation with other people (Tindall and Wellman 2001, p. 278; Jiang and Carroll 2009). For example, besides actual knowledge, people are aware of who knows whom and they know from whom to ask advice (Burt 1992). There are several different definitions for social capital (Pettenella & Maso 2011), which was originally seen as the property of a whole network (social system approach) (Coleman 1988; Jiang and Carroll 2009), and lately also as the property of an individual as an instrumental outcome of the network (Harshaw and Tindall 2005).

In this thesis, structural equivalence is used to describe how similarly different egos, i.e. forest owners, are positioned in their own networks (I). Social capital is examined from the egocentric perspective, as the property of a forest owner (I).

It is important to note that relationships are not similar. According to "the strength of weak ties", relationships between actors can be divided into *strong* and *weak* ones (Granowetter 1973). Tie strength describes the prevalence of it: strong ties are frequent,

dense, everyday relationships. Respectively, two individuals having only a weak tie with each other communicate more seldom. Strong ties include emotional attachment, desire to reciprocate, and trust (Granowetter 1973; Coleman 1990; Reagans and McEvily 2003). Strong, bonding ties exist especially in homogenous networks, and transfer of tacit and complex knowledge requires a strong relationship (Reagans and McEvily, 2003). On the other hand, homophily of networks limits people's social worlds (McPherson et al. 2001). In homogenous networks, there is a risk that individuals share only the same information with each other and they do not have access to different knowledge pools (Reagans and McEvily 2003). There is also the possibility of the existence of *structural holes*, which are empty spaces in social structures and refer to situations where information is not delivered between separate homogenous networks (Burt 1992; Burt 2005). Weak ties, such as bridging ties, are important links that enable the connections between homogenous, separate networks (Granowetter 1973). Therefore, despite the difficulty of communicating with "strangers", weak ties are worth striving for. Individuals that bridge separate social networks are called brokers, and they hold powerful positions since they can gather and deliver information from several networks and either merge or separate networks (Bodin et al. 2006). In an optimal network, there is cohesion and homogeneity to bring support and trust, in other words "bonding social capital" (Gittell and Vidal 1998), but also range and heterogeneity to facilitate contact with the "outside" world, or "bridging social capital" (Reagans and McEvily 2003; Newig et al. 2010).

The more diverse network an individual has, the easier it is to get new information and adopt an *innovation* and to be an *early adopter* (Rogers 2003). On the other hand, some individuals, named *late adopters*, need support through strong, trusted relationships, in order to dare to adopt new practices. Depending on the time required to adopt innovations, people can be divided into different adopter categories mentioned above (Rogers 2003). Moreover, when considering innovation diffusion, *change agents* and *opinion leaders* occupy important positions within networks (Rogers 2003). Change agents facilitate the flow of information from one network to another (cf. broker), typically from servant network to customer network (Rogers 2003). Similar characteristics between change agent and customers ease the communication. Opinion leaders are at the centre of the network and they have the highest amount of contacts (high degree) with locals, therefore being well placed to influence on others' attitudes. Opinion leaders are appreciated and perceived even as role models (Rogers 2003; Crona and Bodin 2010). Opinion leadership is not due to formal status, but it is earned because of social accessibility and technical competence.

In Study II, the most important channels to deliver innovation for different forest owners are explored. For this owners are divided into different adopter categories based on their relationships. Moreover, possible opinion leaders and change agents are recognised. In the discussion of the thesis the existence of strong and weak ties is pondered.

The members of a relatively homogenous group can be called peers (Eisen 2001; McPherson et al. 2001), since peers are people that possess similar identities. Identity can be formed from a variety of reasons, including similar social grouping, experiences, or background characteristics. New ideas are learned best when they are accustomed with existing knowledge. The idea of peer learning is that contemporaries share the same knowledge base and therefore it is easy to share and learn information with each other (Reagans and McEvily 2003; Shiner 1999). The message can even lead to a change in attitudes and behaviour if it comes from a trusted peer. In peer learning, all the members of the group can learn from each other. The roles of teacher and student are changing and a

professional teacher is not needed (Boud et al. 2001; Topping 2005). Peer learning is cost effective and individuals are motivated to learn in this kind of setting.

Forest ownership is believed to constitute "peerness" and peer learning is seen as a way to complement forest owners' extension. The peer learning-concept among forest owners is defined according to previous peer learning theories (III). In this thesis, the focus of peer learning is on information transmission, and it is considered from an individual's learning perspective rather than as collective or social learning (Newig et al. 2010)

According to social identity theory, individuals identify themselves according to different social groups such as organisations or informal communities (Jiang and Carroll 2009). The composition of social networks also affects our identities, which are formed especially through strong ties in homogenous networks (Harshaw and Tindall 2005). A person's total identity is shaped and reconciled from multiple group affiliations (Harshaw and Tindall 2005), so the more diverse social networks an individual has, the more varied also their personal identity. These groups can be called Communities of Practice (CoP) (Lave and Wenger 1991; Wenger 1998; Wenger et al. 2002), particularly those in which informal collaborative learning takes place (Wenger et al. 2002; Hara 2009; Wenger 2009). CoP consist of a group of people sharing a common interest or passion about the same issue (Wenger et al. 2002), and instead of learning only overt knowledge, the members of the community learn tacit knowledge from each other; they learn how to do or how to be (Duguid 2008). CoP is described by three elements: community, domain, and practice (Wenger et al. 2002).

Forest owners' networks with other forest owners are explored with the aid of CoP theory, to define ways to enhance these communities and learning from other owners (IV). In this thesis, peer learning is seen as a process by which knowledge and skills are exchanged, whereas CoP is a theoretical framework that aids examining owners' communities.

DATA

Setting the scope

In this thesis, the structure of forest owners' social networks is gleaned from the forest owners themselves. When defining the possibilities that can complement traditional guidance by peer networks, the opinions of forest professionals are also sought. Both quantitative and qualitative data were collected. The aim of the quantitative data collection via large mail questionnaire (I) was to conduct random sampling to be able to understand individual attribute data and to generalise the findings (Bernard 2006). Qualitative phone interviews (II) and focus group interviews (III & IV) can be seen as purposive sampling rather than random sampling. Purposive sampling is used to understand cultural data or shared cultural experiences without representativeness (Zyzanski et al. 1992, p.234;

Bernard 2006). For example, in phone interviews (II), participants were selected because of their experiences with the protection process.

When collecting social network data, the problems of delineating the social networks (boundary issues) and in finding a proper way to collect the data are typical (Wasserman and Faust 1994; Bodin and Prell 2011). In this thesis, the aim was to examine individual forest owners' forest-related social networks. The data collection was restricted to certain decision making situations that the forest owners had recently completed: timber trade (I) and voluntary biodiversity protection (II). Timber trade is a traditional source of income from forests and it is an ordinary event for several owners. Voluntary biodiversity protection is a new situation, perhaps a once in a life-time process, and it requires new contacts and practices. The objectives, data and the main theoretical concepts used in four studies (I-IV) are summarised in Table 1.

Mail questionnaire considering the latest timber trade (I)

The data for Study I were collected via a mail questionnaire in the autumn of 2009. The questionnaire was sent to those forest owners who had already answered an earlier mail questionnaire, which was carried out by the Finnish Forest Research Institute at the beginning of 2009 (Hänninen et al. 2011). The questionnaire was sent to 2,084 forest owners all over Finland and 1,244 valid responses were received (59.7%). The questionnaire considered forest owners' social networks in their most recent timber sale within the past five years. A total of 68% of the respondents (891 forest owners) replied that they had conducted a timber sale within the time limit (2005-2009) (Korhonen et al. 2010). A non-response analysis was conducted both in the first and in the latter questionnaire and an appropriate weighting was used so that the responses correspond to the Finnish forest owners (Hujala et al. 2010; Hänninen et al. 2011)

In order to understand their networks, forest owners were provided with 10 predefined alters who represented potential actors that the owners could have contacted in a potential timber trade (Study 1, Table 1). The most relevant of them for this summary are presented in Table 2. Owners were asked whether they had been in contact with these alters during their latest timber sale process, to specify the number of contact occasions and define the direction of the contact. In this data, direction of the contact denotes whether the owner is more active or vice versa. Not all the respondents filled in the necessary information and so, in order to obtain larger data, imputation of the network variables (contact occasions and direction) were conducted (Korhonen et al. 2010). After the imputation, there was network data from 753 owners. In addition to network data, background characteristics about the timber trade and owners were gathered.

Table 1. Main objectives, data and main theoretical concepts of the four studies.

Study	Aim	Data	Theoretical concepts
I	Define the most typical social network structures in timber trade	Mail questionnaire (2009) n = 753	Structural equivalence
II	Examine the important channels when diffusion of voluntary protection programme	Phone interviews (2010) n = 44	Diffusion of innovations
III	Define and test forest owner -related peer learning concept	Focus group interviews (2011) n= 43, Observation and interview of a study circle (2011) (n=7), phone interview (2013)	Peer-to-peer learning
IV	Study existence and promotion of forest owners' peer networks	Focus group interviews (2011) n= 43	Communities of Practice

Phone interviews about the voluntary biodiversity protection process (II)

The data for Study II were gathered from those forest owners who had participated in the new Forest Biodiversity Programme for Southern Finland (METSO programme) (Finnish Government 2008) and voluntarily protected part of their forest holding during the year 2009. The holdings of the owners were located in North Karelia, Eastern Finland. There were two types of protection agreements: permanent agreements (19 owners) and 10-year fixed-term agreements (25 owners). The permanent protection agreements were conducted with the Centre for Economic Development, Transport and the Environment (ELY) and fixed-term agreements with FC. In addition, three ELY and five FC officials, who had negotiated the agreements with the forest owners, were interviewed. Owners were interviewed by phone at the beginning of 2010, and interviews lasted from 20 minutes to one hour. Phone calls were recorded and transcribed.

The largest part of the interview was semi-structured. The interview considered five different themes: owners' contacts, motivation for protection, progress of the protection process, owners' satisfaction with the compensation and owners' satisfaction with the protection process. Owners' social networks during the protection process were inquired about in a structured part of the interview and complemented in the semi-structured part. In the structured part, owners were offered 11 predefined alters (Study I, Table 2), the most relevant of which are presented in Table 2. Owners were asked whether they had contacts (existence of the relationship, contact occasions, and direction of the contact) with these alters during the protection process, and if so, what the issues were that they discussed. In addition, information on the familiarity of alter and style of communication (e.g. meeting,

phone, email) as well as owners' background characteristics was elicited in the structured part. Both qualitative and quantitative data were used to examine the channels and connections.

Table 2. Description of most relevant predefined alters in Studies I & II.

Extension professionals	
Forestry Centre (FC)	FC is an organisation operating under the guidance of the Ministry of Agriculture and Forestry. FC offers guidance, services and education for forest owners for example in forest planning. Employees of FC ensure that forest owners obey forest law and allocate the state subsidies to forest owners. FC negotiates fixed-term voluntary protection agreements with forest owners (II).
Forest Management Association (FMA) local advisors	FMA is an organisation funded and administered by owners. FMA aids owners in silvicultural issues and offers training and guidance. In timber trade, the purpose of FMA is to advocate owners' interests and act as mediator between the seller and the buyer. Forest owners can even empower FMA to conduct the whole timber sale.
Centre for Economic Development, Transport and the Environment (ELY)	Employees of ELY negotiate the terms of agreements with forest owners in permanent protection processes (II).
Timber buying companies	
Timber buyer	Industrial timber buying companies buy raw timber from forest owners. With the *competing timber buying companies* (I) the owner negotiates the trade but negotiations do not end up in timber trade.
Non-professionals	
Family members	Spouse, children, and parents. It is typical that the other owners of the joint holdings are family members or relatives.
Relatives	Relatives, such as siblings, uncles, nephews or cousins.
Neighbouring forest owner	Owner of the adjacent holding or owners in the same village. *Neighbours* refer to people living next door, but who are not necessarily forest owners.
Expert	A person, who is considered to be an expert in a certain issue (evaluation is done by the forest owner himself). The term refers to non-professionals or professionals who do not act as a professional for the interviewed owner.

Focus groups of peer learning (III & IV)

The aim of the data collection for Studies III and IV was to learn about forest owners' mutual interactions, define whether there is learning in these networks, and examine the future possibilities of peer-learning networks. Seven focus group interviews (FGIs) were conducted during December 2010 and January 2011. Compared with individual interviews, the overall aim of FGIs is to evoke active conversation, receive reasoned opinions about the issues under concern, and generate new ideas (Krueger and Casey 2009). Since the aim of these studies was also to receive opinions and ideas about the new potential way of extension, FGIs were seen as an applicable method. The interviewed groups consisted of national developers of extension systems, local forest planning and extension professionals, and private forest owners. Each group included between four and seven persons from one category. Altogether, 43 people participated in the focus groups (Table 3). Instead of interviewing only owners, it was assumed that professionals and developers are familiar with owners' behaviour and that they can offer an even broader perspective when planning the development of current extension practices. The questions considered: a) the topics that forest owners discuss with each other, b) who are the other owners to discuss with, and c) the locations where owners meet each other. In addition, possible benefits and drawbacks of peer learning were discussed. Interviews were recorded and transcribed. To deepen knowledge about forest owner clubs one member from the board of directors was interviewed by phone in September 2013. The questions of the interview considered the peer learning dimensions. Moreover, some general information about the activities of the clubs were gathered from the websites of the clubs.

Swedish study circles (III)

For the purposes of Study III, one meeting of a Swedish study circle was observed and its members interviewed. Observation is a useful way to collect data about individuals' behaviour, interaction, and the physical settings in an ongoing event (DeWalt and DeWalt 2002). Study circles are non-formal adult learning settings aimed especially at farmers (Larsson and Nordvall 2010). This particular study circle was located in Southern Sweden, focussed on forest matters. The group consisted of seven forest owners, who lived in the same village. A practice of the group was to read a new forest related book every winter. In the meetings, members read the book aloud and discuss freely what ideas the reading has aroused. Observations and interviews were conducted by Swedish authors in January 2011. During the observation, members were asked to discuss and act as they do at their normal meetings. Questions after the observation considered the issues that owners talk about in their study circle meetings, the benefits that owners gain, and issues with which they were dissatisfied. During the interview, one researcher was asking questions and another was taking notes. The results of the study circle observations and interviews are also dealt with in Westberg et al. (2011).

Table 3. Composition of the group, place of interview, and number of participants in each FGI.

Composition	Place	Number of participants
Developers	Helsinki	4
Forest professionals	Joensuu	5
Forest professionals	Joensuu	7
Forest professionals	Oulu	7
Forest professionals	Oulu	7
Inexperienced forest owners	Joensuu	7
Experienced forest owners	Oulu	6

ANALYSIS

Statistical analysis (I & II)

To define the structural equivalence of forest owners (Lorrain and White 1971; Hanneman 2000) and to define the most typical social networks in timber trade, a two-step cluster analysis was conducted in study I (Norušis, 2004; SPSS Inc. 2010, p. 404-411). The clustering procedure defined the variables (contact occasions and direction of the contact) that were most important to separate the clusters from each other. These variables were used to characterise the corresponding owner groups. The analysis was done with SPSS program. After the groups were determined, the differences between the groups in the owners' background characteristics and the characteristics of the latest timber sale were assessed with cross-tabulation and comparison of sample means. T-test and Pearson Chi-Square test were used to find statistically significant differences. In the data of voluntary biodiversity protection (II), four different groups were formed; two innovation adopter categories in two agreement types. Adopter categories were defined qualitatively. Differences between groups' quantitative background characteristics were assessed with cross-tabulation and comparison of sample means. Non-parametric Mann-Whitney and Fisher's Exact tests were used to find statistically significant differences. Visualization of networks is important when describing the data and the results. Pajek-programme (Pajek 2013) and the SNA package of R-programme (Butts 2013) were used to visualise the network data.

Qualitative content analysis (II, III &IV)

For Studies II, III and IV, qualitative data were collected and analysed with theory-driven content analysis (Krippendorf 1980; Table 4). Both the phone interviews and focus group interviews were transcribed and the transcriptions carefully read through to get an overview. The NVivo programme (Bazeley 2007; Edhlund 2007) was used as a tool for coding, condensing and classifying the data. Theory of innovation diffusion gave a framework for the analysis in Study II (Rogers 2003). Four different stages (Table 4) of innovation adoption (Rogers 2003) were distinguished from each individual transcription and owners' connections within these stages were defined (II Figures 1 & 3). Adopter types were defined according to type of initiative and channels used for information gathering when adopting the innovation (II, Table 1).

In Study III, the essence of peer-to-peer learning (P2PL) was defined and elaborated according to the previous peer-learning dimensions. Three P2PL perspectives were subdivided into eight dimensions, which were described with on a continuum that has two extremes. After exploration of and familiarisation with the data of focus group interviews, forest owner clubs were suggested as potential P2PL settings. Those parts of the interviews that concentrate on the clubs were extracted from the text and analysed as a case example. In qualitative content analysis, the eight elements of P2PL (III) in the clubs were defined from the text (Table 4; III, Table 1). In the case of study circles, the elements of P2PL were searched from the written notes, with the aid of a report (Westberg et al. 2011). The positions of forest owner clubs and study circle on each P2PL dimension continuum were agreed (III, Table II).

In Study IV, the variants of the tree elements of CoP theory (community, domain and practice) were searched for in every potential community that came up in the focus group discussions (Wenger et al. 2002) (Table 4; IV, Table 2). Moreover, interviewees' beliefs and attitudes concerning challenges and possible solutions when increasing forest owners' mutual communication were identified (Table 4; IV, Table 3). When coding the data for Study IV, the origin of every comment was maintained, which enabled the comparison of the opinions between different respondent groups (owners, professionals, developers).

Table 4. Theory-driven coding classes of qualitative content analysis in three articles (II, III, IV)

II	Stages of innovation diffusion: o knowledge o persuasion o decision o implementation and confirmation Criteria for defining adopter categories: o initiative for protection o channels used for information gathering
III	Dimensions of P2PL: o motivation (initiation, reinforcement) o focus (content and participant profile) o organisation (schedule, role of professionals, responsibility, role continuity)
IV	Elements of CoP: o groups of participants o purpose of practice o ways of communicating Owners' mutual communication: o challenges o solutions

RESULTS

Forest owners' relationships in decision-making situations

Network structures

The two decision making situations that were studied are different. Timber trade as a more common decision situation required on average only 2.9 alters, whereas the owners involved in voluntary biodiversity protection on average 4.6 alters (Table 5) (I & II). Owners' social networks were largest when they were making permanent protection agreement (II) or when they belonged to the group of *Relationship builders* in timber trade (I). In timber trade, the timber buying company, local FMA advisor, and family members were the most typical alters (I) (Table 6). In voluntary protection, forest owners were in contact mainly with family members and the advisor of FC or ELY, with whom they made the agreement (II).

Table 5. Average number of alters in four timber trade networks and in different protection types.

Timber trade ($p \leq 0.001$, mean 2.9) n=742				
	FMA-partners	Independent timber traders	Relationship builders	Non-committed FMA-members
	(15%)	(27%)	(24%)	(34%)
	1.3	2.0	5.3	3.0
Voluntary biodiversity protection ($p \leq 0.05$, mean 4.6)				
	Permanent agreement (n = 19)	Fixed-term agreement (n=25)		
	5.2	4.1		

Table 6. Forest owners' connection percentages, average contact occasions with the different alters in two different decision making situations.

	Timber trade (n=742)		Voluntary biodiversity protection (n=44)	
	connection (%)	contact occasions (mean)	connection (%)	contact occasions (mean)
Family member	42	4.3	82	6.3
FC	11	1.8	91	4.2
FMA local advisor	69	3.2	32	2.7
Timber buyer	69	3	27	1.6
ELY	0	0	52	3.8
Relatives	0	0	45	2.9
Expert (non-professional)	16	1.8	34	2.5
Neighbouring forest owner	18	2.4	34	1.6
Competitive timber buyer	22	2.4	0	0

Different roles of alters

Trusted professionals

According to the results, it is typical that owners have one familiar and trusted forest professional from FMA, FC or a timber buying company (I, II) and that these relationships can be interpreted almost as strong ones, due to the high amount of contact occasions (Table 6; Figure 4). This trusted professional is often the first and even the only source of advice in any kind of forest related problem (II). FMA is a trusted source of advice especially in timber trade; 15% of owners handled the whole trading process via a FMA employee alone, without direct connection to the timber buying company or any other actor (I). Moreover, when initiating voluntary protection agreements, some owners contacted the professional that was familiar to them first, even though this professional was not the one who could make the agreement (II). Some owners wanted their trusted FMA advisor to take care of the process (II). Employees of FC are familiar and trusted people, especially for those owners who have a forest management plan compiled by FC (II). Making a forest management plan is an occasion that enables this relationship to born (II). If the connection with FC exists, it is typically a sufficient source of professional information in the persuasion stage for those owners who made a fixed-term voluntary protection agreement with FC (II). For *independent timber traders*, the employees of the timber buying company are almost their only connection with forest professionals in timber trade (I, Table 3). It is typical that the members of this group do not even seek offers from other timber buying companies, which suggests that they have one trusted professional in a certain company. Also, in biodiversity protection, familiar employees of a timber buying company are typically at least informed about the decision if not asked to participate in the process beforehand (II).

Bargaining companion

Forest professionals can also be seen as bargaining companions depending on a decision situation and the type of forest owner. Bargaining companions, such as competitive timber buyers in the timber trade or ELY employees in the protection process, are not that close to forest owners as trusted professionals (Table 6; Figure 4). Especially, if a forest owner seeks offers from several timber buying companies, these relationships are more business- than extension-oriented. This is the case especially in the group of *Relationship builders* (I). In the voluntary protection agreement, prior to the protection agreement, ELY was an unfamiliar organisation to several owners interviewed. Making the protection agreement was their only reason to contact ELY (II) and, especially at the beginning of the process, these relationships were limited to trading. However, during the process the officials of ELY became more familiar to forest owners and it may be that extension-oriented relationships became possible through developing trust.

Decision-making company

If the owner includes other people into the decision-making process, they typically are family members (I, II) and, as such, are strongly connected with the owner (Table 6; Figure 4). Families are communities in which information and details of forest property

can be openly delivered and discussed (IV). Decisions made by one individual occurred more often in the timber trade than in biodiversity protection. In the timber trade only about 40% of owners were in contact with their family, while in the voluntary protection agreement 80% needed endorsements from a spouse, children or parents (I, II). If the forest holding is jointly owned, for example between siblings, it is the official principle that owners make decisions regarding the forest together. However, in practice, it is typical that one of the official owners takes care of the forest management and the others "sign the papers" (II). Some owners have as dense connection with their trusted forest professional to the extent that they may even include the professional within their decision-making team or even assign them the role of decision maker (II).

Extra advice

In timber trade, one-sixth of the owners had contact with an expert forest owner (I) and one-third contacted experienced owners when making a voluntary protection agreement (II) (Table 6). The connected acquaintances who were considered as knowledgeable peers or experts were typically also relatives (II). Having some kind of kinship relationship lowers the threshold to ask for advice or opinions (II). For example, a brother-in-law or nephew can be asked for advice if they are perceived as forest professionals or more experienced forest owners. Familiar experts are needed especially in the persuasion stage of decision making, when owners are considering the pros and cons of adopting the innovation (II). Also, forest professionals can be sought for extra advice; owners who made permanent agreement with ELY sought the opinions of FC and FMA professionals (II). In the timber trade, *Relationship builders* had several connections with forest professionals and, besides bargaining, they were probably also receiving information. If owners need extra advice for decision making, they typically need to ask it for themselves (I). This is a problem in the case of *late adopters* (II), who do not actively gather information about new ideas, and as such recommendations from trusted experts would be important for them and benefits of "innovations" should be explained and justified to them.

Neighbouring forest owners

Owners who live next to their forest holdings in the countryside have more contacts with their neighbouring owners than owners living in towns or cities (IV). In the countryside, owners know who other owners are and they see the actions that others have done in their forests (III, IV). In rural areas, owners meet each other in different kinds of interest groups, like hunting clubs, or during their daily activities, such as grocery shopping or having coffee. These events and places bring forest owners together to discuss general forest issues (III, IV). However, some topics may be taboo, such as protecting one's own forest (II) or income from the timber trade (IV). After making the protection agreement, it can be discussed with neighbours (II), although directly criticising the treatments or decisions that neighbouring owners have done in the forest is unusual. However, some owners are unwilling to discuss the protection with their neighbours due to fear of being perceived as conservationists (II).

"Unfamiliar" forest owners

Owners have the highest amount of communication with those forest owners who are familiar to them because of kinship or neighbourhood, but connections with other owners are more rare (I, II, IV). If these relationships exist, they can be described as weak or temporary ones (Figure 4). It is not likely that peer communities spontaneously emerge among forest owners only because of common background as a forest owner (IV). Contacts with otherwise unfamiliar owners may be born in extension events, in different interest groups related to the forest, or via the Internet (III, IV). Experiences of other owners can also be received indirectly via media, for example when reading forestry magazines and newspapers (II). Extension events such as courses or forest days are led by forest professionals from extension organisations. The primary purpose of these events is delivery of information, and owners take part in order to receive information about certain issues from professionals rather than their peers (III, IV). On the other hand, the results of this thesis suggest that projects, which unite a group of owners for a lengthy period of time around a certain topic, provide the perfect opportunity for owners to become familiar with one another (IV). The practices, in which owners themselves have motives to communicate and even learn from other owners, are forest owner clubs and discussion forums on the Internet (III, IV), both of which are rather new practices.

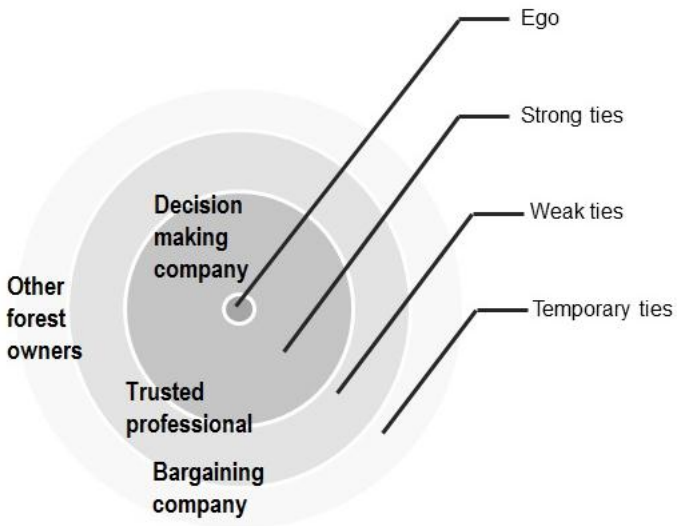

Figure 4. Graphical depicting the positioning of different alters in forest owners' egocentric network (partly adopted from Wellman and Berkowitz 1998, p.27). The position is described by the closeness circles and different types of ties within the circles. The locations of alters are based on connection percentages and contact occasions (Table 6) as well as on qualitative results of owners' connections (Studies II & IV).

Forest owners' peer learning

Definition of genuine peer learning

Peer learning can be seen as informal and unplanned communication that happens whenever forest owners meet each other, or it can be defined in a more strict way as actions and learning constellations that explicitly aim to learn from contemporaries (III). The definition that was defined and pondered in Study III deals with the latter situations. Table 7 summarises the results of Study III by emphasising the end of the continuum to which eight dimensions should aim in genuine peer learning.

According to the definition, the highest motivation for peer learning should come from the forest owners themselves. Initiation and reinforcement can be received also from external sources, such as society or extension organisations. However, it should not be too voluminous, since a high level of external support may easily lead to advocacy or even commercial motivations that aim at supporting the objectives of the external party at the expense of the learning of forest owners. Avoiding commercial motivations is especially important and the role of forest professionals should be considered carefully. Their role should be restricted to facilitation, or professionals can act as invited specialists who provide objective information about certain topics, but not have the whole responsibility.

The focus of forest owners' peer learning can be either open or predefined. A predefined content profile can be an easy way to gather those owners already interested in the issues defined and even devoted to the topic. However, there is a risk that only a narrow group of owners, who already have strong opinions about the issue of interest, participate. Moreover, a strictly defined focus can already include an ideology, which can even prevent the learning of different perspectives. The participant profile can be either open or pre-defined; however it would also be interesting to compare the degree of homogeneity with that of heterogeneity.

In P2PL it is important that owners see each other regularly which increases the possibilities and willingness for mutual communication and therefore that an open schedule that has continuity could be a desirable direction in P2PL. The roles of participants and responsibility are shared and changing, which prevents one person from taking an overly strong or permanent role. In addition to the dimensions defined in Study III, the aim and especially the learning motivation of participants should also be clarified more in detail when defining P2PL.

Table 7. Three key perspectives defining P2PL are divided into eight dimensions that vary between the two extremes. The preferred end of the extreme of genuine peer learning is highlighted with grey background (III).

Perspectives	Dimensions	Extremes		
Motivation				
	Initiation	internal		external
	Reinforcement	low	medium	high
Focus				
	Content profile	open	adaptive	pre-defined
	Participant profile	open	adaptive	pre-defined
Organisation				
	Schedule	open		pre-defined
	Role of professionals	no role	facilitator	specialist
	Responsibility	shared		dedicated
	Role continuity	changing		fixed

Forest owners' communication settings

In Study IV, eight settings in which the owners communicate with each other were found (Table 8) and subsequently assessed with the aid of the CoP framework (Study IV, Table 2). The settings found can be divided into those that are arranged by the forest extension organisations, by the forest owners themselves, and those that are informal and unorganised. The role of extension professionals from the governmental organisations is strong. They have the responsibility and act as leader or teacher in forest days, courses and in projects. The informal networks, such as neighbourhood networks in the countryside or intergenerational networks within families, are dependent on the owners' own activity. However, according to the results these kind of networks may be decreasing. On the other hand, the amount of networks and activities in networks developed via the Internet are supposed to increase.

According to the peer learning definition in Study III, the most promising examples are the kind of events where forest owners have initiated the groups by themselves. Good and traditional examples of peer learning are study circles among landowners in Sweden (III). In the study circles, the role of professional is limited to an invited specialist, with the owners themselves retaining the primary motivation and the external reinforcement remaining moderate. These factors prevent the hidden advocacy motivations and enable owners to freely express and exchange their thoughts. However, in the study circle observed, the main motivation was not learning, but spending time together. Forest owner clubs in Finland have many features of genuine peer learning (III). Nevertheless, since the role of FC or other professionals is strong in some clubs, there may exist hidden advocacy

motivations. The disadvantage of both study circles and forest owner clubs is the stable role of participants and even too homogenous composition of the group.

Contradictions when enhancing peer learning

Studies III and IV raised issues that should be taken into account when promoting peer learning and forest owners' mutual communication (IV, Table 3). When comparing the opinions of interviewees with the definition of peer learning (III) and the theory of CoP (IV), some of these issues are even controversial (Table 9). Both forest professionals and forest owners think that the most critical challenge in forest owners' extension in general is *reaching the "passive" or indifferent owners* (IV). Some of the interviewees could not see how peer learning would solve this problem, whereas others perceived peer learning to be a potential channel to help reach these owners. For example, if invitation comes from an active owner instead of a forest professional, it is more likely that the passive owner becomes inspired to join the activities. Moreover, the existing interest groups related to forests could be utilised to reach different owners.

Where inexperienced owners were members of peer learning groups, professionals were afraid of *the delivery of wrong information*. Wrong information and lack of control seems to be an actual issue, especially in the discussion forums on the Internet. Professionals were even unwilling to give up the responsibility of guiding the groups. In addition, it was noted that among non-residential owners in particularly, there is an evident need to introduce owners to each other and professionals are needed for this. On the other hand, controlling the groups through the use of professionals goes against the idea of genuine peer learning (III). As a solution, it was suggested that at the beginning of peer learning, initiation could come from professionals or from active owners. However, practices should be planned in a way that enables later responsibilities to be passed to the forest owners themselves. Moreover, professionals suggested that there could be more time for informal discussions in existing extension events and in this way peer learning features could be increased. In the discussion forums registration requirement and use of social media in parallel with face-to-face meetings would improve the quality of discussion.

Interesting and diverse peer networks with *different focuses* should be created (IV). Professionals thought that the topics of the communities should be predefined in order to prevent the discussion from easily straying into non-relevant issues (IV). On the other hand, having an overly predefined focus can prevent genuine learning (III), since peer learning should be open to all kinds of thoughts. An overly rigid and inflexible focus may even prevent some owners from participating, if the ideological background behind the focus is strong. Professionals and experienced owners (III, IV) in particular noted that not all forest owners are peers with each other, and therefore, peer learning groups should be *homogenous* enough to ensure that owners have an approximate level of experience as a forest owner. This would guarantee that everybody understands the topic of discussion and establish a safe atmosphere where owners feel comfortable and confident speaking and asking questions. On the other hand, the original idea in the theory of CoP (IV) is a community consisting of apprentices and masters – the kind of group in which experienced members can transfer their skills to inexperienced members. As a solution, instead of gathering together as a group, in some cases peer learning could include one-to-one connections. Private communication with a more experienced owner would make it easier

for an inexperienced owner to receive information and experiences. Those experienced owners who would be willing to act as mentor owners could be recognised and listed.

Table 8. Eight forest owners' communications settings found in Study IV.

Settings led by extension organisations
a) Forest days
b) Courses
c) Projects
Settings led by forest owners
d) Board of directors of local FMA
e) Forest owner clubs
Informal and unorganised settings
f) Neighbourhood network in the countryside
g) Families
h) Discussion forums on the Internet

Table 9. Controversial issues in forest owners' peer learning and opposite arguments about them.

Reaching "the passive" owners	*Anyway, passive owners are not going to participate*. vs. *Peer learning is a way to engage the passive owners.*
Role of professional	*Professionals are needed to control and deliver accurate information for the groups.* vs. *In genuine peer learning, professionals are not included into the groups.*
Focus of peer learning groups	*Each group should have a predefined focus.* vs. *Focus can be adaptive.*
Composition of participants	*Participants in each group should be homogenous.* vs. *A peer learning group should consist of heterogeneous owners.*

DISCUSSION AND CONCLUSIONS

Reasons for the composition of networks

The pool of people around owners consists of extension professionals and public officers, employees of timber buying companies, family members, relatives, neighbours and non-professional experts. In this thesis, the participation of alters in two decision making situations was quantitatively examined. The results found are appropriately in line with earlier results. The average number of forest owners' ties in their forest-related decision-making situations tends to vary between three and four (Rickenbach 2009; Knoot & Rickenbach 2011; Ruseva 2013) and, as noted also by Rickenbach (2009) and Ruseva (2013), the most typical alters are different extension professionals. Tikkanen (2006) found that in Finland "non-industrial-private-forestry-oriented organisations", such as FC, FMA and timber buying companies, form a forest cluster that has dense co-operation and a common goal (see also Tikkanen et al. 2003). The results of this thesis suggest that part of the forest owners also belong to the cluster, since they are professionals or semi-professionals, due to their education or working experience (II). In addition, several owners have a dense connection with the forest cluster via strong relationships with relatives or trusted professionals working in the cluster. However, despite the high connection percentage with extension professionals (I & II), the concern regarding how to reach passive owners (IV) suggests that some owners are outside the cluster.

In Finland, the support that forest owners receive from their family members seems to be essential, especially when making emotional decisions regarding the forest, such as biodiversity protection (II; Hujala and Tikkanen 2008). Kin are already there and there is no need to "create" relationships with them (Stevans 1990; McPherson et al. 2011). Comparably, contacts with neighbouring owners, non-professional experts or other peers seem to remain minor as noted also in earlier studies (Rickenbach 2009; Ruseva 2013). In Finland, the number of forest owners is high (632,000) compared with the total population (5.4 million.) (Leppänen and Sevola 2013). It could be thus assumed that all forest owners have other forest owners in their own circle of acquaintances. However, for those 35% of owners who are living outside the municipality of their forest property (Hänninen et al. 2011) it seems to be difficult to find peers. This is understandable since it is almost impossible to perceive forest ownership from owners' everyday life in urban areas. Urbanization is gradually shifting ownership identities from rural to semi-rural, semi-urban and to urban which evidently affects the social networks and information channels (Hujala and Tikkanen 2008). Place of birth has an effect on peer relations; those born in the same place have well-established relationships with each other that can be hard to form for newcomers, who find it difficult to penetrate the local networks (Rickenbach and Kittredge 2009; Ramirez-Sanchez 2011). This indicates that owners who do not live on their holdings find it hard to get acquainted with their neighbouring peers.

The results of the thesis support the theoretical consideration that the size of a social network could be explained by the prominence of the decision (Fisher 1982; Borgatti et al. 2009). If the decision is significant, such as large timber trade or permanent protection, forest owners try to maximise utility and collect information from several sources to increase the likelihood of making the right decision. *Relationship builders* sell the greatest

amount of timber and they have the largest properties and, as a consequence, also the largest networks in the timber trade (I). The positive effects of large property and owner's activity to the size of network have been noted also by Knoot and Rickenbach (2011) and Ruseva (2013).

Prominence of the decision can also affect the amount of people to whom the owner wants to inform about the decision. In a case of biodiversity protection, early adopters were highly protection-minded and willing to deliver the message to other owners (II). On the other hand, big networks result in increased costs of having the relationships (Knoot & Rickenbach 2011). In the case of small and less significant timber trade, owners' social networks remained small. Moreover, when making a temporary protection agreement (II), owners have fewer contacts, possibly in order to minimise discomfort caused by building and maintaining the relationships. Therefore, it can be inferred that there certainly are also owners to whom forest issues are so insignificant that they would rather divert all of their time and attention to issues other than creating forest-related relationships. These preferences can lead to indifferent behaviour regarding the forest property (Karppinen & Tiainen 2010; Karppinen & Korhonen 2013).

Consequences of different network structures

The composition of the forest owners' ideal social network depends on perspective. A position of having several forest related relationships enables receiving a lot information and even collection of social capital related to forests (Coleman 1990). A large network is supposed to provide sufficient support for owners' decision making. However, it is important to consider a large network's homogeneity and heterogeneity. Owners who have large, heterogeneous networks, such as *Relationship builders* (I), receive sufficient social support and they also receive different kinds of information. They can even hold the valuable position of broker who can cross structural holes by connecting homogenous networks (Burt 2005). Homogenous networks and the networks that consist only of one tie, such as networks of *FMA-partners* or *Independent timber traders* (I), have rather similar benefits and drawbacks. In homogenous networks, strong relationships with like-minded others make the communication easy. If there is only one contact, owners do not need to use time or energy to create or maintain several relationships with different persons, which supports also the discomfort minimization principle (Borgatti et al. 2009). From the extension professionals' perspective, one relation-network is an easy channel to promote messages, such as new practices or ideas (Hodges and Cubbage 1990; Primmer and Wolf 2009). On the other hand, homogenous and unanimous networks, with their strong relationships, can easily produce convergence of thoughts, which may even reduce the acceptance of different opinions and prevent the diffusion of innovations (Crona et al. 2011).

The previously mentioned forest cluster is also suggested to be homogeneous (Primmer and Wolf 2009). The goal of the forest cluster has traditionally concentrated on securing the timber production and employment (Tikkanen 2006), and a hegemony of growing trees and maximising the growth has even existed (Hiedanpää et al. 2011). Nowadays, this is challenged by other uses of forests (Hiedanpää 2011). Several owners have strong ties with the cluster and through these ties, old and new practices and even ideologies flow to

owners. The results of this thesis indicate that this cluster has power, even a position as an opinion leader, when supporting the new uses of forests. The "innovation" of voluntary biodiversity protection has adeptly been introduced to forest owners via the trusted professionals in FC (II) who are considered as forestry people rather than nature protection people (Horne 2009).

If owners do not have a forest related social network then they do not receive support from trusted persons, which may result in indifferent or passive forest related behaviour (Karppinen & Tiainen 2010; Karppinen & Korhonen 2013). In network research, it has been proven that partners are one of the most important sources of support (Stevans 1990). Hänninen et al. (2011) recognised widows as a group of forest owners who do not necessarily get forest-related support from their social network. Widows need to take care of the forest-related decisions that were typically the responsibility of their husbands. In the timber trade, some of them probably belong to *FMA-partners* (I), yet it can be assumed that not all of them have a connection with the extension professionals causing decisions to remain undone.

Being a member of a group and seeing things from the same perspective as other group members, establishs and strengthens an individual's identity (Harshaw and Tindall 2005). A study of Rämö and Toivonen (2009) on Finnish forest owners suggests that the forest is perceived as part of the identity of 90% of new forest owners. According to this thesis, connections with peer owners are rare. If new owners are not connected with other owners, are they able to build an identity as a forest owner? Especially for the urban owners who receive their primary source of income elsewhere, their forest can be a remote and nostalgic place from childhood memory (II, IV). For them, forest ownership might be only a very small section of life and a small branch of identity that does not stimulate them to make decisions. Peer contacts could stimulate owners to become interested in their own holdings and to make forest-related decisions.

Peer learning directions

In earlier studies, forest owners' peer learning was primarily viewed as a positive step in the right direction (Ma et al. 2011; Kueper et al. 2013; Ricci et al. 2013). However, this thesis acknowledged some challenges of peer learning. For example, a strong, committed leader for peer learning is needed, but the role of professionals or semi-professionals could be restricted to facilitation (Kueper et al. 2013). This study partly supports earlier results; professionals are needed especially at the beginning of peer learning to initiate the groups. In practice, this would require only minor monetary investments from extension organisations. The most demanding task, for both extension professionals as well as for forest owners, would be to get out from the conventional model of knowledge-transfer. Well-functioning study circles in Sweden suggest that social reasons are the most important motivators for owners to participate in peer learning actions (III). Also, earlier studies suggest that peer learning should not include only information delivery or intentional learning, but rather mutual communication in a relaxed and informal community (Kueper et al. 2013; Ricci et al. 2013). In contemporary Finland it seems that owners come to extension events to learn exact information and to get direct benefits. Due to different cultures, even between Sweden and Finland, the model of study circles may not directly fit

into the Finnish culture. In Finland, words are spoken to deliver true messages and most of the forest related face-to-face discussions are polite and careful and owners do not share the most sensitive issues, such as money or protection, with other owners (IV). In establishing peer-learning practice, it is a challenge to create the kind of atmosphere that encourages open discussion about experiences and thoughts.

The focus of peer networks needs careful consideration. As noted earlier, peer learning groups are in a position to particularly focus on practical issues rather than on technical information (Kueper et al. 2013). It is important to note that timber production is not the first objective of all forest owners and passivity or indifferent behaviour of forest owners might be partly derived from the fact that not all forest owners find silvicultural options that are compatible with their values (e.g. Johnson et al. 2006; Ní Dhubháin et al. 2007; Butler 2008). Therefore, the focuses of peer learning groups should be diverse. When considering new uses of forest, reaching the indifferent owners is not the only challenge, but also to re-engage the present "active owners" to perceive and learn "new" benefits that their forests could provide (IV). Defining the focuses and creating peer groups requires volunteer work, enthusiasm and willingness to co-operate, especially from the owners themselves.

Critical review of the results

The two decision-making situations studied (I, II) do not necessarily reveal anything about owners' social networks in other situations. However, since the selected situations are different it can be assumed that the results reveal the variety of networks in different decision-making situations as well as the variation in the size of network. In the case of the timber trade (I), it can be assumed that similar, typical social network structures can be found all over the country, since the data was comprehensive and appropriate weights were used to scale the results to the population of the Finnish forest owners (Hänninen et al. 2011). When generalising the network structures of the voluntary protection process (II), there are some limitations. Data was gathered only from one part of the country and from one phase of diffusion of protection program (year 2010). It is not likely that the situation is similar all over the country due to the strong role of employees of FC and ELY when promoting the programme. Moreover, "innovation diffusion" proceeds and it also affects what kind of owners are participating in the programme. Even though extending the results of the thesis to small-scale forest owners in other countries is not possible, the meaning of different actors described in the results can be compared with different decision-making environments.

The limitation in Studies I and II is that the data were collected only from those forest owners who have actually made the decision to sell timber or to protect forest. The social networks of the owners who did not sell timber or make protection agreements remained unknown. However, in the discussion of this thesis, the structure of "indifferent" or "passive" owners' social networks was also pondered. Data collected via focus groups did not focus on any specific decision-making situation, did not define actualised relationships or count their number, but it rather gave conversationalists' views about the reality (III, IV). It can be assumed that the data do not cover all situations in which owners meet or discuss with each other in Finland or all the potential barriers when enhancing peer networks.

Due to the egocentric nature of the data (Prell 2011) this thesis did not provide a profound examination of owners' social positions in their network. Moreover, whole network measures, such as centralization, were not calculated. The relationships of owners can even be considered as their characteristics and the analysis could have been conducted with the same methods as those used in "cases by variables" analysis, such as Two-Step Cluster analysis was done in Study I. On the other hand, the asset of this study was its examination of network data together with the characteristics of individuals.

In network studies it has been noted that people do not remember all the ties (Haythornthwaite 1996; Wasserman and Faust 1994, p. 56-59; Rickenbach 2009). This might be true, especially in Study I. On the other hand, the data collection procedure of Study II proved the usefulness of the mixed method approach when collecting social network data (Creswell 2010). When recalling the protection process with open questions in chronological order, owners remembered relationships that they did not mention at first when using the quantitative question pattern. Quantitative data are fast to collect and enable the calculation of network measures that can be generalised more easily. Qualitative data can provide a deeper understanding and reveal patterns that may otherwise remain unknown (Prell et al. 2011). Individuals belong to several kinds of networks. In this thesis, it was not possible to define who has actually affected owners' forest-related decision making. It is important to note that influence and information received can come from outside the forest-related network and the effects might be subconscious even for forest owners themselves.

Reinforcing networks

Stimulus or inspiration to make decisions regarding forest holdings is not born if owners do not visit their forests, see the examples of other forest owners (Schubert and Mayer 2012), or get any forest-related support from their social network. Therefore, it is important to maintain and reinforce these networks. The results of this thesis support the earlier findings; it is typical that owners who have made decisions regarding their properties have at least one trusted person – typically a forest professional – to talk to when making decisions (Hujala and Tikkanen 2008; Rickenbach 2009). As owners are ageing, it is important to transfer these relationships to those who will inherit the forest property, such as children or a spouse. Besides the owner, forest professionals could also promote the transfer of the relationship, for example by suggesting the inheritor participating in decision-making situations before the inheritance. Intentionally creating and supporting the relationship between new owner and professional is increasingly important when new owners are not living next to their holdings and do not get acquainted with local forest professionals. In urban areas, new kinds of communication and extension models are needed to create strong relationships between owners and professionals. Since the communication that happens via the Internet is independent of location or time, it may reduce the energy required for creating and maintaining the relationships and in this way enable new connections to born. The forest management plan is a tool that plans harvesting and other silvicultural activities to promote timber production. Over the past decades, other uses have been increasingly included in the plans. Compiling the plan should be a situation that enables connection and understanding to be born between the planner and owner. As the earlier results highlight,

plans should be more customer-oriented, in a way that they respond to the true objectives of the forest owner (Hujala et al. 2007; Hokajärvi et al. 2011). Compiling a plan that meets the goals of the owner may also strengthen the link between professional and owner and provide a good basis for forthcoming cooperation.

Traditionally, forest issues have been discussed within the family and tacit information, that which is learned by doing, has been delivered to the next generation. However, the results of this study imply that this way of information delivery is decreasing (IV), an unsettling fact since it is not easy to receive such knowledge elsewhere. Moreover, family members are often different ages and genders, living in different places. Therefore, having conversations among family brings the needed heterogeneity into networks (McPherson et al. 2001). Forest-related information delivery within families should be supported. Ideas, models and customs to promote families to create workable forest communities could be developed by forest extension organizations. For example, services that gather family members together into the forest to have a conversation could be beneficial. In addition, the results suggest that mentor owners could be used to deliver trustable knowledge, especially for new or inexperienced owners in their "own language" (Kueper et al. 2013). In the USA, Ricci et al. (2013) found that contact with a master or mentor increases the number of management plans, provides channels to search information, and even enables saving and earning money in forestry activities. Extension organisations could train mentor owners to disseminate practical advice to other owners (Kueper et al. 2013) and, moreover, they could create lists of the available mentors. "Mentoring" could be as simple as walking with an un-experienced owner in his or her forest.

So far, private forest owners' property rights have remained strong and, according to this thesis, citizens are not included into owners' social networks. When planning the use of publicly owned forests, the presence of citizens could render the situation totally different and also the values of the general public are more relevant to collect through participatory processes (Harshaw and Tindall 2005). However, increased importance of certain ecosystem services can cause the general public to be more interested in the use of private forests, and new monetary compensation models can provide a channel for the public to influence owners' decision making. As a consequence, owners' social decision making environment and the pool of people around them may become more diverse in the near future. This heterogeneity of the networks is needed to achieve real breakthroughs in knowledge creation, especially now when we need to discern new ways to compensate the various benefits that forests produce.

Future research needs

The results of the thesis suggest channels and means to reach diverse forest owners. It would be important to know if decreasing information delivery within forest owner families is a common direction (IV) and also to find out ways to reinforce forest-related information exchange in families. In this thesis, existing peer learning settings were searched. More detailed studies of explicated as well as informal peer learning settings are needed. What is the motivation behind forest owners' participation in mutual activities and what are the power relations among these networks? Defining good practices and critical issues of peer learning in a practical level could aid in enhancing existing networks and creating new

ones. For example, the peer learning models from the USA could be benchmarked and the applicable parts could be utilised in Finland. Moreover, a profound examination of forest-related virtual discussion forums on the Internet and the possibilities to support or even replace face-to-face communication with virtual channels is needed.

The important questions about the meaning and significance of the relationships were briefly covered in the discussion. In the future studies, network measures could be analysed together with owners' background characteristics in a way that cause and effect -relationships are revealed (Bodin and Crona 2011). For example, can the network characteristics explain the satisfaction of owners? Or conversely, network characteristics can be as used as dependent variables, when the composition of the network is explained by individuals' characteristics (Bodin and Crona 2011, p. 83). In this thesis, the focus was on Finnish private forest owners' social networks on a general level. According to the results, it can be stated that the owners who have large, heterogeneous networks are important persons in the networks and they can be utilised as brokers or change agents. When aiming to recognise these persons, social networks among restricted groups of individuals and their mutual interactions should be studied.

Private forest owner studies have mainly used quantitative data and related methods and their main focus has been on defining owners' background characteristics, classifying owners, and examining the behaviour of different owners (Karppinen 1998; Ní Dhubháin et al. 2007; Butler and Ma 2011; Hänninen et al. 2011). However, during the past decade, the use of qualitative approaches has increased (e.g. Jokinen 2002; Hujala et al. 2007; Peltola 2013). This is a desirable direction since the qualitative approach can bring new perspectives and novel information. For example, narratives or even ethnographies of forest owners can reveal profound structures and new kinds of reasoning for forest owners' behaviour. Moreover, to study forest owners as humans in society, new, unprejudiced theories, for example from social psychology, would be needed.

REFERENCES

Bazeley P. (2007). Qualitative Data Analysis with NVivo. Sage Publications Ltd, London. 309 p.

Bernard H.R. (2006). Research methods in anthropology: Qualitative and quantitative approaches. Altamira Press, New York. 800 p.

Bodin Ö., Crona B., Ernstson H. (2006). Social Networks in Natural Resource Management: What Is There to Learn from a Structural Perspective? Ecology and Society 11(2).

Bodin Ö., Crona B. (2011). Barriers and opportunities in transforming to sustainable governance: the role of key individuals. In: Bodin Ö., Prell C. (eds.) Social networks and Natural Resource Management: Uncovering the Social Fabric of Environmental Governance. Cambridge University Press, Cambridge. p. 75–94. http://dx.doi.org/10.1017/CBO9780511894985.005

Borgatti S.P., Mehra A., Brass D.J., Labianca G. (2009). Network Analysis in the Social Sciences. Science 13(323): 892–895. http://dx.doi.org/10.1126/science.1165821

Boud D., Cohen R., Sampson J. (2001). Peer learning in higher education: Learning from and with each other. In 'Peer learning as pedagogic discourse for research education'; Studies in Higher Education 30: 501–516. http://dx.doi.org/10.1080/03075070500249138

Burt R. (1976). Positions in Networks. Social Forces 55 (1): 93–122.

Burt R. (1992). Structural Holes: The Social Structure of Competition. Harvard University Press. 313p.

Burt R. (2005). Brokerage and Closure: An Introduction to Social Capital. Oxford University Press, New York. 281p.

Butler B. J. (2008). Family forest owners of the United States, 2006. Gen. Tech. Rep. NRS-27. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 72 p.

Butler B.J., Leatherberry E.C. (2004). America's family forest owners. Journal of Forestry 102: 4–9.

Butler B.J., Ma Z. (2011). Family forest owner trends in the northern United States. Northern Journal of Applied Forestry 28(1): 13–18.

Butts C.T. (2013). Package 'sna'. http://cran.r-project.org/web/packages/sna/sna.pdf 238 p.

Coleman J. (1988). Social Capital in the Creation of Human Capital. American Journal of Sociology 94(s1): 95–95. http://dx.doi.org/10.1086/228943

Coleman J. (1990). Foundations of Social Theory. Harvard University Press. 997p.

Creswell J.W. (2010). Mapping the Developing Landscape of Mixed Methods Research. In: Tashakkori A., Teddlie C. (eds.) Sage handbook of mixed methods in social & behavioral research. 2nd ed. Thousand Oaks, California. p. 45–68.

Crona B. & Bodin Ö. (2010). Power Assymmetries in Small-Scale Fisheries: a Barrier to Governance Transformability? Ecology and Society 15(4): 32.

Crona B., Ernstson H., Prell C., Reed M., Hubacek K. (2011). Combining social network approaches with social theories to improve understanding of natural resource governance. In: Bodin Ö. & Prell C. (eds.) Social networks and Natural Resource Management: Uncovering the Social Fabric of Environmental Governance. Cambridge University Press, Cambridge. p. 44–71. http://dx.doi.org/10.1017/CBO9780511894985.004

DeWalt K.M., DeWalt B.R. (2002). Participant observation: a guide for fieldworkers. AltaMira Press, Walnut Creek, CA. 287p.

Duguid P. (2008). "The Art of Knowing": Social and Tacit Dimensions of Knowledge and the Limits of the Community of Practice. In: Amin A. & Roberts J. (eds.) Community, Economic Creativity, and Organization. Oxford University Press. p. 69–89. http://dx.doi.org/10.1093/acprof:oso/9780199545490.003.0004

Edhlund B. (2007). NVivo Essentials. Form & Kunskap AB. 152 p.

Eisen M.J. (2001). Peer-based Learning: A New-Old Alternative to Professional Development. Adult Learning 12(1): 9–10.

K .B.H., Wiersum K.F. (2001). Forestry and rural development in Europe: an exploration of socio-political discourses. Forest Policy and Economics 3: 5–16. http://dx.doi.org/10.1016/S1389-9341(00)00027-7

Finnish Forest Research Institute (2011). Markkinahakkuut vuosittain [Yearly cuttings]. MetINFO – Forest information services. Forest statistics. Available at: http://www.metla.fi/metinfo/tilasto/hakkuut/hakkuut_vuosittain_mk_t.html. [Cited 10 Jan 2011].

Finnish Government (2008). Government resolution on the forest biodiversity programme for Southern Finland 2008–2016 (METSO). 15 p. [Online document]. Available at: http://www.miljo.fi/download.asp?contentid=111229&lan=fi [Cited 24 Jan 2012].

Fisher C. (1982). To Dwell among friends: Personal Networks in Town and City. University of California Press, Berkeley. 451p.

Follo G. (2011). Factors Influencing Norwegian Small-Scale Private Forest Owners' Ability to Meet the Political Goals. Scandinavian Journal of Forest Research 26(4): 385–393. http://dx.doi.org/10.1080/02827581.2011.566574

Gittell R., Vidal A. (1998). Community organizing: Building social capital as a development strategy. Sage, London. 196p.

Gootee R.S., Blatner K.A., Baumgartner D.M., Carroll M.S., Weber E.P. (2010). Choosing what to Believe about Forests: Differences between Professional and Non-Professional Evaluative Criteria. Small-scale Forestry 9(2): 137–152. http://dx.doi.org/10.1007/s11842-010-9113-3

Granowetter M.S. (1973). Strength of weak ties. American Journal of Sociology 78(6):1360–1380. http://dx.doi.org/10.1086/225469

Hanneman R. (2010). Introductory Textbook on Social Network Analysis. Available at: http://faculty.ucr.edu/~hanneman/networks/nettext.pdf. [Cited 16 June 2011].

Hänninen H., Karppinen H., Leppänen J. (2011). Suomalainen metsänomistaja 2010 (Finnish Forest Owner 2010). Working Papers of Finnish Forest Research Institute, 208. Vantaa. (in Finnish). http://www.metla.fi/julkaisut/workingpapers/2011/mwp208.htm

Hara N. (2009). Communities of practice. Fostering Peer-to-Peer Learning and Informal Knowledge Sharing in the Work Place. Springer-Verlag, Berlin Heidelberg. 137p.

Harshaw H.W., Tindall D.B. (2005). Social structure, identities, and values: a network approach to understanding people's relationships to forests. Journal of Leisure Research 37(4): 426–449.

Haythornthwaite C. (1996). Social Network Analysis: An Approach and Technique for the Study of Information Exchange. Library & Information Science Research 18(4): 323–342. http://dx.doi.org/10.1016/S0740-8188(96)90003-1

Hiedanpää J., Kotilainen J., Salo M. (2011). Unfolding the organised irresponsibility: Ecosystem approach and the quest for forest biodiversity in Finland, Peru, and Russia. Forest Policy and Economics 13(3): 159–165. http://dx.doi.org/10.1016/j.forpol.2010.11.007

Hodges D. G., Cubbage, F. W. (1990). Adoption behavior of technical assistance foresters in the southern pine region. Forest Science 36(3): 516–530.

Hokajärvi R., Hujala T., Leskinen L. & Tikkanen J. (2009). Effectiveness of sermon policy instruments: forest management planning practices applying the activity theory approach. Silva Fennica 43(5): 889–906.
http://www.metla.fi/silvafennica/full/sf43/sf435889.pdf

Hokajärvi R., Hujala T., Tikkanen J. (2011). Change in forest planner's advisory role. Scandinavian Journal of Forest Research 23(5): 466–476.
http://dx.doi.org/10.1080/02827581.2011.579996

Horne P., Koskela T., Ovaskainen V., Karppinen H., Horne T. (2009). Forest owners' attitudes towards biodiversity conservation and policy instruments used in private forests. In: Horne P., Koskela T., Ovaskainen V., Horne T. (eds.) Safeguarding forest biodiversity in Finland: Citizens' and non-industrial private forest owners' views. Working Papers of the Finnish Forest Research Institute 119. Vantaa. Available at http://www.metla.fi/julkaisut/workingpapers/2009/mwp119.htm

Hujala T., Pykäläinen J., Tikkanen J. (2007). Decision making among Finnish non-industrial private forest owners: The role of Professional opinion and desire to learn. Scandinavian Journal of Forest Research 22:454–463.
http://dx.doi.org/10.1080/02827580701395434

Hujala T., Tikkanen J. (2008). Boosters of and barriers to smooth communication in family forest owners' decision making. Scandinavian Journal of Forest Research 23(5): 466–477.
http://dx.doi.org/10.1080/02827580802334209

Hujala T., Tikkanen J., Hänninen H., Virkkula O. (2009). Family forest owners' perception of decision support. Scandinavian Journal of Forest Research 24(5): 448–460.
http://dx.doi.org/10.1080/02827580903140679

Hujala T., Kurttila M., Korhonen K., Pykäläinen J. (2010). Reasoning of family forest owners – survey of forest management and biodiversity protection problems. In: Helles F. & Nielsen P.S. (eds.) Scandinavian forest economics, 43:146–160. Proceedings of the Biennial Meeting of the Scandinavian Society of Forest Economics Gilleleje, Denmark.

Hujala T., Kurttila M., Karppinen H. (2013). Customer segments among family forest owners: Combining ownership objectives and decision-making styles. Small-scale Forestry. DOI:10.1007/s11842-012-9215-1
http://dx.doi.org/10.1007/s11842-012-9215-1

Jiang H., Carroll J.M. (2009). Social Capital, Social Network and Identity Bonds: A Reconceptualization. Proceedings of the fourth international conference on communities and technologies: 51-60. June 25–27, 2009, University Park, Pennsylvania, USA. Available at: http://www.iisi.de/fileadmin/IISI/upload/2009/p51.pdf. [Cited 28 June 2013].

Johanson J.-E.,Uusikylä P. (1998). Sosiaalipääoma verkostoissa (Social capital in networks). Sosiologia 1/98: 17-27. (in Finnish).

Johnson J.E., Creighton J.H., Norland E.R. (2006). Building a Foundation for Success in Natural Resources Extension Education: An International Perspective. Journal of International Agricultural and Extension Education 13(3): 33–45. http://dx.doi.org/10.5191/jiaee.2006.13303

Jokinen A. (2002). Metsänomistaja metsänsä hoitajana: rutiinit, "tarjokkeet" ja vastavuoroisuus (Forest owners as a caretaker in her forest: routines, utilities and reciprocity). Yhteiskuntapolitiikka 67(2): 134–147. (in Finnish).

Karppinen H. (1998). Values and Objectives of Non-industrial Private Forest Owners in Finland. Silva Fennica 32(1): 43–59. Available at http://www.silvafennica.fi/article/699

Karppinen H., Hänninen H. (2006). Monitoring Finnish family forestry. Forestry Chronicle 82: 657–661.

Karppinen H., Korhonen M. (2013). Do forest owners share the public's values? An application of Schwartz's value theory. Silva Fennica 47(1): article id 894.

Karppinen H., Tiainen L. (2010). "Semmonen niinkun metsäkansa" – suurten ikäluokkien perijät tulevaisuuden metsänomistajina ["Kind of Forest People" – inheritors of the post-war baby-boom generation as the future forest owners]. Metsätieteen aikakauskirja, 1: 19–38. (In Finnish.) http://www.metla.fi/aikakauskirja/full/ff10/ff101019.pdf

Kauneckis D. & York A.M. (2009). An empirical evaluation of private landowner participation in voluntary forest conservation programs. Environmental Management 44(3): 468–484. http://dx.doi.org/10.1007/s00267-009-9327-3

Knipscheer K.C.P.M., Antonucci T.C. (1990). Maturing of the social networks research in the Neatherlands. In: Knipscheer C.P.M., Antonucci T.C. (eds.) Social network research: substantive issues and methodological questions. Swets & Zeitlinger. Amsterdam/Lisse.

Knoot T.G., Rickenbach M. (2011). Best management practices and timber harvesting: the role of social networks in shaping landowners decision. Scandinavian Journal of Forest Research 26 (2): 171-182. doi: 10.1080/02827581.2010.545827

Korhonen K., Kurttila M., Hujala T. (2010). Typical social networks of family forest owners in timber trade. In: Helles F. & Nielsen P.S. (ed.) Scandinavian forest economics, 43, (pp.161-171). Proceedings of the Biennial Meeting of the Scandinavian Society of Forest Economics Gilleleje, Denmark.

Krippendorf K. (1980). Content analysis: An introduction to its methodology. Sage, Beverly Hills, California. 415 p.

Krueger X., & Casey X. (2009). Focus groups: A practical guide for applied research. 4th edition. Sage, London. 217 p.

Kueper A.M., Sagor E.S., Becker D.R. (2013). Learning From Landowners: Examining the Role of Peer Exhange in Private Landowner Outreach Through Landowner Networks. Society and Natural Resources.
http://dx.doi.org/10.1080/08941920.2012.722748

Kuuluvainen J., Karppinen H., Hänninen H., Pajuoja J., Uusivuori J. (2011). Yksityismetsien puuntarjonta – Uudet metsänomistajat (The timber supply from private forests – new forest owners) Metsätehon katsaus 47. (in Finnish). ISSN 1796-2366.
http://www.metsateho.fi/metsatehon-katsaus?year=2011

Larsson S., Nordvall H. (2010). Study Circles in Sweden, an Overview with a Bibliography of International Literature. Studies in Adult, Popular and Higher Education, 5. Linköping University Electronic Press, Linköping, Sweden. Available at: http://urn.kb.se/resolve?urn=urn:nbn:se:liu:diva-57887. [Cited 16 June 2013].

Lave, J., Wenger, E. 1991. Situated Learning. Legitimate peripheral participation. Cambridge: University of Cambridge Press.
http://dx.doi.org/10.1017/CBO9780511815355

Leppänen J., Sevola Y. (2013) Metsämaan omistus 2011 [Ownership of Forest Land]. Official Statistics of Finland, Agriculture, Forestry and Fishery. Finnish Forest Research Institute, Metsätilastotiedote 16. (in Finnish). Available at: http://www.metla.fi/tiedotteet/metsatilastotiedotteet/2013/metsamaan_omistus2011.htm.

Lorrain F.P., White J. (1971). Structural equivalence of individuals in social networks. Journal of Mathematical Sociology 1: 49-80.
http://dx.doi.org/10.1080/0022250X.1971.9989788

Ma Z., Butler B.J., Kittredge D.B., Catanzaro P. (2012). Factors associated with landowner involvement in forest conservation programs in the U.S.: Implications for policy design and outreach. Land Use Policy 29(1): 53–61.
http://dx.doi.org/10.1016/j.landusepol.2011.05.004

Ma Z., Kittredge D.B., Catanzaro P. (2011). Challenging the traditional forestry extension model: Insights from the Woods Forum Program in Massachusetts. Small-scale Forestry 11(1): 87–100.
http://dx.doi.org/10.1007/s11842-011-9170-2

Mc Pherson M., Smith-Lovin L., Cook J.M. (2001). Birds of feather: homophily in social networks. Annual Review of Sociology 27: 415–444.
http://dx.doi.org/10.1146/annurev.soc.27.1.415

Millennium Ecosystem Assessment (2005). Ecosystems and human well-being: Synthesis. Island Press, Washington, DC. 137 p.

Moreno J.L. (1934). Who Shall Survive? Foundations of Sociometry, Group Psychotherapy, and Sociodrama. Washington, D.C. Nervous and Mental Disease Publishing Co. Reprinted in 1953 (Second Edition) and in 1978 (Third Edition). Beacon House, Inc., Beacon, NY.

Newig J., Günther D., Pahl-Wostl C. (2010). Synapses in the Network: Learning in Governance Networks in the Context of Environmental Management. Ecology and Society 15(4): 24.

Ní Dhubháin Á., Cobanova R., Karppinen H., Mizaraite D., Ritter E., Slee B., Wall S. (2007). The Values and Objectives of Private Forest Owners and Their Influence on Forestry Behaviour: The Implications for Entrepreneurship. Small-scale Forestry 6(4): 347–357.
http://dx.doi.org/10.1007/s11842-007-9030-2

Norušis M. (2004). SPSS 13.0 Statistical Procedures Companion. Upper Saddle-River, N.J.: Prentice Hall, Inc.

Pajek wiki (2013). Available at: http://pajek.imfm.si/doku.php. [Cited 16 June 2013].

Peltola T. (2013). Asiantuntijuuden rakentuminen metsäneuvojan ja metsänomistajan kohtaamisissa: esimerkkinä luonnon monimuotoisuuden turvaaminen (Construction of expertise in the meetings of forest extensionist and forest owner: safeguarding the nature biodiversity as an example). Metsätieteen aikakauskirja 1/2013: 45–60. (in Finnish).
http://www.metla.fi/aikakauskirja/full/ff13/ff131045

Pettenella D. & Maso D. (2011). Networks of Small-Medium Enterprises Operating in Forestry: Some Theoretical Concepts and Empirical Evidence. In: Weiss G., Pettenella D., Ollonqvist P. & Slee P. (ed.) Innovation in forestry: territorial and value chain relationships. CAB International, Wallingford, UK. p. 35–47.
http://dx.doi.org/10.1079/9781845936891.0035

Prell C. (2011). Some basic structural characteristics of networks. In: Bodin Ö. & Prell C. (ed.) Social networks and Natural Resource Management: Uncovering the Social Fabric of Environmental Governance. Cambridge University Press, Cambridge. p. 29–43.
http://dx.doi.org/10.1017/CBO9780511894985.003

Prell C., Reed M., Hubacek K. (2011). Social network analysis for stakeholder selection and the links to social learning and adaptive co-management. In: Bodin Ö. & Prell C. (ed.) Social networks and Natural Resource Management: Uncovering the Social Fabric of Environmental Governance. Cambridge University Press, Cambridge. p. 95–118.
http://dx.doi.org/10.1017/CBO9780511894985.006

Primmer E.,Wolf, S. (2009). Empirical accounting of adaptation to environmental change: Organizational competencies and biodiversity in Finnish forest management. Ecology and Society 14(2): 27.

Ramirez-Sanches S. (2011). The role of individual attributes in the practice of information sharing among fishers form Loreto, BCS, Mexico. In: Bodin Ö. & Prell C. (ed.) Social networks and Natural Resource Management: Uncovering the Social Fabric of Environmental Governance. Cambridge University Press, Cambridge. p. 234–254. http://dx.doi.org/10.1017/CBO9780511894985.011

Rämö A.-K., Toivonen R. (2009). Uusien metsänomistajien asenteet, motiivit ja aikomukset metsiin ja metsänomistukseen liittyvissä asioissa (Forest related attitudes, motives and intentions among new private forest owners in Finland). Pellervo Economic research institute reports 216. (in Finnish with English abstract).

Reagans R., McEvily B. (2003). Network Structure and Knowledge Tranfer: The Effects of Cohesion and Range. Administrative Science Quarterly 48(2): 240–267. http://dx.doi.org/10.2307/3556658

Ricci N., Demers C., Long A. (2013). Cooperation and Communication: Benefits for Non-Industrial Private Forest Landowners. FOR235, School of Forest Resources and Conservation, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Available at: http://edis.ifas.ufl.edu/fr297. [Cited 10 June 2013].

Rickenbach M.G. (2009). Serving members and reaching others: The performance and social network of a landowner cooperative. Forest policy and economics 11: 593–599. http://dx.doi.org/10.1016/j.forpol.2009.08.006

Rickenbach M.G. & Kittredge D.B. (2009). Time and distance: Comparing motivations among forest landowners in New England. Small-Scale Forestry 8: 95–108. http://dx.doi.org/10.1007/s11842-008-9071-1

Rogers E.M. (2003). Diffusion of Innovations, Fifth ed. Free Press, London. 550p.

Ruseva T.B., Evans T., Fisher B.B. (2013). Variations in the Social Network of Forest Owners: the Effect of Management Activity, Resource Professionals, and Ownership Size. Manuscript.

Salmon O., Brunson M., Kuhns M. (2006). Benefit-based audience segmentation: A tool for identifying nonindustrial private forest (NIPF) owner education needs. Journal of Forestry 104(8):419–425.

Sagor E. (2013). Personal Networks and Private Forestry: Exploring Extension's Role in Landowner Education. Doctoral thesis, University of Minnesota (in press).

Schubert J.R., Mayer A.L. (2012). Peer Influence of Non-Industrial Private Forest Owners in the Western Upper Peninsula of Michigan. Open Journal of Forestry 2(3): 150–158. http://dx.doi.org/10.4236/ojf.2012.23018

Shiner M. (1999). Defining peer education. Journal of Adolescence 22: 555–566. http://dx.doi.org/10.1006/jado.1999.0248

Shivan G.C. & Mehmood S.R. (2010). Factors influencing nonindustrial private forest landowners' policy preference for promoting bioenergy. Forest Policy and Economics 12(8): 581–588. http://dx.doi.org/10.1016/j.forpol.2010.07.005

Sim D., Hilmi H.A. (1987). Forestry extension methods. FAO Forestry paper 80. 171 p. Available at: http://archive.org/details/forestryextensio034891mbp [Cited 15 April 2013].

SPSS Inc. (2010). SPSS Base 17.0 User's Guide. Available at: http://support.spss.com/ProductsExt/SPSS/Documentation/ [Cited 27 July, 2010].

Stevans N.L. (1990). Widowhood, well-being, and the quality of primary relationships. In: Knipscheer C.P.M. & Antonucci T.C. (ed.) Social network research: substantive issues and methodological questions. Swets & Zeitlinger. Amsterdam/Lisse. p. 83–100.

Steyaert P., Barzman M., Billaud J.P., Brives H., Hubert B., Ollivier G., Roche B. (2007). The role of knowledge and research in facilitating social learning among stakeholders in natural resources management in the French Atlantic coastal wetlands. Environmental Science & Policy 10(6): 537–550. http://dx.doi.org/10.1016/j.envsci.2007.01.012

Tikkanen J. (2006). Osapuolten välinen yhteistyö yksityismetsien suunnittelussa [Co-operation in forest planning processes for non-industrial private forestry]. Dissertationes Forestales 26. 56p. (in Finnish with English abstract). Available at: http://www.metla.fi/dissertationes/df26.htm

Tikkanen J., Leskinen L., Leskinen P. (2003). Forestry Organization Network in Northern Finland. Scandinavian Journal of Forest Research 18: 547–599. http://dx.doi.org/10.1080/02827580310019239

Tindall D.B. & Wellman B. (2001). Canada as social structure: Social network analysis and Canadian sociology. Canadian Journal of Sociology 26(3): 265–308. http://dx.doi.org/10.2307/3341889

Topping K.J. (2005). Trends in peer learning. Educational Psychology 25(6): 631–645. http://dx.doi.org/10.1080/01443410500345172

Vedel S.E. (2010). Creating First-Mover Advantages in Nature-Based Recreational Goods. Small-scale Forestry 9(1): 21–39. http://dx.doi.org/10.1007/s11842-009-9099-x

Wasserman S. & Faust K. (1994). Social network analysis. Cambridge University Press. Cambridge. 825 p.

Wenger E. (1998). Communities of practice: Learning, Meaning and Identity. Cambridge University Press. Cambridge. 318 p. http://dx.doi.org/10.1017/CBO9780511803932

Wenger E., McDermott R., Snyder W.M. (2002). Cultivating communities of practice. A guide to managing knowledge. Harvard business school press, Boston, Massachusetts. 284 p.

Wenger E. (2009). A social theory of learning. In: Illeris K. (ed.) Contemporary theories of learning: learning theorists – in their own words. Routledge. New York. p. 209–218.

Wellman B. (1979). The Community Question: The Intimate Networks of East Yorkers. The American Journal of Sociology 84(5): 1201–1231. http://dx.doi.org/10.1086/226906

Wellman B., Salaff J., Dimitrova D., Garton L., Gulia M., Haythornthwaite C. (1996) Computer Networks as Social Networks: Collaborative Work, Telework, and Virtual Community. Annual Review of Sociology 22: 213–38. http://dx.doi.org/10.1146/annurev.soc.22.1.213

Wellman, B. & Berkowitz, S.D. (1988) (eds.). Social Structures: A Network Approach. Campbridge, England. Cambridge University Press. 517 p.

West P.C., Fly J.M., Blahna D.J., Carpenter E.M. (1988). The Communication and Diffusion of NIPF Management Strategies. Northern Journal of Applied Forestry 5(4): 265–270.

Westberg L., Appelstrand M., Sriskandarajah N. (2011). Peer-to-peer learning experiences in Sweden. In: Karppinen H, Hujala T., Virkkula O. (eds.) Recent advances in land owner extension. Proceedings of the IUFRO 3.08 Symposium with a special theme of peer-to-peer learning among land owners, 3-5 April 2011, Kuusamo, Finland. Working Papers of the Finnish Forest Research Institute 193: 55–64. Avalaible at: http://www.metla.fi/julkaisut/workingpapers/2011/mwp193.htm

Wiersum K. F., Elands B. H. M., Hoogstra M. A. (2005). Smallscale forest ownership across Europe: characteristics and future potential. Small-scale Forest Economics, Management and Policy 4: 1–19.

Yuan Y. C., Gay G. (2006). Homophily of network ties and bonding and bridging social capital in computer-mediated distributed teams. Journal of Computer-Mediated Communication 11(4): article 9. Available at: http://jcmc.indiana.edu/vol11/issue4/yuan.html. [Cited 20 April 2013].

Zyzanski S.J., Mcwhinney I.R., Blake R., Crabtree B.R., Miller W.L. (1992). Qualitative research: Perspectives in the future. In: Crabtree B.F. & Miller W.L. (eds.). Doing qualitative research. Sage Publications, Newbury Park, CA. p. 231–248.