



Forest owners' attitudes toward pro-climate and climate-responsive forest management

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ARTICLE INFO

Keywords:

Climate change
Family forest owner
Cognitive mapping
Qualitative interview
Theory of planned behavior
Tripartite model of attitudes

ABSTRACT

Climate change is a global concern. Within Nordic countries such as Finland it has particular influence on the use of natural resources. Family forest owners own 61% of the forested land in Finland and 80% of the industrial roundwood purchased comes from these forest owners. Thus how private forest owners approach climate change is of high national economic and ecological importance. In order to understand family forest owners' perspectives on climate change in their own forests, qualitative interviews along walks through the owner's forests were conducted. Analysis of the conversations during these walks highlighted that forest owners discussed the phenomenon without prompting more often than hypothesized. Additionally, forest owners were less certain as to the causes of changes observed in their forests, mostly willing to take advice from professionals, and economically-driven in their response. For those forest owners who did express concern regarding climate change, they were at a loss for ways their efforts could make a meaningful difference. The prevalent uncertainty among forest owners calls for guidance from authority. Policy practices should make an effort to combine monetary incentives along with climate change focused forest management practices. Additionally, forest owner's reliance on the advice and expertise of forestry professionals should be utilized when pursuing climate-motivated forest management.

1. Introduction

Climate change is having and will continue to have a distinct effect on boreal forests in the northern hemisphere (Harris et al., 2009; IPCC, 2014). Such effects include shorter periods of ground frost; northward movement of the forestline; reduced snowfall and snowpack; increased risks for fire, wind throw, and drought; and timber damage as a result of insects and fungi (Harris et al., 2009; Volney and Fleming, 2000; Stocks et al., 1998). Not only will these changes affect forest composition but they can and should also alter the practices of forest management by landowners (Eriksson, 2014; van Gameren and Zaccai, 2015; Lawrence, 2017; Sohngen and Tian, 2016). Thus, climate change is and will continue to be a major change factor for private forest owners in their forest management decisions.

Not all effects of climate change are considered to be negative though (Blennow and Sallnäs, 2002). With increased annual temperatures comes the potential for less hardy tree species from more southern

latitudes to survive the winters. The advent of certain non-native species can be a source of higher revenue in the timber market, and native species may grow with increased vigor given increased rainfall and shorter winters (SCCV, 2007). On the other hand, invasion of non-native species is been considered as one of the most severe threats facing forests globally, and possibly catalyzed by climate warming (Dale et al., 2001; Hansen et al., 2001; Pimentel et al., 2005).

Researchers often view forest management in the face of climate change through two different lenses: mitigation and resilience, where mitigation is the forest's role in sequestering atmospheric carbon back into the earth (Canadell and Raupach, 2008) and resilience is the forest's capacity to maintain and reshape its current structure and functioning in the face of a changing climate (Folke, 2006). Theoretically, forest owners' adaptation to climate change can include both of these elements. They can change the forest structure pre-emptively in order to maintain or enhance the forest's resilience and production capacity (D'Amato et al., 2011; Blennow et al., 2012). Likewise, they can aim to

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<https://doi.org/10.1016/j.forpol.2017.11.001>

Received 9 May 2017; Received in revised form 27 October 2017; Accepted 1 November 2017

Available online 21 November 2017

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mitigate climate change through carbon binding and storage (e.g. Håbesland et al., 2016; Khanal et al., 2017; Latta et al., 2016). In contrast to the pre-emptive measures, climate change mitigation is best pursued by inactivity in forest management.

Each climate change approach has a place within forest management not only at the national level but also within the management plans of non-industrial private forest owners (hereafter forest owners), who provide ecosystem services to their communities and are working to keep their forests productive for decades to come. Climate change considerations are especially important in parts of the boreal forest that are dominantly owned by private individuals and families. For example, in Finland over 60% of the forested land is in the possession of forest owners and over 80% of all roundwood purchased by the forest industry in Finland comes from forest owner land (Hänninen et al., 2011; Parviainen and Västälä, 2011). The individual decisions that forest owners make will collectively have a large influence on the overall forest landscape, climate, and economy of Finland, and the situation is relatively similar also in other private-forested countries in Europe, such as Sweden, Austria, and Slovenia.

Therefore, it is an important policy objective to support “pro-climate” decisions of forest owners through mitigation practices as well as “climate responsive” decisions for improving the forest's resilience. Making policy programs coherent and influential requires deep understanding on how forest owners think about climate change and how they see themselves in the larger framework of this global issue, which is distinctively uncertain (Zhou, 2015): it is important to study not only climate change on boreal forests, but also climate change perceptions, observations, and attitudes of the forest owners (Hopkins et al., 2017). Adaptive capacity of human communities shapes, through forest management decisions, the resilience of forest ecosystems in the face of climate change. In addition, understanding forest owners' perceptions toward climate change could bring up new insights when considering service provisioning for forest owners (Valatin et al., 2016).

Forest owners' motivations to join with carbon sequestration programs have been focused on several studies (e.g. Håbesland et al., 2016; Latta et al., 2016; Valatin et al., 2016; Khanal et al., 2017), but only few holistic studies on pro-climate and climate responsive dimensions have been conducted in the context of forest owners. In Canada Bissonnette et al. (2016) found out that forest owners did not perceive vulnerability to climate change to be linked to their forests or activities in them, and Grotta et al. (2013) found out that most forest owners did not plan to make changes in their forest management due to anticipated climate change. In Belgium van Gameren and Zaccai (2015) found that landowners were not adapting to climate change and the reasons for the lack of adaptation varied based on sociocognitive factors and multiple objectives. Furthermore, studies from Sweden are emphasizing that both personal experiences and beliefs should be taken into account when working on climate change policy communication:

- Landowners who believed to have experienced the effects of climate change are more likely to take measures to adapt to climate (Blennow, 2012; Blennow et al., 2012).
- Most often, landowners observed changes to their forests such as insect damage, wind throw, increased drought, and fungal diseases (Blennow, 2012).
- Adaptation to climate change is strongly related to forest owner's belief in climate change (Blennow and Persson, 2009).
- Landowners' strength of belief in the adaptability of the forest is related to their adoption of adaptive measures (Blennow and Persson, 2009).

The idea that climate change is not readily understood and accepted comes from the understanding that weather fluctuations are a natural part of climate patterns, and larger over-arching changes are harder to detect through normal human experiences (Blennow et al., 2012). When a phenomenon is hard to observe as actually occurring it can then

be hard to take action to respond. This is particularly true for forest owners, who can have a hard time distinguishing the effects of climate change from normal functions and disturbances in their forests. Higher education of forest owner may increase awareness, and perception of risk (Blennow et al., 2016) and participation to targeted policy programs (Hopkins et al., 2017).

A qualitative study by Eriksson (2014) highlighted the finding that landowners were overall unconcerned about forest risks, be it fire, drought, or insect damage, and highlighted a foundational two-dimensional framework for categorizing and understanding forest landowners. These two categories, perceived risk tolerance and perceived control, and the placement of a landowner in them, was influenced by the role of the forest within the finances of the forest owner, past experiences with risk to the forest structure, forest values, and the vulnerability of the forest overall (Eriksson, 2014). Eriksson's (2014) study allowed landowners to come up with their own ideas of which risks were threatening their forests, and climate change was not immediately introduced. Interestingly, not primed with the thought of climate change, only 10% of the interviewees mentioned it.

1.1. Objectives and research questions

Though some work has been done on this intersection of climate change and forest owners in Europe, most has thus far occurred in Sweden (Blennow, 2012; Blennow et al., 2012, 2016; Blennow and Persson, 2009; Blennow and Sallnäs, 2002; Eriksson, 2014). Thus, the issue is still a highly unexplored field. In many countries where forests play a major role in the national economy, such as Finland, there are currently no studies available.

Using psychological theories on behavioral change, particularly the theories of the tripartite model of attitudes and the theory of planned behavior as a vantage point, this study seeks to add to the existing knowledge of forest owner's attitudes toward climate change through a qualitative and mixed-methods approach. This study contributes to the international forest science knowledge base by acting as validation on previous studies related to forest owners climate change attitudes. Thus, this study explores the following three research questions and hypotheses, respectively, developed from the initial work conducted by Blennow and Sallnäs (2002), Blennow and Persson (2009), Blennow et al. (2012), and Eriksson (2014):

Research Question 1, cognitive element of attitudes: What is the role/position of climate change in the Finnish forest owners' perceptions of change in their forest and forest management?

H1. Few landowners consider climate change to be a fundamental force affecting their forest, and when prompted, their considerations primarily focus on increased risk of forest damage.

Research Question 2, affective element of attitudes: What affective statements do forest owners associate with impacts of climate change in their forests?

H2. Land owners are not primarily concerned that climate change will have a substantial impact in their forests.

Research Question 3, behavioral element of attitudes: How prepared are forest owners to adapt their management practices in response to climate change? What behavioral control statements do forest owners associate with their intentions toward climate-responsive forest management?

H3. Forest owners have not adapted their management practices to consider climate change but those who have observed negative impacts of climate change in their forests are more willing to adopt climate-responsive forest practices than those who have not perceived any impacts.

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