

Between Forests and Climate Change

A Study of Climate Change Relations amongst small-scale Private Forest Owners in southern Sweden



Master's thesis in Social Anthropology

SANM03: Spring semester 2017

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Total amount of words: 26 540

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Abstract

The aim with this thesis is to broaden the understanding of relations surrounding climate change in small-scale private forestry in Sweden by present results from an fieldwork study of a small sample of private forest owners in the south of Sweden. The thesis shows how forest owners are situated within socio-ecological, and political contexts that affect their possibilities to cope with, and shapes their understanding of, future climate change. The results are based upon empirical material collected from a fieldwork conducted in the densely forested border-zone between the three counties Halland, Scania, and Kronoberg, in the south of Sweden in late 2016. The thesis builds upon critical theories from anthropology, and social science, concerned with the contemporary world of climate change.

The results show that there exist social, and political conflicts and contempt to forestry authorities and experts that affect the forest owners' views on climate change and future forest management. It is also shown that forest owners tends to separate their own personal experiences of, and responses to climatic variations from general global climate change, as well as not necessarily connect their own contemporary coping strategies with climate change adaptation. In addition, the thesis also shows how forest owners can be seen as entangled and active participants in their forests and discusses how climate should be seen as relationally connected with local forests, producing what Marcus Taylor conceptualize as 'material climates'.

Keywords: Social Anthropology. Climate Change. Forestry. Forest Owner. Sweden.

Acknowledgement

This thesis was made possible thanks to the forest owners presented in this study, who gave their time and effort in meeting me and shared their views and knowledge. I am grateful to your participation and your openness to this study. I would also like to thank other forestry stakeholders with whom I have been in contact with.

I would like to thank the Department of Social Anthropology in Lund University for exciting years of studies. A special thank to my supervisor Ulf Johansson Dahre who have guided me through both my bachelor and master's thesis.

I would also like to thank my friends for your support, inputs and critical reading of the thesis.

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1. Introduction

In January 2005, Sweden was hit by the major storm Gudrun. In the densely forested southwestern part of the country the storm made massive damages, felling approximately 75 million cubic meter of forest. Two years later, another storm hit, named Per. This storm was not as strong as the previous, but still ended up with yet another major turn of storm damages that had to be managed. The day after Per, a Swedish meteorologist reported to the Swedish public service news that the two storms could be connected with global climate change and that we may witness an increase in similar events in the future (Sundin 2007). Thus, the two storms were no longer just extreme weather events, they were also possible physical manifestations of a global climatic system that was changing to such an extent that an increase in storms and forest damages may be expected.

As forests and forest industry are of great importance to the economy of Sweden there were reasons to get concerned, and as half of the total forest areas in Sweden is owned by private owners, climatic changes and variations not only became a national concern, but to a high extent also a social one. Swedish forest ownership is based on the concept of “freedom with responsibility” and this means that the 330 000 private forest owner scattered around the country will need to learn, and understand how to cope with the future effects of a changing climate. This calls for in-depth studies looking into the private forest ownership in Sweden, in order to better grasp how private forest owners understands, and responds to climate change.

1.1. Purpose and research questions

The storms Gudrun in 2005, and Per in 2007, helped to raise awareness of the need to take considerable action against climate change in Swedish forestry and private forest owners have reasons to be concerned with extreme weather events affecting their forestry in the future (Ulmanen et al. 2012). Despite this, it was shown in a recent statistical study comparing climate change perception, beliefs and adaptive actions taken amongst Swedish, German, and Portuguese forest owners, that Swedish forest owners were least able to tell that they had experienced climate change (Blennow et al. 2012). They also less strongly believed that climate change would affect their

future forestry and answered that they had taken fewer adaptive actions to cope with future changes than the German and Portuguese respondents did.

The results in the study above indicates that it would be relevant to further study what it is that makes forest owners believe, or not, in the effects of climate change in their forests. Due to the fact that Swedish forest owners showed the least concern for global climate change affecting their forestry, it would be relevant to look into this group through in-depth studies in order to better grasp how they explain, understand, and relate to climate change and its effects to their forests and forestry. Therefore, the purpose of this study is to show how climate change is experienced, coped with, and understood amongst a small sample of small-scale forest owners in the south of Sweden, in order to better understand what it is that makes climate change, more or less, a matter of concern to them. This will be done by not simply analyzing the forest owners' reflections concerning climate change as the a priori concern, but instead try to put it into the wider socio-ecological as well as socio-political contexts that are present in their everyday thinking and reflections.

The questions I will attempt to answer through this thesis is:

- How do the forest owners perceive, understand, and respond to climate change and climatic variations in their forestlands?
- What importance does the socio-political context surrounding forestry and forest ownership have when looking into matters of climate change amongst the private forest owners?

1.2. Earlier research

As this thesis aims to show how a small sample of forest owners relate, and respond to climate change it is necessary to look into other studies concerned with Swedish forest owners and future forestry in order to both put the informants into a bigger analytical picture as well as help to guide the results. I will present some earlier research and studies that have analyzed the socio-political world of forestry stakeholders connected to climate change in order to show the current knowledge on these matters.

In the statistical study presented earlier, Kristina Blennow et al. (2012) shows that there seems to exist a correlation between forest owners' personal beliefs in the effects of climate change, their personal experience of it, and their adaptive actions. They suggest that strength in belief and experience of climate change is sufficient in order to explain adaptation actions amongst European forest owners and state that their results challenge general explanations of adaptive capacity being dependent on socio-economic and political structures (Blennow et al. 2012: 6). The study presents strong evidence to the correlation between belief and experience, and forest owners will to take adaptive actions. They also show that these variables differ between the three countries in which the surveys were conducted, where Swedish forest owners' showed the lowest levels of beliefs, experience, and adaptation. As the result differed between the countries this tells that there must be other social, and structural relations and barriers that need to be taken into account in order to understand how forest owners relate to climate change in different settings.

Rolf Lidskog and Daniel Sjödin (2014) show that in the aftermath of the storm Gudrun in 2005, extensive replantation of spruce were conducted by affected forest owners despite recommendations and subsidies forwarded from the Swedish Forest Agency to replant, or mix their forestland with other tree species. They ask why forest owners did not heed to warnings and instead choose to replant vulnerable stocks of spruce when other less storm sensitive alternatives were possible. They discuss how social and political barriers explained why forest owners replanted with spruce. These barriers included economic pressure and need of short-term profit in order to cover necessary expenses in the aftermath of Gudrun, a disbelief in their own coping possibilities, uncertainty with alternative tree species and their value on future markets, and a distrust to authorities and experts knowledge as well as distrust in climate change predictions.

Social, economical, and political relations and barriers have also been discussed in other studies concerning forest owners as well as other forestry stakeholders and seem to greatly affect how climate change and adaptation is understood in Swedish forestry (e.g. Vulturius & Swartling 2015. Linné 2011. Ulmanen et al. 2012). One such barrier concerns forest stakeholders' reluctance to trust authorities and scientific experts due to past experiences with failed outcome from predictions and recommendations. Forest owners expressed that they felt that experts and authorities often changed their recommendations and that earlier warning such as the links

between acidification and extensive forest death during the 1970's and 1980's turned out to be wrong (Linné 2011. Lidskog & Sjödin 2014. Ulmanen et al. 2012: 14, 21). The findings concerning their distrust are important in order to re-socialize climate change, as will be discussed in this thesis, and Gregor Vulturius and Åsa Gerger Swartling suggest that it “seems crucial that science communication more directly addresses issues of trust and credibility” (Vulturius & Swartling 2015: 223).

Johanna Ulmanen et al. (2012) show how different conflicting socio-political relations have acted as conflicting barriers to the incorporation of climate change adaptation and awareness in Swedish forestry discourses. They discuss how academics and political pressure had pointed to the importance of adaptation while the storms Gudrun 2005 and Per in 2007 to some extent helped to create an understanding of the acute importance to incorporate adaptation into Swedish forestry. Surrounding adaptation were also conflicts between adaptation and mitigation, production and conservation, as well as between forest owners' lack of trust in expert recommendations and advices. Accordingly they state that today adaptation is not incorporated appropriately but work in order to either increase production, or increase conservation and biodiversity due to the contemporary conflict between these two interests (Ulmanen, J. et al. 2012: 21-22).

The studies presented above all look into the social world surrounding climate change related concerns in forestry and amongst forest owners, and shows that there exists both possibilities and constraints to the incorporation of climate change adaptation in forestry. Thus, these studies indicate that it is crucial that socio-economic and socio-political relations are taken into account when studying climate change in forestry and that communication and dialogue is developed between different stakeholders in order to form trust and share knowledge (Vulturius, & Swartling 2015. André 2013).

This thesis can contribute to these studies by showing how more in-depth anthropological approaches can help to reach a deeper understanding of the lives of private forest owners and how they relate to, and understand the concept of climate change and adaptation. Looking into how forest owners situate themselves in the political world of forestry, as well as understanding how they are personally entangled with their forests, may render a better picture of the underlying mechanisms that will affect the possibilities of efficient climate change management amongst private forest owners in Sweden.

1.3. Disposition

The thesis is divided into 8 chapters. Chapter 2 will give a brief and general background to how climate change is predicted to affect Sweden and Swedish forestry in general. This chapter presents climatic variations and effects that will pose challenges and opportunities to forestry and forest owners in the future. Chapter 3 will present the theoretical framework that has been used to analyze the data and guide the analysis. This chapter presents critical theories that challenge the ontological division between climate and the social world, which is problematized in this thesis. In chapter 4, the methodology, fieldwork, material, and limits of the study is presented and discussed as well as a short discussion of the role of anthropological methods and contribution to the study of climate change.

The analysis of the data is divided into three chapters. After each chapter follows a short summary of the results given in order to better grasp the significance of each chapter. Chapter 5, *Political Relations*, will look into the informants' contempt to authorities, their feelings of having their ownership right threatened, and their skepticism and distrust to external knowledge and expert recommendations. Chapter 6, *Forest Relations*, will look into how the forest owners were connected to their forests as active participants shaping their land and how their personal memories become embodied in the landscape. It will also show how forest owners related to changes in the landscape and how they produced local knowledge that derived from their real-time experiences with successes or failures with methods or actions performed in the forest. This chapter will also discuss how material climates are produced in forest landscapes. Chapter 7, *Climate Relations*, will look into how the forest owners more directly related to, and perceived climatic variations and weather events. It also looks at how the forest owners have responded to and coped with contemporary climatic variations such as storm damages in their forests and shows how they related to future changes. Chapter 8 gives a general summary with conclusions and discussions concerning the whole analysis.

2. Background

This chapter will give a brief summary of climate change predictions based on scientific data in Sweden and in Swedish forestry as well as show how the administrative authority “Swedish Forest Agency” (Skogsstyrelsen) is concerned with climate change in forestry. The purpose of this chapter is to give an understanding of the general view of climate change in forestry that forest owners will need to relate to.

2.1. Future climate in Sweden

Presented here is a brief overview of the contemporary knowledge and data telling of how climate change will affect Sweden in the future. The data is gathered from a recent report by The Swedish Meteorological and Hydrological Institute (SMHI), made in collaboration with The Swedish Energy Agency (Energimyndigheten), and The Swedish Environmental Protection Agency (Naturvårdsverket) (Kjellström et al. 2014). The data in these reports are based both upon global measurement data from the International Panel On Climate Change fifth assessment synthesis report 2014 (AR5), as well as from regional scenarios and simulations conducted within the SMHI Climate Modeling Unit: Rossby Centre.

The SMHI report tells that there has been a general increase in both temperature and precipitation in Sweden in the period 1991-2013, compared with the international reference period 1961-1990, and that both temperature and precipitation will continue to increase. The relative increase in temperature will be greater in northern Sweden while the increase in precipitation is somewhat more uncertain and will vary between local areas. Even with more rain the risk of drought and water scarcity will increase, especially in south and east of Sweden due to local variations in the amount of precipitation, higher temperatures and more evaporation, as well as more uptake of water from plants due to a prolonged growth season. The growth season for plants and forests are estimated to increase and can be 30-100 days longer in the period 2071-2100. The scenarios do not show any extensive increase in wind speed or change in patterns of extreme wind event patterns in the future and it seems that storms and wind will continue to occur similarly to earlier reference periods.

2.2. Effects of climate change in Swedish forests

The SMHI report states that climate change will have extensive effects on Swedish forests and forestry (Kjellström et al. 2014: 40). These effects have been assessed and presented in more detailed by the section in the Mistra-SWECIA program analyzing climate change adaptation in Swedish forestry (Mistra-SWECIA 2015).

The Mistra-SWECIA report (2015) tells that generally climate change will have a positive effect on Swedish forestry due to warmer temperatures and prolonged growth season and growth speed of plants and trees that will make forests more productive. On the other hand climatic changes will increase risks such as an increase in both domestic and invasive insect infestations, negative spring frost, drought, forest fires, and storm damages. The climate scenarios also tell of little, or no change in wind speeds, but storm damages may still increase due to more precipitation during autumn and winter season, as well as less ground frost in these periods that affect the trees root strength and their ability to withstand the forces of strong winds. Larger areas of monoculture forests is regarded as more vulnerable to negative climatic effects while mixed forests with both conifers and deciduous trees, as well as shortening of rotation cycles, is predicted to be more secure in order to decrease risks of negative outcomes in a future climate. It is also assumed that the market demands for forest products will increase in order to meet the need of renewable resources in the future.

2.3. The Swedish Forest Agency and climate change

The Swedish Forest Agency (SFA) is an administrative authority in Sweden with the mission to administrate and govern forestry related interest and work in order to make sure that political goals of forestry are fulfilled.

SFA has incorporated climate change and adaptation in their work in order to help and support the forestry sector to cope with future climatic challenges. This is done with guidelines from their Climate Policy, that states that employees involved in forestry and communicative work shall incorporate the policy in their work (Swedish Forest Agency 2009: 1).

There is a range of adaptation strategies and possible future effects on forestry presented by SFA, both in the policy and in reports (Eriksson, et al. 2016). Three examples that are of relevance to this thesis will be presented. These concern: storm

damages, future need of forest biomass, and communication and consultations with forest owners.¹

As was shown earlier, most climate scenarios do not show any future increase in wind speed, or increase in the frequency of extreme wind events. Despite this, Swedish forestry, especially in the southern part of Sweden has had problem with an increase in storm damages, with the largest damages occurring during the storms Gudrun in 2005 and Per 2007. SFA informs that storm damages may increase due to a warmer climate with less ground frost and more precipitation during winter season (Swedish Forest Agency 2009: 2). In one of SFA's climate reports it is also recognized that the probably most important explanation to the recent increase in storm damages is connected to a higher standing forest volume and extensive use of so called "trakthyggesbruk" or 'clear-felling', a method where a stock consist of one generation of plants that is managed accordingly with thinning processes that ends up with clear felling activities, and thus leave a naked ground ready to for a new generation of forest stock (Eriksson et al. 2016: 32-33). Therefore, according to SFA the increase of storm damages in recent times is not due to an increase in storm and wind events, but rather depends on other socio-ecological conditions rendering forests vulnerable.

The other point concerns SFA view on how forests and forestry may contribute to mitigation strategies by carbon trapping and producing renewable resources through forest biomass. In the policy it is stated that the general view of the agency is that active productive forests will contribute more to climate change mitigation than non-productive forests since the trees' carbon trapping processes slows down in older forests and due to this the total sum of positive mitigation will be larger with an increase in usage of renewable energy resources gained from forest biomass produced by active forestry (Swedish Forest Agency 2009: 4). At the same time is stated that a higher market demand of forest biomass may have negative impacts on the biodiversity due to higher production if not the management of environmental care is developed simultaneously (Swedish Forest Agency 2009: 3. Eriksson et al. 2016: 25). This indicates that market interests as well as the global need of mitigation actions influence the future use of forests.

¹ SFA states that the report represents the views of the authors and is not necessarily representative to their official view. (Eriksson et al. 2016: 5.)

The last point concerns the communication and consultations with forest owners. The policy informs that it is important that forest owners is aware of future climate risks when planning their forestry and that these risks are able to reach out, and is communicated through information and consultation from SFA (Swedish Forest Agency 2009: 3, 5). One such strategy has been to develop an internet-based self-service tool available to forest owners called “Skogens klimatråd” that give information and advises for climate change adaptation strategies. It is also put forward that it is important that consultation and information should work in order to adequately meet the diverse needs and interests of different forest owners (Eriksson et al. 2016: 8).

3. Theoretical and analytical framework

This chapter will present the theoretical framework that has been used as tool and guideline to the analysis. These theories are based upon general anthropological and social theories concerned with human-nature ontology as well as critical theories of the social world, power relations, and epistemology surrounding climate change.

3.1. Relational landscapes and the production of material climates

The following thesis will build upon an ontological approach where humans, climate, and weather are regarded as actors that are mutually co-producing living socio-ecological worlds. This ontological perspective is critically challenging what is often termed the ‘Cartesian dualism’ that is known to have separated the mind and the body. This Cartesian perspective is often considered as being the foundation of a western modern ontology that tends to view the world as constituted by a dualistic relation between the world of nature, and the social world of human societies (Hornborg 2013. Ingold 2000). This dualism renders nature and society as two autonomous entities that are acting upon each other, and of importance to this study, tends to separate climate from society.

Moving away from the Cartesian dualism this thesis will instead turn to the work of the anthropologist Tim Ingold who has developed theories on how humans make up their environments, not by they acting “upon” it, but rather their acting “within” as active participants by their very ‘being’ in the world (Ingold 2000). This is a form of relational perspective where environments, or socio-ecological settings, are made up of a web of mutual relationships between active agents as they move through the world. This means that humans are not acting upon a pre-made landscape or simply interpret it through their cultural frames but instead must be seen as active agents in creating landscapes through their movements and active participation, or “dwelling” within a place through time and space (Ingold 2000: 173). By building relations within the landscape, humans become entangled with other actors such as plants, animals, wind, earth, and sky, and will produce knowledge and meaning that are temporarily situated and embodied within these webs of relations. The making of such relational entanglements is a constantly ongoing process of producing living places.

Of importance to the study of climate change, Ingold also gives a tool to understand how weather and sky become part of living environments through processes of “binding” (Ingold 2007). Binding can be seen as the process in which the weather, or what he calls the “medium”, becomes intermingled and mixed with the ground and surface of the earth, or the “substance” (Ingold 2007: 33. Ingold 2011: 119). In this zone of intermingling process, rain turns the ground into mud, a strong wind can blow down a big tree, and the sun can dry up forestland that can end up in a devastating forest fire.

In order to understand how an ontological perspective that does not separate nature and society is of importance when studying climate change, the sociologist Marcus Taylor uses the notion of “material climates” as a way to understand how climate is actively produced in local socio-ecological landscapes (Taylor 2015: 39-42). Taylor shows how local material climates are produced and come into being at “various scales within the complex combinations of meteorological forces, social energies and other non-human agencies” (Taylor 2015: 40). Thus a material climate can be viewed as a climate that is turned into matter of concern depending on the socio-ecological setting through which it becomes intermingled and is perceived and experienced. Put more simply we can highlight the fact that weather events such as a heavy rain or a storm will be perceived and experienced very differently depending on if they are perceived by a forest owner, a farmer, or by a business man working in the city. Together with the “binding” process we understand that it is in the intermingling zone between the “medium” and the “substance”, which makes up a socio-ecological setting, that material climates are produced. This means that climate in a range of different spatio-temporal locations cannot be regarded as one solid entity but is rather produced into multiple material climates. Thus, even if a climate as a biophysical system can show similar patterns when objectively measured, people will not experience this system in its regularity but rather experience it first when it has become intermingled with the multitude of socio-ecological settings and produced into different and unique material climates. In the following study it will be shown that material climates are more present in the life and experiences of forest owners than the objective and scientific models of climate systems that will be discussed below.

3.2. The universal climate system and climate science

If a landscape is the result of a coproduction of the mutual relations between involved and entangled actors it will be a difficult matter to detach one part and put it up for separate scrutiny while omit the importance of the others. It has been argued that the modern science of climate change seems to be doing precisely this by sorting out, or externalizing, climate as a fixed entity that becomes external to, and impacting upon the social world of humans and other actors (e.g. Taylor 2015, Fleming & Jankovic 2011, Hulme 2011, Jasanoff 2010). In this view the Cartesian dualism work its ways by separating climate as an external force impacting upon a fixed environment by meteorological forces and events while humans are seen as passive receivers to these forces. By technical adaptation actions humans can then prevent or mitigate the effects of future impacts from this fixed entity.

This separation of climate and future climate change as separated from the world of humans renders it into a global model that can be measured and calculated in itself without taking careful consideration to the mechanism of the other social entity (Tsing 101-102). By statistical indexing and simulations it is possible to explore the imagined coherent system of global climate and render certain objective answers about future climate, in contrast to the complex and contingent, and thus uncertain, future of the social and local worlds where humans dwell. The power of scientific simulations is that it is possible to simulate more certain future climate models by extensive time periods reaching hundreds of years. This type of long-term analyses are crucial in order to get more certain predictions, while contrary, shorter time periods seem to render more accurate and certain results in analyzing the social world (Moore et al. 2015). In this way, climate becomes manageable by technical apparatus and politics as a fixed entity (Taylor 2015). The proposed objectivity of the global climate system becomes regarded as evenly impacting upon human landscapes by excluding social and political mechanisms, as well as local human ground-level experiences from analysis (Jasanoff 2010). In this thesis, this form of de-socializing of climate will be argued to be problematic if we are to understand the complex social web of relations shaping the future of Swedish forestry. If forest owners' views on contemporary climate science seem to be based not on the validity of the actual scientific results, but rather on political history and their personal memory and experience of science and expert recommendations in the past, it will be important

that climate science incorporates the social world as an inevitable part of how climate change will be managed.

Global climate change as abstract scientific model tends to not only become separated from humans in theory but also turns into a global discourse that risks being unreachable or non-relevant to a vast amount of human societies and viewed as knowledge beyond people's epistemological reach (Marino & Schweitzer 2009). As will be shown in this thesis, a discourse of climate change viewing it as a global system can function as a way for local forest owners to separate their own ground-level experiences of climate, based on their role as active participants in their forest landscapes, from general future scenarios that are based on contemporary politics and the predictions made from scientific simulations. This asymmetry between local and universal knowledge can affect the forest owners' feelings of legitimately claiming that they have perceived and experienced global climate changes.

3.3. Epistemological authority and climate reductionism

The problem with the proclaimed objectivity of modern climate science and the proposed coherence of the global climate is that it tends to render asymmetrical relations between climate, as a global phenomena, and the complex socio-economic and socio-ecological relations of local human worlds, as well as creating unequal power relations regarding epistemological systems. Modernity can be seen as a coherent singular knowledge system founded on detaching humans from their local environment, while, in contrast, local or 'traditional' knowledge are plural and locally fixed (Escobar 2007. Hornborg 2013: 132-133. Ingold 2000: 15). These plural knowledge systems, often labeled as "local", "indigenous", or "traditional", has been recognized as of importance to incorporate in the management of future climate change in reports produced by the Intergovernmental Panel on Climate Change (IPCC) (IPCC 2014b). Though, even if the importance of "local" knowledge is recognized in climate change analyses, the former will always be regarded as fixed in its plurality and locality while the latter will be viewed as free and objective in its singularity and universality. This means that local or individual knowledge or experience of climate change is only viewed as important when it is detached from context and put together with other experiences that confirm and corresponds to statistics and objective climate models (Moore et al. 2015: 186). This will also require

that 'alternative' knowledge systems are constantly put to critical validation while the universality of climate science will avoid the same scrutiny. Thus local or subjective ground-level experiences can be part of a universal knowledge system of climate change but can never challenge its foundations, or as stated by anthropologist Anna Tsing: "local data may adjust the global model but never defy it" (Tsing 2005: 102).

As climatic variations and weather changes differ in different places around the world, local knowledge will be situated and unique to different local places. As a way of bridging local knowledge with scientific knowledge about climate change, Susan Crate and Alexander N. Fedorov show how knowledge exchange between climate science and the native Viliui Sakha communities, a group of agro-pastoralist in north Siberia in Russia, resulted in successful communication when the exchange meetings were managed by anthropologists working as mediators and interlocutors between climate science and local knowledge (Crate & Fedorov 2013). This shows the importance of dialogue between stakeholders where trust is developed and local as well as scientific knowledge is taken as equally valid.

Mike Hulme has termed the form of predictive authority of modern climate science as a form of "climate reductionism" where the detachment of climate from the unpredictability of the social world can turn climate change into the main determinant of future societies and environment while other complex relations and human agency are reduced to a backdrop with passive receivers (Hulme 2011). This reductionism not only puts forward climate change as the a priori actor for future change but also risks creating apolitical perspectives on environmental issues. Having an *apolitical* perspective means that hazards and environmental disturbances will be analyzed and discussed exclusively as biophysical or environmental concerns, while social, economic, and political power relations that renders vulnerability risks being shadowed (Robbins 2012: 12-13). The view that a one-sided focus of climate change may shadow unequal power relations and other social relations in local communities has been forwarded as one of the important contributions of anthropology in climate change studies (e.g. Fiske et al. 2014. Peterson & Broad 2009). As an example the anthropologist Jessica Barnes shows how climate reductionism results in climate change being seen by authorities as the primary challenge concerning future water relations in Egypt while local people view politics and power over water access as the main problem. She concludes that "[c]limate change in Egypt, so far as many

international experts are concerned, is about water, but water in Egypt is not just about climate change” (Barnes 2015: 143). Climate reductionism and apolitical perspectives further helps strengthening the binary conceptualization of climate and society as separate entities.

As will be shown in this thesis, a political, rather than apolitical perspective, is crucial in order to understand how forest owners develop knowledge of, and relate to climate change and the future of forestry.

3.4. Re-socializing climate

Re-socializing climate and putting it back into what Frances C. Moore et al. calls the “contextual noise” of social worlds, means defying the binary conceptualization of climate versus society (Moore et al. 2015: 185). Even if climate can be sorted out as a biophysical entity and rendered as a stable and objective fact, scientific truths, as Sheila Jasanoff states: “must ultimately be received back into the humdrum rhythms of ordinary lives and experiences in order to ‘work’” (Jasanoff 2010: 243). Even if climate as a global system can be measured and put forward with durable objective facts and results, localizing this system will render completely different results that are dependent on the unique socio-ecological setting of local landscapes and social settings (Krauss 2009). Taking a bottom-up perspective in order to understand how humans and climate are co-producing local ‘material climates’ can be more efficient. As will be discussed more in detail later on, creating spruce-landscapes in Sweden is a typical example of how local ‘material climates’ are being produced when intermingled with forest politics and market mechanisms demanding highly productive forests. The regular spruce in Sweden, ‘*Picea Abies*’, are very sensitive to both storm damages and drought but is at the same time the most economically profitable for both the individual owners and national forest industry which have resulted in the majority of Swedish forests consisting of spruce stocks. As a result, the effects of meteorological forces will risk becoming more devastating to spruce than other trees due to its greater sensitivity. In this case, the devastations following storms as Gudrun and Per must be considered as a result not of wind alone, but of human acts of planting extensive areas with spruce (Lidskog & Sjödin 2014: 279). This means that to a forest owner that are dependent on spruce production, weather events will be turned into a matter of concern while the same events are perceived and experienced

as of lesser importance to a forest owner dependent on a majority of deciduous tree stocks. Social and economic factors thus produce multiple local climates because even if the climate as a global system is assessed and measured as equal, it is still unequally written into the landscape, and experienced as of more or less concern when intermingling with local socio-ecological forest settings. Put differently, natural disasters are no more natural than social.

Taking a bottom-up perspective, and try to re-socializing climate, puts the objective facts of a global climate system as of secondary importance in order to understand how the possible negative effects of this system, as well as societies' vulnerability, first and foremost are the product of the social, political, and economic world in which humans live. Regarding climate change as a fixed entity and producing objective facts of climate systems make it easily manageable by separating it from the uncertain and contingent social world of humans, but analyzing climate change in Swedish forestry is not simply a matter of looking at it as a objective weather system. Instead it will require careful consideration to the socio-ecological setting in which forest owners live and put climate back as an equally important actor in these settings. This requires that we move away from the risk of climate reductionism and predictive authority and not regard climate change as the a priori force that will shape the future of Swedish forestry, even when actually looking at future climate change explicitly. In other words, analyzing the socio-ecological world in which climate is just one part may better help to grasp how climate change is understood, perceived, and coped with by forest owners. Instead of regarding climate change as a fixed system it will be more relevant to look into how this system becomes transformed into multiple local material climates when merged together with unique local settings.

4. Methodology

4.1. Anthropology and ethnographic methods in studying climate change

To anthropology climate and climate change is first and foremost a matter of dynamic social and political contexts and relations, as well as the cultural values that shapes how people relate to, and understand climatic variations in their local settings (Fiske et al. 2014. Crate 2009: 12). Carla Roncoli et al. argue that these underlying contextual mechanisms are not easily identified by studies concerned with surveys and statistics and that the anthropological method of “being there” through long-term participatory observation and ethnographic methods “continues to be essential to capturing the full gamut of lived experiences and cultural meanings associated with climate” (Roncoli et al. 2009: 104).

The bottom-up perspective and approach of ethnography enables anthropologists to relearn general conceptions of climate change and look at it from the perspective of the vulnerable, or as stated by Petra Tschakert: “putting the vulnerable first” (Tschakert 2007: 382). Ethnography also contributes by bring to light the local and alternative views of climate change that do not always conform to ‘western’ or scientific concepts. Thus anthropology, as argued by Shirley J. Fiske et al., has a unique role in standing “outside the climate change system of prescribed beliefs and see alternative perspectives of climate change, not adopting one paradigm or another as our interpretive framework” (Fiske et al. 2014: 18).

4.2. Structure of the fieldwork, material, and methodological discussion

The fieldwork was conducted during a period ranged from the beginning of October to end of November 2016. During this period I met up with a total of 8 forest owners. These forest owners lived in different places in the bordering zones between the counties Halland, Scania, and Kronoberg in the south of Sweden. I got in contact with the informant through personal contacts, by making requests on social media platforms, and with the help from other informants.

The structure of the fieldwork was to meet with each informant once at their home and forest properties where I spent approximately half a day with most of

them.² We also had some correspondence on telephone, and on the Internet. During my visits I was able to perform one or more open-ended interviews ranging from 1-3 hours in an indoor setting. With five of them I was able to follow them in their forest and could ask them questions while they guided me through their property. I was able to record all of the interviews as well as record some talks we had during our forest visits, as I was not able to take writing notes on these occasions. The formal interviews were later transcribed into text and analyzed while the recordings together with photos taken from the forest visits functioned as a way to re-experience our conversations and my field observations.

Apart from visit the informants I also attended a conference concerning how the local forests could be used for green development in Halland. The conference was arranged by a network group called “Arena Grön Tillväxt” (Arena for Green Growth), a network for stakeholders working with green innovations in Halland. During the conference different speakers highlighted and discussed future challenges and opportunities concerning forestry in Halland. The visitors ranged from different experts, authority officials, as well as other stakeholders from different forest related industries, including some small-scale private forest owners. Attending this conference gave some insights into how different non-forest-owner stakeholder and experts discussed and conceived the future of forestry.

I was able to visit most of the informants in the setting of their homes and mostly we were able to have quite relaxed discussions and talks over a dinner or a cup of coffee. I felt that I became a guest in their house and with this relaxed manner most of the informants seemed to be less reserved and more open in their answers and reflections.

The interviews were semi-structured with some key questions concerning both their personal feelings and background with forestry, their opinions with contemporary forest politics, and their view of climate change and the future of forestry. As I tried to have an open approach to both my questions and their answers and let them talk more freely I sometimes recognized that they seemed to have problems understanding what they were supposed to be talking about. When I contacted them about my study some of them said that they probably weren't the right person to talk to due to they having limited “knowledge”. Even when explaining to

² I met one informant at a public café before driving out to his forest property. Another informant I was only able to meet for approximately 2 hours.

them that I was looking into and wanted to hear their general reflections upon the future of forestry and their role as forest owners, it seemed that they sometimes had problem to understand what they could talk about. This I had to take into consideration when analyzing their answers as it has been argued that answers given by respondents during interview sessions may risk to be, as Vincent Crapanzano calls it, “aesthetically pleasing”, or become adjusted in order to please the interviewer (Crapanzano 2010: 62-63).

Combined with interviews was a walk in their forestland with their guidance. These walks seemed to be appreciated by the informants as they got the chance to show me around in a land partially shaped by their hands. With this method I was able to get a deeper understanding of how the forest owners was connected with, and how they related to their forest. James Davies and Dimitrina Spencer have explained this as a way of studying the actual relations between the objects of study and not the objects themselves, in my case the “inter-material” relationship, between forest owners and their forests (Davies & Spencer 2010: 23). Walking with the forest owners in their forest made me able to observe the relations between them and their material surrounding rather than just understanding how they reflected and conceptualized upon it, a form of “vital materialism” where human and non-human objects comes to life by their inter-relations (Richardson-Ngwenya 2014).

The combination of interviews and forest visits turned out to work very well as the interviews gave the informants a chance to conceptualize and reflect upon themselves and forestry more in general, while the forest visits gave me a chance to observe and get a more in-depth understanding of their personal immersion in the forest as well as have them explain things to me that they often took for granted. Walking in their forests also gave me a better understanding of things they had talked about during the interview, which made me able to be more transparent when analyzing my data.

Since I lacked personal experience and knowledge of forestry I mostly needed to ask my informants to explain simple terms they used or have them explain their everyday work that to them often seemed to be regarded as common knowledge. When I tried to fit in by using certain terms or asking questions based on my limited forestry knowledge, it often ended in them correcting me or gave me alternative views on the matters. This tells that having a distance to the informants seemed to render more detailed answers due to the need for them to explain their views on things that

they usually did not reflect upon. This form of “critical distance” has been argued by John Borneman and Abdellah Hammoudi to be key in gaining ethnographic data because it forces both observer and subject to expose their cultural differences in ‘encounters’ and explain everyday familiar matters that is often taken for granted (Borneman & Hammoudi 2009). Thus in the end I felt that my limited experience and knowledge of forestry gave me a more open approach and a deeper understanding of the informants reasoning due to me not having too much pre-conceptions and knowledge of forestry.

4.3. The informants and general background of private forest owners in Sweden

In Sweden, private forest owners own approximately 50 % of productive forestland, the secondary largest share (25 %) is owned by private sector companies, the third largest (14 %) is owned by state owned companies such as *Svea Skog*, and the last percentages of holdings is owned by other public and private owners and the state (Swedish Forest Agency 2014: 27-30). Within the three counties that this study was conducted, there are a total of 39 970 private forest owners with the largest share of them in Scania (16 484). There are less female forest owners in all of the counties as well for Sweden in general, 38,5 % in 2010 (Haugen et al. 2016). There has also been a strong trend of rural out-migration in Sweden that has shown to affect private forestry with an increase in non-residential forest owners not residing in the same municipality as their forest properties (Haugen et al. 2016).

It has been shown that residential owners tend to put more focus on production values and revenues from forests while non-residential owners tends to put more value on recreational values (Nordlund & Westin 2011). In addition, female forest owners, who constitutes a larger part of non-residential owners, tend to have more ecological and conservational values connected with their forest ownership (Nordlund & Westin 2011).

The above data is important to take into critical consideration since this study is concerned with individual forest owners. As the study includes data from a total of 8 informants it makes no claims to being representative of forest owners as a larger group. Instead the aim has been to give an in-depth view on how some individual forest owners reflect upon climate change by analyzing their reasoning and show how

a bottom-up perspective can render a better understanding to how climate change relations can be understood in Swedish forestry.

The differences in values between residential and non-residential owners, as well as between male and female, did not affect the analysis to any large extent as the data consists of individual interviews and does not claim to be representative of a general group of forest owners. Though, it should be taken into consideration if using this data within a larger context, as more extensive studies may need to take value differences into consideration, especially as non-residential, and female owners are a growing group in forestry.

It is important to outline some general and relevant details concerning the informants. Two of the informants were non-residential owners while the rest of them resided near their forestland. One of them had recently moved to an urban area because his son had moved into his old residential estate and the other lived in an urban area and had bought his forestland in 2010. All the informants were male owners and the age of them ranged between 27 to 72 years old. The average forest holdings ranged from approximately 30 to 150 hectare. All owners, except two that were retired, had other jobs besides their forestry. Concerning the geographical area, two owners had their holding in Scania, four in Halland, and two in Kronoberg.

All the informants appearing in this thesis has been renamed and I have avoided disclosing too many personal details about them in order to avoid possibilities to trace their identity.

4.4. Methodological limitations and clarifications

The way the fieldwork was conducted can be argued to not allow me to get fully immersed and familiarized into the field as this often requires multiple visits or visits during longer periods of time. As the fieldwork was conducted in relatively large geographical area it would have been a challenge to me to be able to meet up with them more than one time. This was also due to me not having a driver's license, thus having to relying on collective transportation and help from the informants in order to get out in the rural countryside where they often resided. Therefore I decided to only meet with them one time but instead get as much data as possible during my visits. This needs to be taken into consideration when looking at the results presented, as I

could perhaps have been able to be more transparent in the analysis if I had been able to get data from several meetings and getting to know the informants better.

The total amount of informants was 8 but only 6 of them formally owned their forests as the two oldest of them had recently sold their properties to their sons. One of these sons is included amongst the informants as I was able to meet them both. The two older owners were still very active in the management and had, before their sons' successions, been the formal owners to the forests. Thus, since all informants were still active in the management and made decisions in the forests, all will be referred to as "forest owners".

As the interviews were conducted in Swedish, all quotes from the informants are translated into English. I have tried as much as possible to translate them as close to the original as possible. Therefore, the translations may in some quotes create weird sentences and uses of words in order to not manipulate the informants' answers. When necessary, small adjustment has been made in order to avoid the risk of wrong interpretations due to mistranslations and general differences between the two languages.

5. Political relations

This chapter presents some contemporary forestry-related political relations surrounding the informants. The chapter will give an overview of some political relations and conflicts between owners, authorities, and the public, that was identified through the course of the fieldwork. These views are important in order to understand the wider social and political context surrounding forestry, forest owners, and in the end, how future climatic variations will be managed.

5.1. Ownership rights

What first strike me when entering the field was that all the informants talked about feelings that their formal ownership right to their forest properties being threatened by authorities putting more and more constraints on their freedom to manage their forests as they wanted. It almost felt as they saw me as an opportunity to get their voice heard about these matters and were quick to either tell me about this when meeting them, or start talking about it when I made a simple phone call to them. I realized that I had stumbled upon a growing conflict with proportions I was not aware of before initiating my study. By taking a look at forestry magazines and Internet forums I soon learned that this conflict seemed to be far more general and that it was far from being an isolated concern to the owners I met.

There seemed to exist a general conception amongst the informants that authorities, NGO's, as well as the public, tried to constrain forest owners' right to interact with their land. This, according to them, was done by regulations that were promoting nature values and protection of forest areas instead of ordinary production. These constraints, they told, were done by authorities forcing owners to sell land, prohibit them to perform management actions areas identified as biotopes that were important to local biodiversity, prohibit them from clear-fell stocks, and having satellite surveillance over their properties. One informant used the term "raped" and called the local authority officials "dictators" to emphasize the imperative character of their interference.

When asking two of the informants, Arne and his son Mats, what ownership rights meant to them, Mats answered that to him it was a freedom to: “come out and decide for myself. (...) here I can be alone”. His father Arne added that:

Then it's also this with the right to decide, there are some that think that it's wrong but it's hard get away from it, that I know that I decide, there is no one else who can come and tell you what to do, here I am the one who decides. But then I will also take the consequences if I make the wrong decisions, but I will also get the profit if I'll make a good decision.

Other informants also talked about the importance of the right to decide for themselves and hold power over their property. Though, as will be discussed further in chapter 6, even if personal power over a forest often seemed to explain the importance of ownership rights to the informants, it must not necessarily be seen as the primary incentive for them to take care of, and invest their personal feelings and work within their forestland.

5.2. Conflicts and acts of resistance

The conflict concerning ownership rights seemed to form, and be part of a general contempt to authorities and the public opinion. When asking the informants about their relationship to authorities they often told that they tried to have as little contact as possible with them these days. One informant told me that every time a letter arrived from SFA with information, he often thought “not again!”. This contempt seemed to have created conflicting groups and had resulted in a general use of the term “them”, a category that included forest authorities and agencies, the public, environmental NGO's, and politicians, as a way of distancing them from “us”, a category including both forest owners and the general rural population.

Apart from feeling attacked by authorities, some informants also felt that they as owners were being attacked and misunderstood by environmentalist NGO's, and a general public demanding more forest protection and conservation. One informant held the opinion that there were a lot of people with public opinions that did not know anything about forestry and he said that it seemed as people thought that the forests in

Sweden should be: “like national parks where the city-people can drive out to when ever they feel for it”.

The informants often argued that they cared for, and took extensive responsibility in their forests while the public saw them as greedy profit seekers. According to one informant named Åke, the forest landscape in southern Sweden became more dynamic and diverse just because there was a high amount of privately owned forests. To them managing a forest was to take responsible care for it, while leaving it to itself were seen as irresponsible and unattractive.

One informant, Peter, expressed fear to a nature reserve that had been established and was bordering his forest. He was very afraid of a possible Bark Beetle infestations getting into his forest due to a wind-felled area of spruce lying scattered around in the nature reserve. This area had been felled during the storm Gudrun in 2005 and had been left lying there as dead wood. Peter told that in the aftermath of the storm, he was ordered to collect and remove all the wind-fell in his forest. Due to this need to remove wind-fell from his forest he felt that it was strange that some ten meters from his border, there was an area left with a high amount of spruce wind-fells. This made his bordering spruces exposed to Bark beetle infestations from the wind-fells situated on the other side of the border. This type of situations surrounding the informants and similar stories they heard from other owners, or read in forest magazines, seemed to help to form a feeling that forests were organized between the interests of different stakeholders against which the informants needed to defend their own interest.



A nature reserve bordering Peter's forest. The wind-felled spruces were left intentionally after the storm Gudrun in 2005. (Photo by author. Taken 11 October 2016).

The conflict between private forest owners and authorities seemed to have resulted in acts of resistance amongst some informants. Magnus he told me that he used a term called “naturvärdesgallring” (“nature value thinning”), that according to him was sometimes used amongst forest owners. This term described a method that he used as a strategy to avoid being forced by authorities to set aside forest areas to conservation and protection. This method where conducted by acts of removing traces of high biodiversity such as felling old broad leaf trees, removing dead wood, or thinning out overgrown areas. Magnus was the only informant who used this term but some others told of similar methods that they had done in order to avoid prohibitions. One informant told of a small beech area that he had started to clear in order to avoid possible restrictions.

These types of actions can be seen as strategies of resistance. The following quote shows how the fear of getting areas sealed off made Magnus interfere with an area that he first had planned to leave untouched. He said that he had wanted a pine moss area that should manage itself by self-thinning, that is, letting the trees thin out themselves without human interference. Recently he had started to manage it again in

order to avoid possible prohibitions from SFA and the following quote shows how he reasoned:

J: How come you did it?

M: Because it's beautiful, and it's the right place to have it. I can look at it when I drive past on the road and everything. It fits perfectly to have it there so I did it. Then it was a bit in the risk zone when it started self-thinning and it started to appear dead wood and that stuff. If the Forest Agency had seen that area then I hadn't been allowed to touch it at all. But in this Forest Management Plan it is written that the area is productive land, so I am free to manage there. So it's good to take the opportunity to make it as I want it now before someone sees it, because then it's doomed for, then I will not be allowed to touch it, because it has been started to die and then there are mushrooms there and then it's doomed. So now I have put my own personal touch on it and managed it so now it's not in danger no more.³

Magnus considered the possibility of getting an area protected by authorities as a risk and felt that he needed to protect his land from possible management restrictions. To him it was primarily more important to feel that he could keep his right and power to decide over his land than manage it in a certain personal way with the risk of getting prohibitions.

5.3. Past experiences with forest politics and experts

In the last 60 years, forest politics have shifted from a focus on monoculture production of spruce that included the usage of pesticides to get rid of unwanted trees and plants, to a forest politics that started develop in the 80's where environmental question of forest protection and biodiversity got higher priority. This new forestry politic ended up with a new forestry act being proposed in 1993 (1993 års Skogsvårds lag) that held that environmental and production goals should be equally prioritized, and this approach was kept fifteen years later in the Forest Act of 2008 (Appelstrand 2007. Mistra-SWECIA 2015: 25). Thus, during roughly the productive life span of one generation of spruce, forest politics in Sweden has changed extensively and continues to change.

³ A *Forest Management Plan* is a written document that works as a guideline for the planning of future management in the forest and includes general statistics of the forest property. It is often made together with a professional forester from SFA, or from a forestry company.

As was presented earlier, recent studies have shown that forest owners tends to feel reluctance to expert advice and recommendations due to past experiences of failures and sudden turns with methods that were recommended. According to Tobias Linné, expert recommendations often becomes viewed as general and universal truths while history has shown that these recommendations several times have changed or even failed (Linné 2011: 91-93). During the fieldwork a general skepticism to expert knowledge and recommendations was identified. The forest owners often talked about, and even showed failed experiments in their forestland. Some talked about the problem with the proposed methods and recommendations being to homogenous and not always transferable to the ecological settings of their forests. One informant, Thomas, used the term “fashion”, when he referred to climate change adaptation strategies, indicating that it may be a current trend among experts today and that it may change in the future. When talking with Åke he used a pendulum as a metaphor for how expert recommendations and forest politics had changed and swung during a period ranging from the time his father owned the forest until today:

You should listen to knowledgeable people in the industry, but who are the knowing people? Because, if you look at forestry through time so, well, it's like a pendulum [gesticulating a pendulum with his hands], either it swings very much in one direction or in another. And it has turned out that it was not right.

He told that in the 70's the industry had promoted pesticides and wanted to eradicate all deciduous trees. He continued:

That was the attitude then, in that time the pendulum had swung that much and today it has swung in the other directions, now we're supposed to replant old fields and grazing areas that is no longer in use and then it should preferably be broad leaf and be saved, so now it's going in that direction. Then we try as private forest owners to find ourselves somewhere in the middle, if it swings in one direction, well, we go with it but maybe just half the way.

To Åke, following the pendulum half the way meant that he did read and acknowledge recommendations and advices but did not see them as general truths or facts. Scattered around his kitchen table was a bunch of different forest magazines and while talking to him it became clear that he was interested in reading forestry

news and willing to learn new methods and strategies. But he also stated that he was careful when reading about new strategies, always looking into the actual possibility to transfer certain methods tested in other areas, to the ecological conditions of his forest.

Managing a forest was to the informants first and foremost a matter of taking decisions that they held the final responsibility for and Thomas stated that he believed that forest owners were capable of managing their own forests:

Yes, as I said I am a bit skeptical to their opinions since earlier, it hasn't been wrong before when forest owners have managed their forests after their own head and not followed authorities. I don't believe it will be wrong now a days either, at least, not always.

The informant's general skepticism to expert knowledge and recommendations is of great importance when looking at the possibilities for climate change adaptation recommendation and policies to reach out to the informants. This will be further discussed in chapter 7.

5.4. Chapter summary

This chapter has presented some of the contemporary political relations and conflicts that were identified amongst the informants in order to better understand the socio-political context surrounding their forestry. Bringing light on these matter is important in order to understand the wider socio-political setting to which climate change will be received by the forest owners. This chapter shows that there are social barriers and conflicts that can affect how climate science and data will be understood and be received by the informants depending on their relationship with authorities and experts.

As was showed, the informants expressed contempt to authorities and experts and felt somewhat attacked by them as well as by the general public. They felt that authorities tried to limit their right to manage their forestlands in order to put more forest areas up to conservation and protection. This had made some informants starting to perform resistance strategies as a way to keep control over their forestland. It was also showed that the informants were often skeptical to expert recommendations and advices based on their earlier experiences and an awareness of

how these recommendations had changed back and forth in the past. One informant even reflected upon the focus on climate change adaptation being a contemporary trend that may change in the future.

6. Forest relations

The following chapter will discuss how a forestland is not a pre-made backdrop that a forest owner can act upon, but instead can be regarded as an ongoing process that is dependent on the forest owner being entangled as an active participant in the forest. It will be shown how the forest owners were situated within their forests that in turn shaped their knowledge, memories and actions as well as the landscape itself. It will be discussed how forest owners seemed to develop experience-based knowledge through their active engagement in the forest. It will also show examples of how climate and weather becomes part of a landscape and how ‘material climates’ are being produced.

6.1. The forest owner within the forest

While walking with Björn in his forest we paused in the middle of an open area where we had a good view of the forest in every direction.

“Here I made a mistake” he said while pointing toward some larch trees.

“First I planted larch trees over there, but then the roe deer butt them down. Then I planted black spruce over here, because they said it should grow well on mosses and wet ground conditions, but... they do not grow any good. I’ve planted them at the same time as those and you see the difference?”

“Yes”, I answered with an unsure confidence in my voice while looking around trying to see what he saw. I realized that I had no connection with this particular area. To me this landscape only existed in the present time of my visit, but to Björn this area was full of memories embodied within every part of the landscape. The shape of the landscape as well as the different trees told stories of his earlier actions that he had performed in order to set up the right environmental conditions for growing a wealthy forestland.

“I did plant spruce over there also” pointing in another direction, “but, it is too wet, if you look in front of you there, they do not thrive there.”.

Björn showed a deep personal entanglement with his forestland. He told me a whole story of landscape changes compressed into some sentences explaining years of

giving shape to this particular area. The history he told consisted of a multitude of active relations such as between external experts, game, plants, ground conditions, weather, that altogether had created a local and unique socio-ecological setting. Björn was himself an inevitable part of the land and the small area would have told me little without his guidance. More importantly, the area would not have looked the same without him since this area is a product of his active participation.



Two different angles in the same area, the one to the left showing black spruce and the other showing larch trees planted by Björn. (Photo by author, taken 3 November 2016)

This example with Björn shows how he was connected with, and part of his land, and showed that there was several other involved actors and component that together with his acts formed the contemporary shape of the area. The roe deer had destroyed a lot of his larch plants, and expert recommendations had made him plant black spruce that turned out bad when planted in the local ecological conditions. Thus, Björn is not in any way the main manager of this land; he does not act upon it, but instead becomes relationally and mutually entangled with a multitude of other actors that together continue to co-produce this area. His entanglement with the land gives him a unique knowledge of the area and provides him with the “perceptual sensitivity” that Tim Ingold writes: “enables him to discern, and continually to respond to, those subtle variations in the environment whose detection is essential to the accomplishment of ongoing activity.” (Ingold 2000: 147).

6.2. Connecting with a forest

Understanding the premises to how a forest owner becomes part of a forest landscape requires a relational perspective where he or she is seen as an active participant acting within, and producing, a landscape. To cultivate a forest is to be an active part in shaping and in Ingold's terms, setting the conditions for "growth" (Ingold 2000: 77, 87). This means that from the perspective of plants and trees, the forest owner does not 'make' or 'create' them, but rather, the owner himself becomes a part of his or her environment and support their wellbeing and growth by shaping the environmental conditions necessary to their nurturing. Thus the trees and the forest owner can be said to be interdependent beings, or what Donna Haraway has termed "beings-in-encounter" (Haraway 2008).

The relationship between forest owner and tree could be identified both by the way the informants talked about the trees and how they expressed beliefs in their own necessary role as nurturer. They often talked about the trees in terms of their thriving, wellbeing, their "needs", comparing them with raising children, or that the trees were individuals with different genetic codes that helped determine their development. The nurturing role was expressed by talking about the importance of managing the plants to increase their wellbeing. This was done by performing forestry actions such as thinning processes, fertilizing, creating storm protections, avoiding root damages, or quickly acting to get rid of insect infested trees in order to protect the healthy ones. The mutual bond between owner and plant was expressed explicitly by some informants that told about the special feeling of "seeing it grow" or to look at a thinning process and feel that you are a part of the growing result. The continuous growth of the trees in certain directions decided by the owner became a manifestation of their relationship, while a disconnection would had resulted in a different shape of the trees, telling that this relationship is not fixed but rather an ongoing process. A forest without the involvement of a forest owner was said to be unhealthy; resulting in weak growing plants, and this was considered as irresponsible management.

This connection between owner and land was strengthened by generational bonds, passion, and the joy felt when working in the forest. Having personal and sentimental connections to the forest was also regarded as important for responsible management. It seemed to be a general belief amongst the informants that if someone working with a forest felt closely connected with it, he or she would take more

responsibility, while someone lacking a personal relation with it would manage it poorly. Almost all the informants referred to examples of bad management from neighbors or in other forests they had visited that they regarded as a poorly managed. They argued that this was due to the owner being interested only in profit, or that he or she had no personal interest in forestry. It could also depend on an owner being too old and weak to be able to work in the forest and therefore in need of hiring large companies to perform forestry work, which meant that forestry workers without personal connections would take care of their forests. Thus building mutual relations and becoming entangled with a forestland was emphasized as necessary in order to have a healthy forest.

All informants stated that economic profit was not the main incentive for them to own a forest. Instead personal values, such as feelings of childhood nostalgia, freedom, or getting away from everyday stress, was often put forward as the most important reason to their forest ownership. Despite this, a lot of their reflections and talk about the forest concerned economy and forest production. But after spending time with them I realized that using a language of production could be seen as a way of describing and measuring the result of their personal acts within their forestland. It was common to relate to your forest or specific trees in terms of cubic meters, timber volume, annual growth, and cubic meter value. One informant had also a personal interest in measuring carbon trapping in the growth as a way to compensate for a lot of flight trips he had made during a long career as CEO for a company. In the end, these numbers and results became a personal proof and a symbol of their active participation in the forest.

6.3. Ownership rights as the right to entanglement

I argue that the mutual relationship between owner and forest to some extent can help to explain why ownership rights were seen as very important to the informants. The formal ownership can be seen as a proof of their right to continue being mutually entangled with their forests. Peter told that when he bought his forest from his parents in the 80's, the purpose was to get an income and profit from it but never to overexploit it. He explained how he was able to get enough timber through continuous forestry (kontinuitetsbruk) to cover necessary costs but he did not use it as

a way to get luxury.⁴ Today he told that his forest was valued to 5 million Swedish kronor and his friends had tried to convince him to sell it arguing that he would become a millionaire. “But then”, he told me; “we come to this thing with ownership, that’s important to me”. I asked him why and he explained that “well it is this feeling that this is mine, here I walked with my parents and picked mushrooms”. Similar feelings was also expressed by other informants telling about the special feeling of shaping something of your own or use timber from your own forest to build your house. To the informants, ownership did not seem to simply be about the right to have power and gain economic profit. Rather, it became a right to continue to be part of and alter a landscape that they had become part of and had developed personal bonds with. Thus constraining the right to interfere with their forest may be in conflict with their relational engagement with a landscape that they have been part of co-producing.

6.4. Understanding changes in a forest

“In here we have one of those old”, Arne said while getting of the quad that we used to get around in his forest. We had stopped in an old spruce stock and after walking a few steps on the soft moss we saw a small ruin of an old house. All that was left of this house today was the stone foundation. He looked around and said, “here did they raise five children in the 30’s, and my philosophy here is to not move or touch anything at all, I want it to be almost as a graveyard”.

He showed me old bottles and tools that were scattered around the house and continued to guide me around. “The food cellar was here, and here they had some farmland plots, they had some cows and chickens”.

“Were they related to you?” I asked him.

“No no”, he responded, “this was un-free land you know, they didn’t own the house themselves”.

The ruin was surrounded by a spruce stock that Arne told was planted by his father in the 60’s when forest experts had recommended him to use it because of the good quality of the tree. “But it turned out to be really bad timber” he said, “and it

⁴ ”Kontinuitetsbruk” is a form of forestry management strategy that allows dynamic growth and different ages of trees, often spruce. The strategy is to fell the oldest trees and give room for the younger one to continue growing. In this way the forestland will have a continuous forested cover without total clear-felling activities.

was a pity actually”, referring to planting it so near the ruin, “when I clear fell I will not plant new trees close to the ruin”.



An old ruin surrounded by spruce trees in Arne’s forest, (photography by author, taken 1 November 2016)

What we observe in the example from Arne is a process of ongoing change consisting of past, present, and future, all entangled in one area. On the one hand we have a past history of the ruin, representing a past that Arne has no generational connection with. The other is the Romanian spruces planted by his father, this stock represents a memory of his fathers work, but also about past forestry management recommendations. The present is represented by his conservation values, and his future planning will continue to honor his values and not plant new forest covering it. Important is that even though Arne chooses to conserve the ruin, it will still alter the landscape, as it will conform with his contemporary values. This is not about rendering it back to a former state because the landscape has already been through a process of alteration. Thus the contemporary landscape will represent values

important in the time of shaping and becomes a manifestation of the present entanglement between owner and land embodied in the shape of the forestland.

Understanding the relationship and embodied connection between owner and land can render a better understanding of how the informants perceived changes in their forest. Understanding how forest owners can relate to changes in both past and present is important in order to understand how they think about, or will react, to future changes concerning land, politics, and climate.

Generally, to all informants, changes were regarded as normal and necessary in farm- and forestland. Referring to their landscape in both the near past, and in the range of their own lifetime, as well as in a long-term historical perspective was common in order to tell how the landscape had changed. Some informants told about how major parts of Scania and Halland was dominated by open heathland during the 18th and 19th century before being overgrown by cultivated forest in the 20th century. Referring to local history in their local forestland was also common, telling of ancestors' work, showing fields dug out by hand or old ruins that today was mostly overgrown by forest. Björn showed a wetland area in his forest where he had managed to raise a wealthy pine stock. This area he said was made up of lakes in the past and it was estimated to be 8 meters deep beneath the ground.

Being part of a land is also to know its history, it is written not only in printed records but also in the shape of the land itself (Setten 2004: 396). The forest owner is situated in this history by his or her own acts of altering the land. Thus being part of a forest can be described as being part of a trajectory of an ongoing local history of altering the landscape.

On the side of a small road leading to Peter's house he showed an old birch tree that had a big black stain on it. He told me that in the 80's he had ran into this particular tree with a tool, resulting in the damage. He was impressed by tree's healing capacity and said that the entire area where the black stain was today had been slit back then, but today it was fully healed. Looking at the spot made him remember the specific past event leading to the damage. This is an example of how a personal memory can be embodied in the landscape and work as a reminder of the ever changing and living process that makes up trees and forestland. To the informants looking at a forest area often rendered memories of how the area looked in their childhood and they often

talked about how different certain areas looked today compared to the past. Connecting parts in the forest with parents or time periods of their life was also common, such as telling of how a certain area was planted by a parent or relative, or remember how they had helped with certain management, or tell of how the forest had looked when they took over the management. The way memories became embodied in the landscape helped strengthening the bonds between owner and land, making it harder to disconnect from it.

Changes were seen by perceiving actual changes in the forest coupled together with personal memories of the earlier shape of the landscape. This seemed to make the informants consider changes as normal in a forest. To them, the contemporary shape of a forest was a temporary product of ongoing inter-relations between humans and land. By this, accepting changes and following along seemed to be the general way of relating to their land. This indicates, as will be further shown in chapter 7, that the informants' understanding of climatic changes and variations may follow a pattern of general acceptance of changes that a forest owner needs to follow along, and to respond to accordingly when they occur.

6.5. Experience-based knowledge production

It has been shown that forest owners put great trust in a form of real-time and experience-based knowledge when managing and planning their forests (Linné 2011). This knowledge is founded on their experiences of earlier successes as well as methods that has been proved to work in earlier generations of forest owners and Lidskog and Sjödin states that “[t]heir knowledge is situated, practical and to a large extent unarticulated and embodied.” (Lidskog & Sjödin 2014: 281).

All the informants were putting great trust in this type of experience-based knowledge and, as was shown in chapter 5, often held a certain degree of distrust to external knowledge from experts and science. But in order to understand how experience-based knowledge is formed we can turn to Ingold to understand the premises of experiencing the world around. To Ingold, personal experience-based knowledge is gained through human perceptual and sentient being while moving through the world, and not by interpreting the world through abstract pre-made models stored in our minds (Ingold 2000: 99, 109). This does not mean that knowledge cannot be detached from the local environment but it means that it is

formative and personal to the human as a sentient being that develops it through material interactions and therefore it cannot turn into general objective facts.

When talking with Jan-Olof he told me how he had learned by himself and that he had no formal education. Mostly he seemed to trust his own personal knowledge and told of how he often felt that his forestry methods seemed to work quite well. When thinning spruce stocks he told how he always tried to keep track of the westward direction in order to secure against storms in that direction. When he was asked how he had learned this he told that “well I have seen where the wind-fell has been, so that’s the way”. To Jan-Olof, using his senses and perception was a common way to learn and develop knowledge of how to best manage a forest.

Often the informants told about how they had perceived successes of certain methods, trees, or ground conditions and telling about this seemed to work as a way for them to fortify a personal trust in their own actions and knowledge. Arne told that when he replanted spruce stocks he planted “the same old spruce” and that he knew “by experience that it works well”. As will be shown in chapter 7, Åke told of a similar trust in plant material based on his experience of success in planting Sitka spruce, a variant of spruce that his father had planted in the 60’s and that he had seen grow very well. Perceiving the strong vitality and success of the tree made him optimistic to plant it.

Even if the development of personal forestry methods, and trust in certain management strategies, derived from the informants’ experience with them, the informants also gained knowledge and information from other external sources. Forestry magazines, Internet forums, recommendations from authorities or other experts, and other external sources, also functioned as a source of information. Though, this information seemed to be regarded as providing them with possible or alternative answers rather than facts. Real trust in methods seemed to more commonly be connected with real-time experience of the actual outcome of a performed activity.

6.6. Producing ecological material climates

When visiting the forest owners it became clear to me that weather and climate was an essential part of a forest. Weather was not a single system acting upon forests; it was part of the very forestland itself. If weather, as discussed in earlier chapters, is

manifested through the intermingling processes of becoming part of the ground or, referring to Ingold, the “substance”, we can understand how the actual form of a forestland becomes an intrinsic part in producing the material outcome of weather effects (Ingold 2007). As an example, by building and managing drainage systems or drying up wetlands, a forest owner can alter the actual effects of rain and precipitation. By planting drought resistant trees such as pine on top of hills, and plant water-demanding trees such as spruce lower down in the valleys, the owner can avoid or mitigate negative effects of precipitation. In other words, it is the actual form of the forestland that will produce the outcome of weather events and not climate itself as an independent system. Thus by looking at weather from a bottom-up perspective we will note how a local climate is not something floating freely above the forestland but instead becomes manifested as a material climate when going through the process of becoming mixed with the landscape. This means that the effects of a possible future increase in precipitation will affect an area unevenly depending on its form and ecological conditions. In the end, this result in people that are living in the same geographical area will perceive and be concerned about climate and weather events very differently (Taylor 2015: 17). As forest owners alter the forestland they also shape the material outcome of weather.

6.7. Producing political material climates

If weather and climate is viewed as being produced by the shape and form of a landscape, it also becomes important to identify the non-ecological mechanisms within a forest. In this case, a forestland does not simply consist of the immediate entanglement of a forest owner and the surrounding ecology. There is also a vast range of social, political, economic, and cultural relations, which shape the landscape.

Looking at the forest landscape of southern Sweden is to look at the manifestation of forestry and national forest politics that follows at least 60 years back in history. Vast areas of spruce dominate the landscape that looks deep and never-ending when viewed from the ground, but more like a patchwork when perceived from the air. This is because a typical forest in southern Sweden is made up of smaller patches of spruce stocks in different age groups that prevent large forest areas from becoming clear-felled all at once. This strategy has often been called the *Swedish Forestry Model*. Spruce dominates the landscape because during the last 60 years this

tree has been planted extensively in South Sweden. This tree grows fast and is easy to manage. It is also suitable to the contemporary climate in the boreo-nemoral zone of southern Sweden; but it has also been planted in the not-as-suitable nemoral zone along the southern coasts regions.

To the forest owners, spruce was mostly regarded as the most important tree due to its high economic outcome, but it seemed to hold lower esthetic value. When visiting the informants' properties, I noticed that there was less spruce surrounding their houses while broad leafs and other deciduous trees were more common. Due to the income gained by growing spruce the informants often talked about how they were forced to plant spruce in order to gain any profit at all, and that experimenting with other species would mean that they would loose important income to their forestry. When asking Björn if he would had planned differently if he had not been dependent on economic outcomes he told that “yes, then I would not have had spruce at all”.

Deciduous trees were associated with high esthetic value and were often seen as a beautiful contrast to spruce domination. Planting broad leafs was often conducted to either fulfill forest certification demands, that required that a certain percent of the forestland should consist of deciduous trees, or simply because they were beautiful to look at. In contrast, having spruce near the house was to most informants considered as unattractive. Thus, fast-growing spruce stocks were associated with industrial forestry and profit while slow growing deciduous trees held more esthetic values to the forest owners.

Regular spruce in Sweden, *Picea Abies*, has shaped the contemporary landscape in the inland of southern Sweden. The issue with this tree is that it is sensitive to drought, storm damage, root rot, and insect infestations, which are all highly hazardous risks that has been predicted to increase in a future change in climate. Because of the high risks with spruce it has been proposed that its expansion and mono-cultural domination must decrease in southern Sweden in order to cope with future climate change (Eriksson et al. 2016). But a decrease of spruce is not a simple task to an individual forest owner dependent on the economic outcome from this timber. Most informants were well aware about the sensitivity of spruce but said that they had little choice other than to continue planting it because it was the only timber that the forest industry and the market paid enough for. A majority of the re-plantation in areas

affected by the hurricane Gudrun was in fact done with ordinary spruce, despite recommendations from the Swedish forest agency to replant with other sorts of trees (Lidskog & Sjödin 2014).

Arguably it seems that it is not simply climate change and meteorological systems that are the main cause of future risks, but the material climates that are produced by the social, and political relations that surrounds, and shape a forest. Climate change becomes a problem not as an entity impacting upon a spruce stock but because of market demands that enable monoculture set-up of sensitive spruce stocks making the forest more vulnerable. Thus, coping with climate change is not done just by reducing spruce domination, as an apolitical model would propose, but by looking into the social and political mechanisms that shape a landscape in a certain way. Adaptation strategies proposing that reducing spruce or transform monoculture into mixtures will put the forest owners to risk of economic loss and it has been critically noted that these risks needs further consideration (Keskitalo et al. 2016).

In other words, adapting to climatic variations and changes will necessarily mean that other relations will need to change along with it. Experiencing storm damages is to follow variations along the trajectory that makes up a landscape as a whole, consisting of a range of ongoing socio-ecological relations that produce unique local places. Experiencing not-yet-perceived changes based on scientific simulations on the other hand, requires stepping out of the process of local landscape changes.

6.8. Chapter summary

This chapter has shown how forest owners should be seen as active participants in their forest and how a forest can be seen as the product of a mutual relationship between owner and land. Forest owners are situated in the center of their forests and are actively changing, as well as perceiving changes in their landscape. They do not read and interpret a landscape that is ‘out there’ but instead their knowledge, experiences, and memories are products of their movements and actions within the forest. I’ve shown that a forest was made up of a range of ecological, social, political, and economic relations that formed it into particular shapes, and I argues that these relations made a landscape more or less vulnerable to climatic variations and extreme weather events.

This chapter highlighted the underlying mechanisms that were shaping a forest and gives a better understanding of how climate is part of, and how it becomes 'material' and multiple in different socio-ecologic forestlands. This is important in order to understand climate change from a bottom-up perspective and not simply as an independent system that act upon the social world in which forest owners live.

7. Climate relations

This chapter will show how the forest owners perceived and reflected upon climate change in their local forestland, and how they responded to contemporary weather events and climatic variations by developing coping strategies along the way. It will show how they reflected upon political and economic relations connected with climate change and the future of forestry. The chapter will also show how their skepticism to expert knowledge that was discussed in chapter 5, also seemed to influence their trust in climate predictions and expert recommendations.

7.1. Perception

To Tim Ingold, perception is not about perceiving things that are out there by your mind and interpret it through cultural concepts and frames, but rather, perceiving is seen as the result of your ‘being’ in the world and expanding your whole organism by movements (Ingold 2000). If climate is regarded as an intrinsic part of the whole and not something ‘out there’, this means that perceiving changes in weather patterns must imply exploring changes in the material whole that perceiving ‘beings’ are part of. To a forest owner this requires constant presence and participation in the forestland in order to sensitively grasp these changing patterns.

In contrast, discovering and perceiving climatic changes by scientific models is dependent on long periods of time beyond human lifespans and beyond the acts of local humans ‘being’ in the world. This means that perceiving long-term changes requires other technical tools than human senses. Apart from the scientific methods and technical tools available, understanding climate change can also be reduced to a global discourse that may shadow actual and locally bounded climatic experiences of local people (Marino & Schweitzer 2009). In the following it will be discussed how climate change as a global system and discourse seemed difficult to grasp to the informants while short-term changes and the effects of real-time ‘material climates’ were more reachable to them due to the direct experiences of them.

7.2. Memories of weather and climate

As was shown in chapter 6, memories about past events and actions could be embodied in the land. This could also be a way for the informants to remember past weather events. All but one forest owner, who had bought his forest 5 years after Gudrun, had memories of how the storm Gudrun had affected their forests. These memories were often inscribed and embodied in the landscape by actual changes such as areas that had been totally destroyed during Gudrun and today consisted of a new generation of spruce stocks. These areas, the informants often labeled “Gudrunhygge” (“Gudrun-felled-areas”) indicating that they were cleared in the aftermath of Gudrun. One other example of an embodied memory was the remaining stump from a huge spruce in Björn’s forest that had been landmark to local people in the past but had blown down during Gudrun.

When talking about storms, some informants seemed to have developed views on wind behavior by using their perceptual experiences. Two of them explained how the wind, during Gudrun, seemed to walk like a giant, going down in one area and wipe it clean and then go up again and down in an other area and clear it out. When talking to Peter told how during one recent storm, the wind got hold of two very old and tall spruces and hurled the tops 10 meters down on the trunk. He told that he was confused by this behavior and emphasized that: “it was a hell of a weird wind”. This shows that when the strong winds became intermingled with the ground conditions it made material impacts that produced views on how the wind was behaving. The informants’ views of wind behavior were based solely on the experience of how the wind had affected the forest ground. Thus it is first when the intermingling process between wind and forest has taken place, that is, when it has become ‘material’, that a forest owner is able to describe its behavior due to them primarily using their bodily senses as perceptual tools.

7.3. Perceiving climatic variation and long-term changes

Asking the informants about experiences, and perceptions of a changing climate did rendered quite uncertain answers that reflected the problems of looking into cases of perceiving traces of global climate change in the local instead of trying to identify the

material and local form of different climates, and weather variations from the bottom up.

None of the informants denied that global climate change was happening, but the experience and perception of local weather and climatic changes varied as well as the fear of how it would affect them in the future. Generally they seemed to separate their own experiences from their general knowledge and belief in global climate change. Thomas who had a background in both medicine and geology showed a high degree of knowledge about the scientific methods used for modeling future climate and he was convinced that the extensive emission of carbon dioxide would result in a warmer climate. But Thomas also emphasized that he could sometimes doubt the predictions if he experienced short-term weather effects that were not corresponding to the long-term prognosis of climate change. He told that if there was a cold snowy winter this could make him doubt the relevance in his decision to stop planting ordinary spruce. Thus Thomas shows a somewhat double-sided relation to future climate change that will be discussed further as a form of personal separation between climate change as a global model and discourse, and climate change as a real-time experience.

The informants' separation between a general belief in long-term changes and uncertainty about their own actual experiences of these changes resulted in discussions that included both of these views simultaneously. When Björn talked about drought during summer time, which was a common environmental issue in the geographical part of Sweden where he had his forestland, he said that: "they talk about the pre-summer drought, that it will get worse. And that is worrying!". He told how drought had been problematic recently and that he perceived how the trees did not absorb enough water. He was able to tell about this water scarcity by simply looking at the plants and measure their wellbeing. Even if he knew that there are future prognoses telling of an increase in this type of drought, he continued:

But I think it has been that way for a long time, I know the elders said that it can never rain to much before midsummer (...) and it's often during the summer droughts we have problems with infestations by spruce bark beetle. But it's our way of life; it's the price we will have to pay because of our emissions.

Björn bounced from his own memories of drought as a familiar problem in the past, and a concluding remark referring to his knowledge about a future increase in drought

as an effect of anthropogenic emissions and global warming. The former reflection was a product of Björn's own memories and experiences while the latter referred to knowledge based on a more general climate discourse.

Åke was also careful to use his personal experiences and memories as a way to tell of actual changes in the climate. He didn't think he had experienced that the winters were warmer today. He told about this by referring to his childhood and he remembered that "green winters" without snow, when they were able to "play football all winter through", was common already back then. This careful approach to the past he also showed when reflecting upon a possible increase in winter precipitation patterns:

Å: What may be the case today is that there is a little more rain [during winter time], when it is raining it often comes in greater amounts. (...) but I mean.. it's too short period of time for me to be able to claim that it's climate [change]. I cannot really tell the difference.

J: But are you afraid that it [climate] will change?

Å: Yes, I believe it will and I also believe that it has changed before in history (...) I mean the climate always change but then I think that humans are speeding up these processes today and that is not good.

Åke tells of a possible climatic change in precipitation patterns but is then careful to state this as an actual personal experience of climate change. He is certain that the climate is changing but careful to make claims about this by referring only to his senses.

These above examples show how the informants seemed to separate local and personal experiences of climate variations and local weather events from their knowledge of, or reflections about a more general global climate change. Thus, climate change can be regarded as an external discourse that was not part of the informants' everyday thinking even if they may have experienced the effects of these changes in their everyday forestry work.

This was also apparent when I meet Arne who talked a lot about the management of storms and how to best prevent large amounts of wind-fell during strong winds. When mentioning climate change he speculated upon the possibility that his experience of an increase in wind-felled trees could be connected with global warming:

Then there is one big thing that has come more and more in recent years and that is wind fell, we have much more storm damages today than we had 50 years ago and what the reason for that is, well... Maybe it's this rise in temperature that we have.

Arne did not seem to connect an increase in storm damages with global warming, but when talking about these matters he reflected upon it as a possibility. Perceiving and concluding that some sort of changes has taken place locally does not imply evidence of a global phenomena. More importantly, a confirmation of global change is not necessary in order for the forest owners to actually react upon local environmental changes as part of their everyday forestry work. It is important to remember that even if environmental effects may or may not be the effects of global climate change it does not matter much to them because they are not perceiving the effects of a global climate system, they are perceiving the effects of a climate producing real 'material climates' when intermingled with the socio-ecological structure of their local forestland. This makes it hard to perceive actual global climate change because it only become manifested as 'material climates' bounded in spatio-temporal settings. This shows the importance of in-depth studies of how forest owners relate to, and how they interpret the concept of climate change.

If weather changes are manifested through intermingling processes with the local landscape, the results will inevitable affect the forest owners and shape their thinking and their actions. Björn told of how the storms, according to him, had definitely increased in recent time and this had affected his annual work in the forest. Therefore he needed to develop strategies such as early thinning in the autumn, in order to put greater time and effort in the work of collecting wind-fell throughout the whole winter season. He told that he also used to help his neighbor with this but had stopped because he got tired of it. When asking him if it was like this before he stated that "no it wasn't, before it was some few trees that had blown down but often it was root-rot in them (...) but it was not at all like the storms are today". He also told that his father, and later on himself, had kept record on the amount of cubic meter felled since 1962 and looking at this he said that it was a significant increase in the felled amount today compared to earlier times. What is important is that even if Björn has a record telling him about these changes, he is not responding to them because of the

calculated results but because these changes have had a real impact on his everyday forest work. The amount of wind-fell has increased to a level where it has become regular routine work but the paper record merely works as an indicator that his perception are correct. Numbers on a paper are not the main reason to changes in his working routine. He does not need these results in order to perceive what needs to be done. Thus theoretical indications and models of change, in this case, seem to be secondary to personal perception and real-time experiences.

This tells that the forest owners reacted to, and coped with material changes in their landscape when they appeared and changed their routines in order to adapt to them. Thus managing effects of climatic variations or extreme weather events along the way seemed to be the most common strategy. Magnus put this explicitly, and he also showed less concern about climatic effects:

I am not that worried about storms and climate and such things because I think it has been going on all the time, it's simply that no one has reflected upon it to any greater extent.. I think most of it is possible to do with [forestry] management and the reason why we have large damages today is because it has been deficient management in 30 years. So I don't think it's anything to get all worked up about. I am more worried about my economy.

Magnus was in no way lacking management strategies to cope with storms but he regarded this as part of his forestry work and not as something that needed to be managed separately from everything else. This is a view of climate variations as an intrinsic part of forestry that a forest owner needs to cope with along the way. He also explained how effects of climatic variations is dependent on the actual structure of the landscape:

We have more storm damages today because we have more percentage of spruce today than before. It was grown in a totally different time, it was during the 60's they planted most of it, and now it has become forest so its no wonder it blows down and becomes big news (...) its just that people have this perspective [symbolizing "narrow" with his hands] on something that is this big [gesticulating "big" with his hands]. So it's nothing. Just keep managing your forest with the right timing and you're good.

To Magnus a forest is dependent on its material structure and management, and as this structure is constantly changing you can only cope with variations along the way.

7.4. Climate change adaptation and coping along the way

Adaptation, as a concept, is central to the global climate change regime. In the IPCC report, Adaptation is recognized as, “[t]he process of adjustment to actual or expected climate and its effects” (IPCC 2014, Part A: 5). It can be short-term and reactive coping strategies as well as long-term and proactive adaptive measures, based on expected or possible climate change effects. While the former is based upon reactive strategies taken in order to cope with experienced effects, the latter must be based on external data telling of possible future scenarios. This distinction between proactive adaptation and reactive coping activities has important implications when analyzing forest owners’ responses to climatic variations, as these actions are based on either real-time experience, or trust in scientific climate knowledge.

Arne and his son Mats told of climatic changes mentioning increase in storms and less ground frost today. They were aware about these changes but unsure what they could do in order to prevent them. They had a lot of ideas about how to best manage these changes but they felt that they had little power to prevent them from happening. As a response to Mats saying, “we will have to adapt”, Arne exclaimed that “adapt yes! We must adapt but we can’t do anything active more than capturing carbon dioxide and well, that is more global”. Even if Mats and Arne showed awareness of changes and global climate change it was clear that their adaptive responses derived from their local and real-time experiences of changes and not from a general knowledge of future forestry adaptation. Their views on adaptation was to manage their forest better with contemporary methods and conditions, such as ground damage management, good relationships with local entrepreneurs, being an active part of their forest, and react upon stress and variations along the way.

Mats and Arne were concerned about ground frost and they told about how it had changed. They could no longer rely on ground frost during the winter season. This was regarded as problematic as one of their main forestry strategies was to avoid ground damages that could make spruces exposed to root rot. According to them they were trying to cope with these changes by changing their strategies a long the way of

experienced climatic variations, but they did not seem to develop long-term strategies based on future predictions. Arne told about how they were always careful when planning their forestry work and said that: “we look at the weather prognosis how it looks 10 days forward, if the mean temperature is below 5 degrees Celsius, if it’s not we don’t do anything.” Mats responded that they actually had to break this rule recently: “it’s the first time this year, when it has been a little warmer, but then we keep it to wet areas with pine”. Although their carefulness to not perform thinning while the temperature were above 5 degrees Celsius had been challenged, they still needed to perform minor thinning activities, which they did in smaller scale. This shows how they kept changing their strategies as a way of coping reactively with variations along the way.

Less ground frost combined with an increase in precipitation in future forests is one of the concerns connected with climate change as it will render the trees more exposed to storm damages due to a weakening of their rooting system (Mistra-SWECIA 2015: 35-36). Though, when talking with Magnus about less ground frost as a risk for wind-fell in the future, he gave an alternative view that was based on his own experience:

J: Does it [ground frost] not make it more stable?

M: No, well, some is chopped of and some will get bumps. I have cut a lot of storm edges that have been left since Gudrun and I see that there are bumps on them, dips, and when you fell them they crack, they chop of in the cracks. Then the tree has been swinging so much in the wind that the fibers have cracked.

Magnus referred to his own background in forestry. To him it’s not simply that ground frost makes forest more storm-secure, because he has witnessed how it can damage a tree even if it endures a storm. Experiences like these helps shaping his concern for this particular environmental condition and makes him personally less worried about the predicted decrease in ground frost in the future. Thus, his trust in his own personal experience can work as a barrier to take scientific data seriously.

There seemed to be a conceptual difference between actively doing something to prevent future climatic variations and events, and to more slowly cope with changes as they occurred. This was shown by a separation between the informants thinking of

future adaptation and their actual contemporary strategies and knowledge they had developed by their experience of past events. To them, coping with a storm or drought was not the same as coping with global climate change or coping with possible future and unfamiliar events. Instead it was a form of coping with future based solely on an experience of past events.

All the informants constantly developed their strategies to more efficiently manage and prevent effects from meteorological stress such as storms, insects, drought, and ground frost. They often confidently showed and talked about their methods as the most reliable, but when asked about the future and risks with climate change they somewhat lacked confidence and expressed feelings of uncertainty or even felt that it was hopeless.

Jan-Olof who had a lot of ideas and strategies to storm management based on his personal experiences and knowledge put great trust in his own methods. But when asked about how to prevent storm damages in the future he exclaimed, “No, it cannot be done, I have no idea about how to do it, do you have any suggestions then I more than welcome them”. Even though he had developed strategies to cope better with storms and expressed confidence in these methods he was not as confident when reflecting upon his power and his possibilities to cope with long-term future events. He was worried about the storms that he thought would increase and said that it was worrying that he and the forestry sector in general could no longer manage forests as they had done before. He thought that they would probably have to shorten the rotation period of stocks in order to not let them become too old and thereby more storm sensitive.

Peter showed similar uncertainty when asked about adaptation to future climate. When I asked him about his capacity to adapt his forest to climate change he pointed out that: “well, first and foremost I do not know what climate adaptation is... what can I do to adapt to a warmer climate? I have no idea”. Evidently, there was a lack of confidence when he was asked specifically about preventing future effects of climate change. This was not the case when freely talking about forestry strategies and methods that he had learned from experiences.

It seemed that planning for future unfamiliar events was also connected with high risk-taking due to the unpredictability of the future and coping along the way was regarded as more safe and efficient. Thomas summarized this by telling:

Of course I have some thoughts, but I don't go around and think about how bad it can get, because it can get really bad, but on the other hand, if I plant broad leaf trees today then maybe this longhorn beetle comes and eats it, and if I plant spruce then I may instead get problems with other damages and storm-fell. Whichever way you are turning you will take risks. You have to take the day as it comes and then you adapt thereafter.

Generally it seemed that the informants felt a certain constraint to their agency in coping with changes when these were labeled 'climate change' and did not believe that they could do anything more than cope with variations as they occurred as a form of reactive strategies. Adapting to general environmental, economical, and political changes has been discussed to be an inherent part of forestry (André 2013: 66). But discussing climate change as something outside normal everyday coping seemed to render uncertain answers from the forest owners in this study.

7.5. Reactive actions and coping strategies

When walking with Thomas in one of his spruce areas he showed me an old stonewall that still marked the border between his and the neighboring forest. This area consisted of monoculture of spruce on both sides. On one of the neighboring tree on the other side of the wall there hanged a tape marking for planned forestry activities from a large-scale forest company that the neighbor had hired. I noticed that when Thomas saw the tape marking, he was surprised and showed a minor expression of worry. "Ouff?!" he uttered. He looked at it and discovered that the tape was a marking for thinning and said that: "thinning, phew! That's good, I was afraid it was a marking for clear-felling". When I asked him what it would have meant if it had actually been a tape marking for clear-felling he answered that there would not be much to do and said that: "well, you'll just have to adapt". This was a way to tell that he cannot control his neighbors' actions. A clear-felling of the bordering spruce which grew in a westward direction would have exposed Thomas's old spruce stock to wind and storms and, necessarily, he would have needed to rethink if he should fell it earlier than he had planned in order to not loose it all as wind fell during a possible storm event.

The example with Thomas shows a reactive response. His initial reaction told of a sudden change in plans. If the neighbor should had clear-felled his or her forest, it would had put his stock in great risk and he would have needed to take action in order to cope with this sudden change. This would have resulted in an economic risk as he would had to choose either to fell the stock earlier and thereby gain less economic outcome from it, or to let it stand and be exposed to possible strong winds and the risk of losing outcome to storm damages.

Reactive measures are taken during storm events in order to cope with the consequences of a sudden stress, but recently storms had been perceived to occur more often and had made the forest owners take actions to prevent damages in case of possible future storm events. Gudrun seemed to mark a shift when storm management and adaptive measures started becoming a more important part of their, and other forest owners forestry planning (Ulmanen et al. 2012: 10). Gudrun also seemed to symbolize the tipping point to what a forest owner was able to actively cope with. Some informants told of the possibility of successful storm management as long as they did not have to cope with another Gudrun, because nothing could cope with a storm on that scale. Since Gudrun struck in 2005, strategies for managing storms had become a necessary part of the forest owners' everyday forestry in order to cope with an experienced increase of storms. Important is that all the informants told of an increase in storms and did not refer to one storm or cyclone alone. They had identified a pattern of climatic effects and changes that had made them develop reactive measures based on their real-time experiences of this pattern.

Most of the informants, as was discussed in chapter 6, held spruce as the most important tree to them and planned to continue to plant it. They were aware of the risks but tended to argue that they had no other options. Jan-Olof can figure as an example. When I asked him about future climatic risk of bark beetle increase connected with warmer climate he argued that:

It becomes like that, if you have a lot of one sort. It would be the same if we had planted larch everywhere, then, most likely, some insect that had specialized itself on that [tree], (...) but as it looks today there is nothing that gives as much [yield] as the spruce, even if there is root rot in it, it still ends up better than anything else, because it grows that fast (...) and it is spruce they [the industry] want, we have quite a lot of thick grown pine here but they don't want any pine!

As a result, most storm-securing strategies consisted of methods to secure spruce stocks in order to continue to get economic outcome. This was done by a diversity of strategies such as planting walls of broad leafs bordering spruce stocks in westward direction, leave pine trees as an admixture with spruce, avoid large machines, or develop better strategies to avoid ground damages.

There was a great range of different strategies and the forest owners' reliance on them differed. Generally they held great confidence in their own methods because they were grounded in their own experience while they could be skeptical to other methods where they had not been able to test or perceive its possible success. Primarily they were critical to methods performed by large forest companies but also to some extent to other owners and neighbors working with other methods.

The confidence in their own methods seemed to depend on their experience and perception of success or failure with different methods. This had important implications for how the informants received both external knowledge and supposed negative effects of climatic variations. When discussing external recommendations or alternative strategies they could respond by telling why these strategies would, or would not work depending on their own experiences. Arne had, as mentioned earlier, put a lot of effort in avoiding ground damages and used a technique using a winch and wire to collect felled trees, a method he argued was very effective in order to avoid ground damages. When we were walking in a part of his forest that he had bought as additional land some time ago, we stopped in an open space in the middle of the forest. He told me that this was an open area made by the former owner in order for big machines to be able to turn around, and that this spot were directly exposed to strong winds. With the winch technique, he told that these turning areas were not necessary and thus it eliminated unnecessary risks. A couple of weeks later, when I met with Jan-Olof, I mentioned the winch method to him and he said that he thought that it was not really effective and that he didn't see the point with using it. To further legitimate this argument he used his own personal experience: "I have winched a lot in my days so I know". He himself was driving a big harvester and argued that the way he managed a forest seemed to cope better with storms than other areas that was managed by hired companies. The same method is regarded as successful or not for Arne and Jan-Olof, depending on their personal experience of them.

A general concern for keeping track of the wind direction was common and regarded as necessary in order for efficient protection. When conducting forest work all the informants told of the importance to always keep track of the westward direction and try as much as possible to shape the forest so that they avoided exposing sensitive areas to strong winds. Björn told that in the southwestward bordering zones he did a major thinning 10-15 meters from the border and tried in as much as possible to save pine trees as well as plant oak seeds to work as future storm protection. This was also the case with Åke who in early state tried to thin down border zones in order for the trees to have room to develop their root systems. He also saved broad leaf trees where it was possible. But as was the case for Thomas and the risk of the bordering forest being clear-felled, as well as Peter's risk of getting his forest infested with spruce bark beetle from the neighboring nature reserve (as was shown in chapter 6) a forest owner have limited agency to manage a border to climate due to more than simply environmental aspects.

The informants had developed a great concern for, and had taking actions to cope with storm-damages. This concern derived from their experience with an increase in damages during a period initiated by the storm Gudrun in the winter of 2005. The different adaptation were developed depending on the informants' perception of success or failure with them. This further strengthens the argument made in chapter 6 that forest owners tend to develop knowledge based on their real-time experience. The diversity in strategies and methods also tells that weather effects are neither experienced or coped with evenly, but are rather developed due to the combination of meteorological events and landscape conditions that mutually create local 'material climates'. Put differently, coping strategies become diverse because of the wide range of socio-ecological settings that makes up different forestlands and forms different 'material climates'.

The coping strategies of the forest owners displayed a reactive form of adaptation as they were based on experiences of destructive events in the past, but became of more proactive character in that they were conducted to prevent or mitigate similar events in the future. The development of this proactivity is a process in which the informants claimed to have experienced a change in climatic patterns over a period of time. The problem with this proactivity is that it does not necessarily conform to adaptation recommendations that are based on external knowledge and scientific

simulations of future changes. This type of knowledge is distant from the informants' personal knowledge that is based on their real-time, and local experiences. It has been discussed that adaptive measures in forestry are often initiated in order to prevent events that have been experienced earlier but not adapt to unknown and possible future risks (Vulturius & Swartling 2015).

7.6. Climate change and forest industry

The confidence that the informants often expressed when talking about their own forestry methods was often connected with a lack of trust in large-scale forestry that according to them was all about efficiency, profit, and strict management models. Hired work force was often seen as having negative impacts on a forest because the employed workers were said to being pressed by time and limited by strict-lined models and directions. Having a small-scale forestry enterprise, and having possibilities to develop good personal relationships with people working in your forest, was regarded as better for management because it put less stress on the involved stakeholders and resulted in more dynamic management that was adjusted to the local conditions and the forest owner's own personal preferences.

It seemed to be a general view that an active and engaged forest owner who avoided hiring large forest companies would render better overall forestry results. Arne and Mats told that, because they lived near their forest and had machines and tools ready when needed, they had no problem to cope with acute problems such as bark beetle infestations quickly, or to postpone forest work if the conditions were not right. Jan-Olof who had a private forestry enterprise told how he mostly was able to discuss with his hirers to get the best results, implying that he sometimes needed to turn around and come back another time if the conditions for performing work were bad at that particular time.

Talking about risks with climate change often rendered discussions about the large-scale forestry companies and the sawmill industry. To them, future climatic risks could not be regarded as an isolated matter disconnected from politics and economy. Bad management that rendered a landscape vulnerable could according to some informants be the result of economic pressure from the forest industry. During my meeting with Arne we read about climate change and the effects of a prolonged growth season that could result in more clear-felling being performed during growth

season. As a response to this, he argued that this was due to an economic pressure on the forest industry:

Well, but that is also because the machines gets more and more expensive, they cannot stay put, they need to work three shifts a year, and then the majority of the felling will be during summer time.

To Arne the main problem was not simply climate itself but rather the pressure on the industry that forced them to perform actions that risked reducing the future coping capacity by damage the forest ground during management in the summer season.

7.7. Trust in expert climate knowledge

Long-term adaptation to possible future effects of climate change must build upon the capacity of people to cope with future stress in a landscape before hazardous events have occurred. In order to gain knowledge of possible future climatic effects this knowledge must be based on modeling and simulations of the future. Thus, proactive actions to prevent or mitigate possible events that have not yet been perceived requires general belief in data and information telling that these events will actually happen in the future.

If global climate change is regarded as a model and as something detached from the locality of a forest, and from the immediate perception of a forest owner, which is argued here to be the case of modern climate science, taking proactive actions to predicted events necessarily means that a forest owner will need to turn to external experts as their primary source of knowledge. Though, this seems to be in contradiction to the forest owners' primary way of learning by real-time experience and by developing knowledge through the work and participation within their forestland.

The informants read forestry magazines and listened to expert recommendations but they seemed to regard most of this with skepticism and sorted out what they did or did not believe would work in their forest. The cause behind the informants' skepticism, as discussed in chapter one, seemed to derive from past experiences of failures of expert recommendations, combined with a confidence and reliance on their own knowledge and methods, as well as a feeling of uncertainty concerning the

general future of forestry. This experience of past failures and distrust in expert knowledge has been suggested to function as a barrier to the will of forest owners to take adaptive measures to cope with climate change seriously (Vulturius & Swartling 2015. Ulmanen et al. 2012).

When discussing adaptive recommendations to future climate change the informants were often skeptical concerning both the quality of the expert knowledge as well as uncertainty of the future. This quote shows an example of how Thomas reasoned:

They recommend that you plant more pine, both for climate change, it will get more drought during summer and pine will endure it better than spruce... But as I said, I don't really know how it will look in the future, it is still just a lot of hypothesis, it's quite qualified hypothesis... When I studied we had one example when they did these climate calculations, they do small squares, put it on a map and do a mathematical formula, the first 10 years it corresponds quite well but just one little error that doesn't affect that much in the beginning will show effects more and more along the way and more errors will show. So I mean, it is a matter of quite a great uncertainty how it really will become. We will see.

Thomas had personal experiences of how climate change simulations were conducted and used this to confirm his critical notions about the recommendation to plant pine. He also referred to scientific measurements concerning extreme values of temperature as a way to emphasize the difficulty in adapting forests to climatic variations. Even if he was educated in natural science and understood the methods that were being used to simulate future climate it did not make him less critical to the predictions of the future. Contrary, he seemed to use it as a way to confirm a sort of wait-and-see approach that made him prefer to plan and react upon changes along the way. Generally, reports and recommendations about future change were received carefully and critically.

When I discussed SFA and their recommendations for future climate change adaptation with Åke, he acknowledged their access to scientific models and experts and he thought that they should be legitimate to make recommendations. He then emphasized that: "but as I said earlier, the pendulum have turned that much so, well, you are a little careful, not ready to go all in". He referred to a past history of forestry politics and earlier failures to predict future outcomes and how this had made him less

prepared to fully align with their recommended climate change adaptation strategies. Björn also exemplifies how the past influences his trust in future prognosis from external sources. He told that he had saved a lot of forestry magazines from the 80's and had taken a look at them recently when he and his wife were moving into town. He told that they contained a lot of articles about past concerns in the forestry sector such as acidification, and over-grown spruce. He then said that: "much of this was not correct at all, so the truths that are printed today, what do they matter in 20 years?".

Identifying and understanding the skepticism to external and scientific knowledge concerning the future of climate and forest is crucial if we are to understand how forest owners will conduct adaptation to future climatic stress. If adaptation to climate change requires strategies that are based on knowledge beyond forest owners' common way of learning through real-time experience it will require that authorities, scientists, and experts are able to develop trust in their relationship with owners despite possible uncertainties concerning scientific projections and predictions (Vulturius & Swartling 2015: 223).

Developing trust requires that the forest owners' own personal knowledge and local strategies are acknowledged and taken seriously. Local forestry knowledge and strategies are not developed through top-down processes of localizing universal models down to local forestland, but are rather the product of forest owners' personal entanglements with their forests. If the forest owner feels that his or her knowledge and strategies are taken seriously and that they are being trusted as experts in their own forestland, they may be more open and receptive to expert recommendations on future climate change adaptation strategies. But as was shown earlier, the informants often felt that authorities and experts did not trust them and that they wanted to constrain their rights to manage their forests in their own manner.

7.8. Risks with unknown forestry actions

To the informants, the future was uncertain concerning both the climate and the socio-political context of forestry. Climate change was only one of their concerns and other contexts and relations could constrain their possibilities to develop adaptation measures to climate change. An example of such constraint was Björn who had problem to get permission from local authorities to decrease the moose population by

hunting in order to be able to bring up more pine, a tree that handles drought and can function as storm protection but in turn is hard to grow due to game grazing.

One proposed strategy to decrease damages from climatic stress is to plant more deciduous trees and avoid monoculture of spruce stocks (Eriksson et al. 2016). The problem to most informants with replacing spruce with deciduous trees was the economic risk due to these trees' low market value, or their possible value drop in the future. Björn who had planted a lot of oak tree told of its contemporary high value but also pointed out that no one will know what the value of oak will be in 50 years from now. This uncertainty constrained the forest owners' possibilities to plant larger stocks of broad leaf or pine due to spruce being more productive and a more profitable timber that could render a stable income both in long-term but also short term by performing thinning activities during its growth.

When I discussed climate change with Åke he said that he thought a lot about climatic and environmental conditions and changes but he also emphasized that he was not able to think about what his children would be able to harvest in 60 years from now.

Forestry actions that were not grounded in earlier experiences or that were connected with possible future failures were not absent but they were a minor part of most management and they were often more of experimental sort than routine actions. This included planting alternative species, such as larch, or North American spruce species such as Sitka and Douglas, as well as conducting continuous forestry, and use workhorses instead of forwarders after thinning processes.

Trust and reliance on alternative tree species differed between the informants and were often built upon the quality of their earlier experiences with them. Thomas and Åke were optimistic to plant Sitka spruce. In Thomas's forestland the previous owner had planted some Sitka spruce. He was convinced of its good quality as it was considered more secure to storm and he told that after clear-felling his remaining ordinary spruce stocks he would probably replace them with Sitka spruce. He seemed to ground his reliance on this tree both due to it having a different root system and that it was better suited to the environmental conditions in the region of Scania. His trust in Sitka spruce derived from his own experience of having it planted in his forest but also on his theoretical knowledge of its quality.

Åke were also optimistic to Sitka spruce but grounded this in a perceived success of its growth from his father who had planted some of it on an old beech slope in the 70's that had turned out very well. Both Thomas and Åke has some form of practical connection with the tree, but one is grounded on theoretical knowledge of the tree, while the other was based upon real-time experience.

When asking Arne about alternative species he referred to how, according to him, these experiments often had failed and “hit back” in the past. When visiting a ruin in his forest, as was shown in chapter 6, he showed me an old stock of Romanian spruce that his father had planted in the 60's because it was regarded as a good quality spruce, but today he said that it had turned out to be almost worthless timber. He referred to this stock as an example of how it can turn out, “there is no one that plants Romanian spruce today” he said.

7.9. Chapter summary

This chapter has shown how the informants reflected upon, and responded to climatic variations and changes. It was shown that they tended to separate their own personal experiences of climate and weather variation from their knowledge of global climate change. They were to a high extent able to tell about local weather and climatic variations as well as developing a wide range of reliable methods to cope and react to these along the way. Discussing climate change more generally seemed to render more uncertain reflections both concerning the informants' belief in actually having perceived climate change as well as their possibilities to adapt to it. The future was viewed as uncertain and hard to predict and the informants held a careful approach when relating to it.

It was shown that contemporary coping strategies were developed to cope and react upon changes in weather patterns, especially storms, but that these strategies was developed as a response to real-time experiences of changes and not by theoretical knowledge about future risks. My informants tended to regard these coping methods as more of routine forestry and not as actual climate change adaptation. Adapting to future not-yet-experienced changes did not correspond to the informants' normal reactions upon stress and changes along the way. Therefore adapting to climatic changes that has been predicted by scientific simulations will require that relations of trust are developed between forest owners and experts. Such

trust seems to be lacking amongst the informants today due to their earlier experience with experts recommendations and predictions.

This chapter has also shown how climate change cannot be analyzed through apolitical lenses where climate change is regarded as a bounded system equally impacting upon a forestland. The diversity of methods and concerns regarding climate change uncovered here, as well as the informants' awareness of political and economic relations surrounding forestry, tells that climate change must be understood by the 'material' form it takes when it is put together with the local and social contexts surrounding forest owners.

8. Summary and Conclusions

The aim of this thesis has been to better understand how some private forest owners, in the south of Sweden, experienced, understood, and responded to climate change and its effects to their forests and forestry. This has been done by not only analyzing how the informants talked about matters of climatic variations and weather, and how they responded to them through coping strategies, but also by looking into the wider picture they gave concerning the socio-political context surrounding forestry as well as their personal engagement with their forestland. The analysis has shown that there is more than simply biophysical and climatic effects and variations shaping how the informants related to and responded to climate change. A summary and discussion of the analysis will follow.

8.1. Conflicts and trust

The analysis has shown that the forest owners' relationship with authorities and external experts was affected by both contemporary and past experiences between these groups. The two most prominent themes were conflicts concerning ownership rights, and the forest owners' distrust in top-down management strategies and external experts recommendations.

The informants felt that the ownership rights to their forest properties were being threatened and constrained by authorities and the interest of the public. They felt that authorities and the public tried to put the interest of increasing biodiversity and forest protection before their own right to ownership and personal engagement with their forest. This resulted in conflicts and distance between the owners and authorities. The former tried as much as possible not to have authorities interfere with their forests and forestry. Some informants even told of acts of resistance such as destroying certain forest areas in order to make them less attractive to forest protection.

The second theme concerned trust in external experts and top-down management recommendations. The forest owners told of how past experiences with failed outcomes with advised management strategies as well as failure to predict environmental issues had made them reluctant to fully trust the validity of recommendations and expert knowledge. This distrust also influenced how the

informants believed in the predictions made by climate science concerning future climate change in Swedish forestry.

8.2. A forest of relations, knowledge production, and coping along the way

In Chapter 6 a deeper understanding was presented of what it meant to be part of a forest and how forest owners could be seen as deeply entangled participants in their forestland. Showing how they were inevitable parts of their forests and how their actions and memories became embodied in the very shape of the land gave a better understanding of how the forest owner became an inevitable part in the process of producing a certain forestland. Memories of how the landscape had changed, as well as actual areas in the forest that told of past actions, seemed to make the informants view changes in a forest as normal and that the shape of a forestland was never fixed but rather ongoing.

It was also shown in chapter 6, that the forest owners developed knowledge through their active participation in the forest. This knowledge were situated and developed through their real-time experiences with successes or failures with certain forest management methods, tree species, or weather events. Real-time experience also seemed to be more valid to them than knowledge from external sources such as experts or other forest owners. In other words, the actual perception and experience of success or failure seemed to be the most valid way of producing personal trust in certain methods.

By entanglement and participation within their forest, the forest owners also responded to changes and stress in their forestland by changing their ways and methods along the way. Coping with environmental and climatic variations was a normal part of managing and participate in the shaping of a forest. The recent storms made them develop different storm-securing management methods as a response to recent extreme storm events and experiences of an increase in wind-fell during winter season. These coping methods were developed along the way of changes as a normal way of responding to stress and variations, but they were not necessarily connected with climate change adaptation due to the latter being regarded as something outside of the informants' normal coping capacity. This indicates that forest owners may not identify their actions as being adaptive to climate change when being asked about it

explicitly, and that in-depth studies may reveal what adaptation and coping actually means to them.

8.3. Forest owners' perceptions and experiences of climate change

The forest owners did not regard their coping strategies and measures as actual climate change adaptation because global climate change seemed related to a global system distant from their everyday work and planning. This made them less confident in feeling that they were able to adapt to climate change and that they could only cope with climatic variation along the way as the normal way of responding to changes in forestry.

The discourse of global climate change also seemed to shape how the informants told of their perception of climate change. It was shown that they believed in global climate change but that they were careful to tell that they had experienced or perceived it personally. To them climate change seemed to be regarded as something happening globally and beyond their own perception. This tells that the belief in, and knowledge of, global climate change not necessarily conforms to the real-time and everyday experiences of the forest owners. Thus asking forest owners explicitly about perceived effects of long-term global climate change may shadow their actual perceptions of weather changes, as well as their adaptation actions, which they not necessarily connected to the effects of global climate change. This study has shown that in-depth anthropological studies may render more adequate and nuanced understandings of how climate change is understood amongst local people.

8.4. Re-socializing climate

What the above results tells is that studying climate change in forestry from the bottom-up perspective and looking into how private forest owners relate, not only to climate change, but also to their socio-ecological as well as their socio-political relations, that in the end will have considerable importance to how climate change will be managed, can render better results than studying climate change apolitically as simply a biophysical system doing impact upon forests.

As climate change and adaptation strategies in Sweden and in Swedish forestry is mostly managed and informed to stakeholders through authorities and scientific

experts it is of importance that healthy relations of trust and communication are developed between these groups. As was shown in this study there seemed to be a growing contempt and distrust, amongst private forest owners, to authorities as well as a general distrust in listening to expert advices, as well as uncertainty about contemporary predictions of the future would show to be valid in the long-term. These conflicts and contempt has considerable effects on the possibilities to incorporate efficient management of climatic variations, not least due to climate science simulating long-term climate change and creates theoretical models, while forest owners put their real-time experience as the most valid way to produce knowledge. As has been argued, anthropology and ethnographical fieldwork can have an important role to play as anthropologist can work as community interlocutors bridging local knowledge with scientific knowledge in order to incorporate climate management built upon equal communication (Crate & Fedorov 2013. Button & Peterson 2009).

Studying climate change in the wider social and political context of forestry also showed that climate variations must be seen in their material forms, that is, the forms they take when becoming intermingled with the range of different localities and contexts. This became clear when looking at how political and economic demands had shaped contemporary vulnerable landscapes with storm sensitive spruce stocks dominating the landscape in southern Sweden that made forest owners feel that they where economically dependent on this tree. It was shown that the they felt that economic and political relations constrained their possibilities to fully adapt to possible future changes. This tells us that an apolitical perspective on climate adaptation, working in the logic of a 'climate reductionism', reducing future forestry to climate alone, may miss other relations surrounding ground-level possibilities to adapt to climate change. Thus climate should not be viewed as an external entity impacting upon a forestland but, rather, the effects of climatic variations should be seen as dependent on the social landscape that renders different localities and people unequally vulnerable to climatic variations (Fiske et al. 2014. Taylor 2015).

In order to understand how the forest owners in this study relate and respond to climate change it is necessary to understand the wider socio-political and socio-ecological world in which they and their forestland are situated. Hopefully it has been shown that this form of re-socializing climate is fruitful when studying climate change in Swedish forestry.

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