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# Adaptation to climate change? Why business-as-usual remains the logical choice in Swedish forestry

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ABSTRACT

The two latest IPCC assessment reports have concluded that knowledge is not sufficient for inducing action on climate change. This study problematizes the issue of going beyond business-as-usual through a study of the forestry sector in Sweden, which is a large economic sector and could be expected to be an early adapter, given that newly planted forest may stand some 70–90 years into the future. Therefore resources, economic motivation in the longer term and environmental foundations for early adaptation action could be expected to exist. This study draws upon the Foucauldian conceptualization of governmentality to explain the particular institutional logics that nevertheless lead to business-as-usual arguments dominating discussion on adaptation in the case of Swedish forestry. The study emphasizes that adaptation must be seen as steered and limited by existing institutional, social system logics, rather than by externally defined "rational" motivations. Efforts on adaptation to climate change must thus be considered in relation to, and seek to change, existing institutionally based motivational and incentive structures, and must thus be conceived through social rather than environmental logics. In fact, social logics may even define the types of actions that may be regarded as adaptations.

## 1. Introduction

Although development of climate change policies and strategies is on the increase world-wide, their success and efficiency in resulting in actions on climate change has so far been relatively limited, in terms of both adaptation and mitigation. The latest reports from the Intergovernmental Panel on Climate Change (IPCC, 2014, 2007) note, among other shortcomings, that "knowledge is not enough" and that, although it is an important factor, "knowledge in itself is not sufficient to drive adaptive responses" (Klein et al., 2014: 911). Due to this, IPCC (2014) concluded that implementation so far has been relatively limited and faces a number of barriers and challenges. While this may be partly due to the complexity of adaptation practices and to the fact that effective adaptation has not been fully covered in the literature (Noble et al., 2014), one criticism is that there has been a major focus "on what should happen rather than how it might be achieved" (Mimura et al., 2014: 888; Meadowcroft, 2011). It has been noted that the framing of adaptation planning as a "problem-free" process and underestimation of its social nature has contributed to the creation of unrealistic expectations in societies on the capacity for planning and mainstreaming climate adaptation (Mimura et al., 2014: 874). This has resulted in limited implementation (Mimura et al., 2014: 888) and in the failure of existing models and analyses to handle the concepts and variables of climate change policy in e.g. the forest sector (Wellstead et al., 2013). It is therefore crucial to identify the logics that affect policy processes and actually cause inaction (Noble et al., 2014: 2).

Forest can be studied as an important case in this regard, as it is almost the epitome of an industry where actions today determine development some 70–90 years ahead (a tree planted today in northern Europe may stand that long before final logging). Factoring in climate change should thus be a given, based on this time span and economic decisions. The well-developed forest sector in northern Europe, largely acting on an international market focused on wood production, is also accustomed to long-term planning for growth on long time scales. However, despite this, whilst adaptation policy development has often included forest, implementation of adaptation policies in forestry has so far been relatively limited (Stephan, 2013; Lovell, 2013). This is not a result of limited data on impacts. As plant species ranges are expected to shift upward in elevation and northward in latitude in the Northern Hemisphere under future climate change (Kirschbaum, 2000; Lindner et al., 2010), it has been established that this will lead to both new assemblages of species in space and time (Hebda, 1997; Kirschbaum, 2000; Hansen et al., 2001) and changing physical conditions (e.g. nutrient and soil permafrost) (Stewart et al., 1998; Spittlehouse and

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Stewart, 2004). In addition, it has been claimed that Northern Hemisphere forests require adaptive actions now (Stewart et al., 1998; Walther et al., 2002; Lindner et al., 2014; Kellomäki et al., 2008) and that many climate adaptation options are available within forest management, both to take advantage of beneficial changes such as the potential for increasing growth and to limit risks (Dale et al., 2001; Parker et al., 2000; Stewart et al., 1998; Spittlehouse and Stewart, 2004; Christopher et al., 2017; Garcia-Gonzalo et al., 2017).

This study problematised the problem of going beyond business-as-usual by analysing and defining the institutional logics and framing around inaction, drawing on interviews with all main forestry sector organisations (i.e. a total study) in Sweden, one of Europe's largest forestry countries in terms of forest land and the contribution of forestry to GDP and export value (SFIF, 2016). The analysis covered the specific sets of technologies and rationalities that can be seen as representing powerful and productive "regimes of practices" in structuring mentalities, identities and behaviours as appropriate, legitimate or effective, and that are in effect constructing e.g. forest naturalness or efficiency-orientated regimes, with very different adaptation results (Neumann and Sending, 2007). Situated in a specific context, these rationalities shape policy interventions, actions and implementations (Neumann and Sending, 2007; Hynek, 2008), but can also constitute barriers to effective climate change policy and adaptation (Oppermann, 2011; Methmann, 2010; Tennberg, 2009; Slocum, 2004; Brooks, 2003). The assumption in this study is that adaptation – and inaction on climate change – must be viewed with a focus on social logics, i.e. as the product of the governing rationalities and technologies (Okereke et al., 2009) and the prevailing social, political and economic systems in which they are produced (Smit and Wandel, 2006). These may differ between countries to such an extent that in effect very different actions are constructed as adaptations even in relatively similar environmental regimes. As a result, institutional rather than environmental knowledge or impact-focused research is crucial in understanding the limitations and possibilities of adaptation and mitigation.

## 2. Theoretical framework

Implementing adaptation to climate change, i.e. actions taken to deal with the consequences of climate change, is crucial, given that even the present level of emissions – if emissions were to cease today, which is highly unlikely – is resulting in environmental change (IPCC, 2013). However, the adaptation actions that can be undertaken are largely conditioned by broader decision-making systems. Multi-level governance is increasingly conceived as the dominant model for decision-making, highlighting the way in which not only government, but also other actors such as the private sector and NGOs, impact upon and undertake decision making at several levels (Green, 2008; Pattberg and Stripple, 2008; Biermann and Pattberg, 2008). Decision making is increasingly being delegated to supranational level, such as the EU, and to subnational level, with local governments gaining increasingly large decision-making powers (Eberlein and Newman, 2008; Hooghe and Marks, 2001; Keskitalo and Pettersson, 2016). In order to understand the way in which decision making amongst different actors is structured, understanding their established assumptions and practices is key. Michel Foucault developed the concept of governmentality to describe the "conduct of conduct", or governing mentalities, i.e. the way in which certain assumptions or rationalities "shape, guide, or affect the conduct of some person or persons" by making them seem logical (Gordon, 1991: 2). In other words, governmentality concerns "a multiplicity of rationalities, authorities and agencies that seek to shape the conduct of human behaviour" (Bäckstrand and Lövbrand, 2006: 54). The concept of governmentality is an extension of Foucault's more general work on discourses as systems of thought and practice that structure behaviour. Utilising the concept of governmentality highlights in particular the explicit governing or steering measures of different actors (Foucault, 1991). This concept also structures what is seen as knowledge: "[e]ach society has its regime of truth, its 'general politics' of truth: that is, the type of discourse which it accepts and makes function as true" (Foucault, 1991: 131, quoted in Winkel 2012: 82). For the case of forest management, certain tenets may thus exist as truths, e.g. that forest management should focus on planted monocultures, not on mixed forest (e.g. Scott, 1998).

In Foucauldian literature, it is argued that the rationalities that form a system of governmentality can be identified through the different "technologies of government": the "strategies, techniques and procedures" by which different actors undertake programmes or initiatives in their areas (Rose, 1996: 43). These technologies constitute the pathway through which "rationalities and the programmes […] that articulate them become capable of deployment" (Rose and Miller, 1992: 184). Assessment of such technologies and rationalities has most often been undertaken at the national level, with the focus on governmental rationalities and technologies of government, in the sense of national government. However, as Foucault strongly emphasises, power and government in a more general sense, concerning decision making and not only the state body, is related to actions by multiple actors but steered by such organisational logics, an approach that has been fruitfully applied to other actors (e.g. Senellart, 2007). For instance, the state-focused governmentality literature tends to argue that the state is impacted upon by a market logic originating in areas outside the state itself (e.g. Edwards et al., 1999), which indicates the role of logics applied in the market sector. Here, "governmentality approaches […] direct a call for research to address the complexities of social interaction with cultures of nature; problematising institutions, and the complexities of placing communities in governance" (Stanley et al., 2005: 679). In the present case of Swedish forestry, governmentality could thus be defined through e.g. the forest management measures that are undertaken, whether they are intensive, active or passive, what species they target, how they are implemented, and what system of forest management is assumed. In relation to adaptation to climate change, such approaches to governmentality would determine the adaptation actions that are possible and also the role allocated to adaptation in comparison with other factors (such as economic profitability) (Keskitalo, 2011:, see also e.g. Lindner et al., 2010).

In forestry, the technologies of agency may, for instance, come into play when certain individuals, groups and communities, such as forest owners, are confronted with various forms of risk and rendered a target population for these. The object of technologies of agency is often to transform people's status in order to make them active citizens capable of managing their own risk (Rose, 1999; Dean, 2010). In forestry, this is being practised through processes of subjection and empowerment of forest owners (e.g. through education, forest fairs and media) and in the relationship between forest owners and forest professionals (e.g. consultations, marketing and personalised IT systems such as "My pages"). However, the target population subject to these technologies of agency is not limited to forestry, but also includes parts of the general population that consume forest products and services, by emphasising their responsibilities as consumers, for instance through various types of certification (Holmgren et al., 2010; Johansson, 2013; Johansson and Lidestav, 2011). The technologies of performance are designed to penetrate dominant social enclosures of expertise (e.g. potential geographical variations in practice) and to subsume the substantive domains of expertise to specific forms of calculative regimes (Rose and Miller, 1992) or regimes of standards (Hudgson, 2001). Audits (Power, 1999), budgets, performance indicators, expertise and service provision and the corporatisation and privatisation of public, or formally public, services are all more or less technical means for locking in the moral and political mentalities for shaping and optimising conduct in specific ways (Larner, 2000; Rose and Miller, 1992; Teghtsoonian, 2004; Dean, 2010). These technologies of government can therefore be described as an indirect means of regulating agencies, transforming individuals and groups into subjects of particular "calculative regimes" (Miller, 1992) of Swedish forestry discourse. This distinction between technologies of

agency and technologies of performance makes it possible to examine two different strategies and aspects of governmentality (Dean, 2010) and logics of adaptation within the present rationalities. It also underlines the ability of performance to dominate over agency in Swedish forest governance, in what Rose and Miller (1992) call "government at a distance".

In the context of climate change, concepts of governmentality have been used e.g. in relation to global levels (Oels, 2005, 2013) and to describe the technological/scientific and economic rationalities that are expressed for instance in computer modelling and in discussions of adaptation (Methmann, 2010; Oppermann, 2011; Henman, 2002). Tennberg (2009) and Slocum (2004) somewhat similarly conclude that neoliberal rather than e.g. internal or locally based understandings drive considerations on adaptation, while Keskitalo et al. (2012) review the differences between hierarchical and neoliberal conceptions of adaptation steering in adaptation policy developments in different European countries. With regard to forestry, Winkel (2012) reviews the use of Foucauldian concepts in forest studies and concludes that there are a range of nationally based studies, although in particular with regard to the concept of governmentality largely focusing on developing countries. Ireland and McKinnon (2013) provide a discussion of "post-development" including Foucauldian approaches to adaptation in developing countries, while Singh (2013) discusses Foucauldian understandings, with both these studies focusing on the local level. Bose et al. (2012) review the development of specific forest governmentalities in India, while Ambrose-Oji et al. (2002) assess the corresponding situation in Cameroon (see also Porter (2007) on the development of colonial forest planning legacies in Australia). The present analysis adds to the literature by combining a focus on adaptation and forest with regard to governmentality and reviewing the mentalities of governing that are articulated by market actors in national contexts in adaptation of forestry in a specific case. With its emphasis on rationalities and institutional challenges, the present study also adds to the general literature on climate change and policy implementation by going beyond the existing emphasis on knowledge and techniques to explore the social characteristics of the process on multiple levels.

## 3. Case study, material and methodology

Forestry has historically been subject to little regulation at EU or supranational level (e.g. Angelstam et al., 2011; Parviainen et al., 2000) and varies widely in management assumptions and practices, as well as goals of management, between different countries (e.g. Keskitalo, 2011; Keskitalo et al., 2013). The variations include differences in forest cover and national economic importance, where high values may be linked to a production focus, whereas in "Southern Europe the non-wood products and protective functions, especially the water related services are often dominating" (Parviainen, 2006: 70). Sweden can be seen as an example of relatively intensive semi-natural forestry in this regard (McDermott et al., 2010), with wide-scale production of even-aged stands with a single dominant tree species (Axelsson and Östlund, 2001). Planting of lodgepole pine (*Pinus contorta*), a fast-growing non-native species, is allowed in specific areas. Sweden has also recently reviewed the option of allowing intensive forestry (planting fast-growing trees, including non-native species) on abandoned agricultural land (Lindkvist et al., 2012). As one of Europe's large forest countries, forestry plays a large economic role: 60% of total land area is productive forest land and some 3% of GDP or 10% of export value originates from forestry-related industries. Sweden is also the world's third largest exporter of sawn goods and fourth largest exporter of pulp and paper (SFIF, 2016). Sweden may be able to take advantage of beneficial changes due to climate change, for instance a longer growing season (changes in temperature, although in a complex relationship with potential changes in precipitation) (SEA, 2014), but will also need to adapt to potential negative consequences, such as the potentially greater risk of damage related to storm events, drought or other water stress and insect outbreaks (SweGov., 2007b; Keskitalo et al., 2016; Mistra-SWECIA, 2013). However, at present, Swedish adaptation policies with regard to forest focus on providing information and have no binding requirements, to a large extent leaving decisions on adaptation up to the private, non-industrial forest owners who own 50% of Sweden's forest, as well as to the many organisational actors in Swedish forestry (e.g. SweGov., 2007b, 2009a) – even if this might lead to major consequences for forest production and thereby large costs for the forest industry. So far, the Swedish Forest Agency has mainly been working with information tools to increase awareness of the need for adaptation to future climate change (Keskitalo, 2011).

In order to comprehend and problematise the question of why a well-resourced economic sector dependent on long-term production under known environmental risks nevertheless acts only to a limited extent on these, semi-structured interviews were conducted with all the main organisational actors in Swedish forestry. The study thus constituted a full study of the formal Swedish forestry sector. A total of 15 organisations were represented by the 15 interviewees, and covered all categories of actors in the sector: large national and multi-national forest companies that own forest resources and forest industries and buy timber from private, non-industrial forest owners to complement the timber supply from their own resources; forest industries that rely totally on procuring timber from private, non-industrial forest owners and have their own timber procurement organisation; forest owners' associations (FOA), i.e. cooperative organisations owned by the forest owners themselves that sell their members' timber to both self-owned and external forest industries; and forest management organisations without any industries of their own that provide total management of the forest property, including administrative services, to both private and public forest owners. All these organisations have a direct or indirect influence (or both) on forest management, either in their own forests or in the forests of private, non-industrial owners through guidance (e.g. advisory services and forest management plans). The state-owned forest is operated and managed by Sveaskog (falling under the first category above), which aims to act as a good example with regard to sustainability, but still operates on a commercial basis (SweGov., 2007a). The organisations represented by the interviewees are evenly distributed over the whole of Sweden, but with a smaller representation in the most southern part due to a smaller area of forest cover. Interviewees were selected as those responsible for the strategic planning and in relevant cases also adaptation of their organisation's forest management and operations, either in their own forest or through providing advice to private, non-industrial forest owners; all interviewees also had a qualification in either forest science or biology. Based on their managerial and leading positions in their organisations, the interviewees possess significant insights and knowledge with regard to issues of forest management and climate change adaptation. Therefore, they can be regarded as both the voice of these organisations in particular and Swedish forestry in general on this topic. It should be pointed out, however, that no one interviewee can be seen as responsible for what are often organisational and largely sectoral logics, and therefore interviewees and even organisations are anonymised in the material presented in this paper.

The interview guide covered broader forest management; methods, tools and mechanisms used in forest management; the role of adaptation in forest management; knowledge of potential adaptations; the organisational process for implementation of adaptation measures; adaptation in relation to private, non-industrial forest owners; and discussions on the implementation of certain adaptation measures. All interviews were conducted face-to-face and in Swedish, with all quotations in the text translated by the authors. The interviews, which lasted between 45 minutes and one hour, were transcribed verbatim and deductively coded in accordance with the theoretical framework and in addition related to areas in which interviewees indicated that they are making, or considering making, changes; these were sometimes, but not always, coherent with elements of well-known areas

related to climate risk that respondents were asked about. To situate and make comprehensive the empirical material obtained in these interviews, relevant literature on the Swedish context, Swedish policy and forestry is also referred to in the results section below. This selection of literature was defined by the authors in relation to their own knowledge of Swedish forestry and main publications, in order to contextualise and explain the governance context of the understanding expressed by the interviewees.

The results section proceeds from a background description of the Swedish forestry system as based in established literature, followed by descriptions by interviewees of how they perceive the logics and driving forces in the forest sector and in relation to adaptation.

## 4. Results

### *4.1. The governing mentality in the Swedish forestry sector: focused on production and business-as-usual*

In the deregulated context of Swedish forestry, forest governance is highly dependent on the shared norms and rationales of what has been called the "Swedish forestry model" (Appelstrand, 2007; Törnqvist, 1995), i.e. the social regulatory practices of forestry that are highly influenced by the forestry industry. About half of Swedish forest land is owned by private, non-industrial forest owners (SFA, 2014), which means that this group could in principle have a strong impact on how forestry is carried out. In practice, however, these private, non-industrial forest owners exert relatively little influence, in strong contrast to the large-scale forest companies and industries, partly because of the inequality of information and skills concerning forest management between small-scale and large-scale forestry and the frequent use of contractors for forestry operations amongst private, non-industrial forest owners (Keskitalo and Liljenfeldt, 2014). Thus, the planning process of private, non-industrial forest owners is in many cases conducted in conjunction with a forest owners' association or other purchasing organisation. In terms of climate change adaptation, forest planning is therefore subject to technologies of performance, while the technologies of agency are partly dependent on the subjection of the private, non-industrial forest owner within the national forestry regime. In the "Swedish forestry model", the governing practices and relations between the state and the forest industry are also a key factor in maintaining high activity in family forestry and supplying the industry sector with timber (Appelstrand, 2007; Törnqvist, 1995).

This situation has developed through the construction and implementation of a shared rationale and mentality by the forest industry and the Swedish Forest Agency, with the main focus on timber production and the implementation of "freedom with responsibility" as the governing system (Appelstrand, 2012). A key feature in this governing system is the epistemic authority of forest professionals to guide, support and transfer knowledge and norms to the small-scale private forest owners on what is regarded as good forest management (Appelstrand, 2007). This has long been a shared responsibility of the sector as a whole, including both state agencies and industry. However, since the 1990s, the Swedish Forest Agency has suffered organisational downsizing and budget reductions (Lidskog and Sjödin, 2015; Appelstrand, 2007), which has reduced the information instruments available (such as consultations). In addition to owning almost 40% of the forest, actors in large-scale forestry, i.e. private and state-owned companies, together with forest owners' associations and other timber purchasing organisations, have an influential position over management of Swedish forests and forestry operations, both through their own ownership and through their consultations with private, non-industrial forest owners.

The forestry industry is thereby largely the governing actor within the Swedish forestry system. This group generally has access to information about climate change, including climate change adaptation. Over the past few decades, damage by severe storms, but also wild forest fires and attacks by damaging insects and diseases, have become more frequent and are receiving more attention within the Swedish forestry debate. The extent and implications of forest damage vary between different geographical regions within Sweden: organisations in the regions that have suffered the greatest losses have been found to express slightly higher awareness of the implications of climate change for forests. However, general awareness of the issues is still low (cf. Blennow, 2012; Lawrence and Marzano, 2013) and the extent of planned adaptation by different organisations in relation to forest management, both within their own forest and in relation to private, non-industrial forest owners, is limited. Most of the adaptive measures, i.e. revised guidelines for cleaning and thinning operations, have been defined in direct relation to major events, mainly storms (cf. Spence et al., 2011).

Consequently, many of the interviewees referred to climate change adaptation as "a small question" within the organisations and that they "think more about the supply of timber to the industries and the preferences of the forest owners". Many also noted that preferences amongst forest owners and the industry in general are highly driven not by the threat of climate change, but by economic motives and the specific demand for timber in the industry. Typically, interviewees reported that they "haven't made any adaptions based on climate [change]. In reality, these are made based on business economics considerations".

Different actors interviewed also mentioned the extent to which forestry in general has changed its operating procedures in response to environmental requirements. Most of those who acknowledged change referred in particular to certification as a market-based labelling system that enforces certain social and environmental standards, but underlined the conservative and tradition-orientated nature of the sector. This is illustrated by the following comments by interviewees:

> …there are a lot of traditions. This is a conservative industry and there is a beauty with that … in that way, it feels better to have a cubic metre [of timber] than not to have it … the present value [in the forest] is important for us also − so that you can show a good profit.

> It's clear that we are concentrated about high production, we believe that it will provide future … options … if we create much volume.

> We believe that if have a vigorous, strong and healthy forest today, it will also be able to handle climate changes.

However, interviewees also acknowledged that such economic rationales of forestry produce a very narrow span of actions − something that might affect social relations and trust:

> …of course are we interested in cutting down everything, but we have to be receptive to what the forest owner want […]. Although it's clear that we want to buy, often as much as possible.

> We might not be the best partner when it comes down to target scenarios and sustainability, since if there is a cubic metre to be bought we gladly do that.

The production aim was thus highlighted as an (expected) central motivation in this large economic sector. However, in relation to this, interviewees regarded the economic production aspects as more guiding than adaptation per se. Interviewees indicated that most adaptation to storm had been a direct result of changes and concerns directly following the large storms Gudrun and Per (in 2005 and 2007, respectively), rather than undertaken in relation to adaptation per se. In this regard, interviewees also raised the problem of including stronger adaptation in relation to production viewpoints:

> We haven't undertaken any adaptations to climate [change]. In the long term, we make the judgement that the implications are too uncertain.

> Thus, in relation to known climate change-related changes such as a

longer growing season, storm risk and risks of insect damage, the focus on the production aim rather than other factors remains motivating: a longer growing season is largely seen as positive, as it would enable faster growth and earlier logging, while an increased risk of storms is equally seen as motivating earlier thinning. For instance, interviewees suggested that:

> All this might lead to that it being better to log earlier rather than postpone the felling of a mature stand.

> When thinking about [forest management] measures, we point out that there might be storms and that you have to think about that when leaving edges of a stand. We really push that, since it's within our interest. For us it's also better to have a more rapid turnover on the forest, to get the timber and to have activity on the property. So, of course, we have a double interest in speeding this up, but it's also important not only to get the timber, but also to think long-term.

Nevertheless, interviewees also noted that a strategic and long-term climate-related agenda on these types of risks is lacking. As one of the interviewees pointed out, "it's like people forget and that there has to be a big storm to start all over again and think right – but then feel secure again and think that you can go back to the usual way of thinning, thinking that it won't happen again".

In addition to potential risks related to storm and pest damage, one of the potentially more costly adaptations that could be undertaken in relation to climate change is that of developing a more mixed forest. This is based on evidence that more mixed forest, in particular broad-leaf forest, could be a relevant adaptation option and increase resilience, but would also carry with it increased potential costs compared with planting the more fast-growing species promoted today (cf. SweGov., 2009b, 2007b). However, as with arguments regarding storm and pest risks, this issue is not highlighted from an adaptation consideration, but rather in relation to requirements in existing regulative systems: that a certain proportion of broad-leaf or deciduous forest is required in certification standards. Thus, interviewees noted for instance that they "don't choose to keep [broad-leaf trees] for any climate change reason or so" and claimed that the aim of "increasing the share of broad-leaf [in the stands] is a demand from the certification". Similarly, the reasons for one of the larger environmental consideration-based changes in recent years, that towards including increasing consideration of water systems, was seen as related not to adaptation to potential risks to water systems over time under climate change, but to requirements under the EU Water Framework Directive (which is widely regarded in Sweden as an issue of potential concern for forestry, e.g. Keskitalo and Pettersson, 2012).

Similarly, interviewees saw the production focus as governing not only in relation to adaptation, but also as a major consideration regarding actions that may be undertaken in relation to mitigation. Partly due to a focus on economic rationales, mitigation has become more emphasised than adaptation in forestry with regard to climate change – both in terms of carbon sinks (contested, see e.g. Johansson et al., 2006; Kurz et al., 2008, 1997; Lindroth et al., 1998) and renewable resources (substitution), but largely as framings developed for mitigation coherent with a production focus in forestry. In this framing, interviewees perceived responding to climate change as "an enormous opportunity for business", where the industry is the agent of mitigation measures to produce more forest, take up more $CO_2$, and thereby "save the climate". For instance, some noted that:

> Increased growth binds more carbon dioxide and even harvested forest gives more carbon dioxide-binding products … in some way, this is what we want – we want a very nice young forest that grows well.

> We have to take out biomass and substitute in order to become fossil free.

The positive role of forestry production in relation to mitigation, rather than or even substituted for adaptation, thus seems to have become the dominant narrative, partly as this articulation of climate change does not challenge the production rationale of Swedish forestry. Such a conception could be viewed as the industry's struggle to minimise the consequences of their accepted ways of doing business (Bridge and McManus, 2000; McManus, 2002; MacKenzie, 2009), by finding an alternative mode of social regulation through the incorporation of discourses of sustainability and new accumulation strategies, i.e. certification, ecosystem services and carbon stocks (cf. Alarcón Ferrari, 2012, 2015; Holmgren, 2015). On the key issue of forms of production, the conflict between Swedish forestry and the environmental movement was highly evident in the interview material and many of the interviewees positioned themselves in direct or indirect relation to the core issue of the environmental debate over the past decade. As an example, based on the previous arguments, one of the interviewees positioned the present production system in the environmental discourse:

> The … idea is that forestry production is the way forward. This would be a very strong case if we could manage to get the environmental movement in on this … they have to reorient themselves too.

Although the intensive production focus and rationale of Swedish forestry has been debated and criticised by e.g. the environmental movement (e.g. Laszlo Ambjörnsson et al.., 2016; Lisberg Jensen, 2002), its dominant position still persists within the discourse. Situated in its long history and tradition, its persistent function has been shown, in a number of related issues, to be stable within the discourse and to have a significant, and partly conserving, effect on various processes of change (e.g. Keskitalo et al., 2016; Holmgren and Arora-Jonsson, 2015). Production is thus constructed as the solution to both climate change adaptation and mitigation requirements. Within the present production paradigm and conventional risk management, risk is assumed to be knowable and controlled on the basis of scientific probability calculations (Aradau and Van Munster, 2007: 107), thereby constituting the basis for economic cost-benefit calculations.

### 4.2. Governing rationales, technologies and logics

Interviewees highlighted that the production-driven processes of the industry explain the present coping-related approach to climate change and the lack of strategic and planned adaptation (cf. Seppälä et al., 2009; Buizer and Lawrence, 2014). Similarly to the case of broad-leaf forests, this construction of risk discloses the economic rationales of decision-making processes (cf. Dryzek et al., 2013) and "tolerable" levels of risk (cf. Lutes, 1998) in Swedish forestry. Much of this can be seen as enabled by the technologies of performance used, which shape adaptation logics and govern the actions of the specific context. In these logics, retaining and potentially expanding upon existing rationalities (for instance increasing production in relation to climate benefits, but not taking actions that may include costs) thus becomes appropriate. This type of development can largely be related to the fact that adaptation is not currently built into any of the main governing tools used in forestry.

In the Swedish development of forest management and governance, statistics, cartography and the National Forest Inventory have been crucial elements in rendering the forest governable and naturalising society's relations to it (cf. Scott, 1998). Moving from annual allowable cuts to advanced models of management, forest management plans, advisory services, and application of market standards (e.g. ISO & tailless harvesting) and certification systems (e.g. FSC & PEFC) have acted as additional technologies of government and representation, all of which have enhanced the multiplicity of forest management practices and the influence of social relations. Increased awareness of e.g. environmental and social concerns in forestry has thereby been mainstreamed into organisation and operation through the application of certification schemes. Interviewees generally agreed that certification

was the most influential steering system in terms of setting requirements they need to meet, but with great variation between organisations regarding the role they believe certification plays in changing forestry from established practice:

> I'm not at all sure that the environmental concern and forestry that we are caring for … has become much better due to certification, but instead it imposes higher demand for structure than before – so the local timber dealer can't make it … This drives up the size of the timber purchasing organisations in order to provide the competence required on environmental and forest management issues.

> It's more along the line of getting everything in order; that the instruction for the operation is complete, that we get it back with comments and that the contractor does as he should. It's the routines that make it, not the measure in itself.

> If you manage the forest in accordance with the guidelines of the certification standards, then that is sustainable forestry in our definition.

The subjectification of forests through the certification model can thereby be seen to have helped underpin the dominant "realm of calculation" of the discourse in forestry (Pérez-Ramírez et al., 2012; cf. Gulbrandsen, 2009) and to have combined the technical language of sustainable forest management with corporate managerialism by imposing new sets of technologies of agency and performance (cf. Braun, 2002; Sjöblom and Godenhjelm, 2009). This structures social relations and nature in precise ways, in time and space, to deal with different issues. By placing production at the centre, both the certification systems and Swedish forest policy emphasise the division between production and environmental concerns as the primary way of dealing with these challenges, both in policy and practice. One of the interviewees articulated this by saying that "we think that there should be production at the places for production and consideration at the places for consideration".

A similar example can be seen in forest management plans, which represent the operationalisation of the certification process and enact a technology of government and representation on local level. The plans of private, non-industrial forest owners are to a large extent produced by the companies represented in this study and govern their actions and the measures taken in their forest. This subjectification through the technologies of government and representations pushes the dependence on the dominant "realm of calculation". In relation to climate change specifically, one interviewee gave the following example:

> If we can't really measure it, then nothing really happens because we don't have anything concrete to point at. So to get something really done, we need to be able to validate the action taken.

In this way, the technologies of government not only enable and shape actions, but also hinder actions, as well as language, that go beyond the rationales of the discourse. This is in particular a consideration for adaptation, which is at present only included in informational means such as Swedish Forest Agency advice, and adaptation assessment has not been required within any of the calculation tools used within forestry: in legislation per se, in certification systems or in forest management tools such as forest management plans. With reference to technologies of government, i.e. audit systems, standards and education, the main argument expressed by interviewees was instead often to do the same things, but better:

> Today, the main aim is to have vigorous forests that are healthy and grow well, which will give us a bigger chance of managing climate change.

Thus, situated within the organisational cultures and language, two interviewees described one of the main challenges in working with climate change issues as lack of traction for such work within the industry in comparison with more short-term, event-related measures:

> I think that many experience the call to adapt forestry to climate change as fuzzy because we haven't seen any major effects of possible climate changes in Sweden yet. At this moment, I think you make it hard on yourself to implement any new forest management methods and blame it on climate change. If we take the example of broad-leaf involvement, then it's possible to say that it's positive for biodiversity, but it will also give more storm-secure forests. Then you get that as an extra. I don't think that you should state [climate change adaptation] as the main purpose. Then you won't get far at this moment.

> Internally, we have a greater acceptance of these issues if we don't talk about them in terms of climate change adaptations, but instead talk about them as good forest management measures.

As another interviewee underlined, this situation also extends to private, non-industrial forest owners:

> If we were to have a forest [education] day on storm-adapted forestry, as example, then we would get a pretty good response. But if we were to call the same day climate change-adapted forestry, then I believe the interest wouldn't be that high.

Thus, although that the level of planned adaptation is low, the majority of the interviewees argued that climate change factors may be included in the adjustment and development of forest management for multiple purposes. Nevertheless, a number of the participants acknowledged the risk with limiting the mainstreaming of adaptation into the present system of forest management. Without recognising climate change specifically, interviewees implied that there was a risk of not fully recognising the specific effects of climate change and, as in one example, of "people just being focused on forest management measures and changes without acknowledging the causes of the change".

This illustrates the current challenges in producing transformative adaptive measures and strategies within the rationales, technologies and struggles of the discursive space of boreal forest. The present logics of adaptation can thereby be placed, and understood, in the competition and negotiation of contrasting rationalities (cf. Larner and Butler, 2005; Raco, 2003) and as delimited by the unfixed meanings of environment, sustainability and climate change (cf. Mckee, 2009).

## 5. Discussion and conclusions

This study demonstrated that, rather than dismissing a focus on business-as-usual with regard to climate change as "illogical" or "incorrect", it is important to comprehend and explore the logics of adaptation that drive and structure these defined actions (cf. Dean, 2010). Without knowing these logics, we will be unable to construct arguments or develop incentives that go beyond the established logics and ways of thinking to produce substantial change within the specific case. In the Swedish forestry case, the dominant logics of the forest industry focus on maximising production without considering its possible dependence on including long-term climate change considerations within the production system. Currently, responses are made only in relation to specific events as they occur, without systematically and coherently taking into account issues that, despite short-term costs, may result in higher gains over the long term. In sum, the Swedish forestry system could thus be seen as maximising (shorter-term) production rather than long-term resilience to a number of factors such as potential high-risk storms and pest damage.

The main rationalities of Swedish forestry are economic (e.g. focusing on modification of natural systems, maximising production and cost-benefit calculations), cultural (e.g. forestry tradition-orientated) and managerial (e.g. focused on mainstreaming within the logics of an existing system, and on forestry knowledge regimes and organisational structures). This study demonstrated how these rationales, together with market-based solutions and technologies, shape and produce the

course of action. The lack of adaptation policies and strategies on multiple levels in the forest organisation in Sweden leaves the process of adaptation dependent on local uptake of adaptation technologies and it therefore risks being short-term. Cultural and spatial conditions help to reinforce the reliance on past training and local practices of forest management as the basis for actions. The variations in the damage caused by climate change, local traditions, spatial conditions and the geographical factor also shape the logics of adaptation in Swedish forestry. These logics within forest management refer partly to environmental conditions, but are predominantly influenced by the economic structure and forest industry demands in a specific market segment. This study also illustrated how, through the technologies of government (e.g. certification, forest management plans and modelling), "nature's ordering in and through modern forms of knowledge is related to, and in part constitutive of, the ways in which nature is integrated into forms of economic and political rationality" (Braun, 2000: 14). What actions and considerations are undertaken is thus structured by, and thereby also largely delimited by, major sectoral logics.

Overall, the interview material showed how the risks of climate change to forestry are constructed and negotiated within the present discursive space and how they are rendered governable through the calculative regimes and the processes of externalised (others), individualised (forest owners) and fragmentised (multiple actors) decision-making. The dominant position of mitigation over adaptation, with a prevailing focus on high production and stocking levels of carbon, was shown to limit a focus on lower level adaptation capacity and a role for planned adaptation (cf. D'Amato et al., 2011; Urwin and Jordan, 2008).

Given the strongly production-related logics of the forest sector in Sweden, this suggests that the ways in which adaptation is conceived within other forestry systems, which focus e.g. on retaining natural forest with minimal intervention, might be driven by other factors. A possible example of this is that "passive adaptation", i.e. adapting by avoiding implementation of any management measures so that those species which work well under climate change may adapt naturally, has been discussed in an Italian context (e.g. Keskitalo et al., 2013, 2015). In that system, a construct of "naturalness" of forests (Rouvinen and Kouki, 2008; Baldwin, 2003) might instead be interlinked with the types of forest management undertaken, but would fundamentally also relate to what is economically relevant in such a system and would be dependent on a number of factors, e.g. type of forest (Parviainen et al., 2000) and established ways of seeing, knowing and acting upon nature (e.g. Whitehead, 2009; Agrawal, 2005; Scott, 1998). In such a case, however, economic considerations, e.g. limiting management costs where these are not seen as providing obvious economic outputs (e.g. selective felling and mixed-species stands), would probably limit adaptation not to the most important measures for environmental systems (logics of ecological diversity), but to the most economically rewarding, i.e. the lowest cost option in the short term. Given these types of economic logics prevalent in relation to forestry, a potential way to mainstream climate change adaptation in forest management could be to include adaptation requirements in the economic operating systems, such as in forest certification guidelines (e.g. Keskitalo, 2013). On local level, in specific contexts it could be possible to find discursive space to explore alternative and site-relevant adaptations options (e.g. Lawrence, 2017): an adaptation-focused forest owner could in detail direct the actions to be undertaken in their forest, and potentially influence others. In an ideal case, adaptation actions could thus include e.g. measures to lower stand vulnerability to damaging insects and diseases (Gottschalk, 1995) and facilitating a shift to better-adapted forest types (Lindner et al., 2000; Parker et al., 2000), including for instance mixed or broad-leaf forest (SweGov., 2007b, 2009b). These actions could largely be undertaken with the help of more adaptive use of existing tools (e.g. Janowiak et al., 2014; Daniel et al., 2017). Potential actions to support adaptation could within the present forestry system potentially even include introduction of quick-growing exotes that can best exploit the future increased potential for growth and associated shorter time to maturity, thereby decreasing the storm risk (Hemström et al., 2013; Keskitalo, 2013). Coming to see climate change action as economically beneficial within, or as imposed, by larger systems, or to see specific actions implemented locally, could potentially be a first step towards greater change.

Adaptation measures discussed in practice today thus differ between forestry systems depending on the specific interlinkages between the production of problem definitions and solutions in historical and structural localities. How the forest, and climate change, is represented is therefore also constitutive of its political space (Lövbrand and Stripple, 2006; Stephan, 2012; Boyd, 2010; Baldwin, 2003) and governance (Oels, 2013, 2005; Stripple and Bulkeley, 2013). This suggests that in the case of forestry, adaptation responses, even for environmentally similar forests, may thus take different forms and have different impacts, depending on the socio-economic system within which the forest is situated (Keskitalo et al., 2015). However, placing climate change in the "too difficult box" (Clarke, 2014) can best be described as "organized irresponsibility" (Beck, 1992) in handling the discrepancy between external pressure and lack of capacity or will. In the specific context of Swedish forestry, neoliberal rationalities contribute, through the processes of mainstreaming, to the repetition of existing goals and rationalities where the question of limited inclusion of climate change considerations is not challenged. In the case of forest management, the dependence on benchmarking and best-practice systems becomes even more problematic and highlights the limitations to including adaptation as long as these considerations are not integrated within assessment systems.

This study thus illustrates the fundamental social and institutional basis of the logics, considerations and motivations that determine the adaptation actions that may be undertaken – or not – within specific systems. This contradicts the common instrumental approach to policy implementation regarding adaptation, which emphasises information, techniques and tools that are to be implemented in relation to available knowledge in assumed socially disembodied, "black-boxed" systems (e.g. Wellstead et al., 2013; IPCC, 2014). The present study also showed how the institutional framework and "logics of adaptation" shape the meaning, content and outcome of specific policy and implementation processes. It demonstrated a need for understanding climate change adaptation and mitigation inaction and implementation as institutionally rooted in social systems and a need for working with, or attempting to revise, the motivations and incentives that exist within the present capitalist system, in order for adaptation to be implemented in practice. Thus, it revealed a need to explore further, within other contexts, the interlinkages between technologies, representations and actions/inactions, in order to scrutinise the guiding institutional logical of various policy fields. By extension, the study illustrated the challenges to advanced liberal rationalities in producing sustainable and long-term adaptation measures that go beyond the "ideals of economy, efficiency, effectiveness, and value-for-money" (Edwards et al., 1999: 477) and the role and function of discursive struggles within the process of transformative change.

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