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A Historical Overview, 1990–2010

Johanna Ulmanen, Åsa Gerger Swarfling and Oskar Wallgren

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Johanna Ulmanen¹, Åsa Gerger Swartling^{1,2}
and Oskar Wallgren¹

¹ Stockholm Environment Institute

² Stockholm Resilience Centre

Stockholm Environment Institute
Kräftriket 2B
SE 106 91 Stockholm
Sweden

Tel: +46 8 674 7070
Fax: +46 8 674 7020
Web: www.sei-international.org

Director of Communications: Robert Watt
Publications Manager: Erik Willis
Editors: Tom Gill, Andrew Mash
Layout: Richard Clay

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ABSTRACT

This report explores how climate change adaptation concerns were integrated into the Swedish forestry discourse in the period 1990–2010. The paper applies a governance perspective, using discourse analysis focused on actors' beliefs and learning to identify the following: how the forestry discourse evolved, the main adaptation advocates and critics, how other dominant discourses, debates and external events influenced the discourse, the effect this had on forestry policy and the lessons that might be learned for future policymaking. The study shows that academics advocating climate change adaptation, together with outside influences such as political pressure for adaptation responses and the nega-

tive effects of storm Gudrun in 2005, contributed to an increased general awareness and understanding of adaptation issues in the forestry sector. Nonetheless, the influence of adaptation advocates was fairly weak, and the influence of advocates for mitigation and forest production dominated the forestry discourse. This fact has hindered the integration of adaptation into forestry policy, although there have been recent advances in integrating and legitimizing adaptation issues in the sector. Two lessons for policymakers willing to further this integration process are the importance of clear leadership and the importance of creating arenas to enable learning about adaptation among stakeholders.

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CONTENTS

Abstract	iii
Acknowledgements	iv
Acronyms	vi
List of figures	vi
List of tables	vi
List of boxes	vi
1 Introduction	1
2 Research focus	2
2.1 Analytical framework	2
2.2 Method	3
3 The evolution of Swedish climate change adaptation policy since 1990	5
3.1 International policy on climate change adaptation	5
3.2 National policy on climate change adaptation	6
3.3 The process of integrating climate change adaptation into forestry policy	8
3.4 Coverage of climate change adaptation and forestry in swedish daily newspapers	18
4 Discussion and conclusions	20
4.1 Discussion	20
4.2 Concluding remarks	22
References	24
Appendix: Methodology	29
1. Interviews	29
2. Content analysis	29

ACRONYMS

CBM	Swedish Biodiversity Centre
COP	Conference of the Parties
EPI	Environmental Policy Integration
EU	European Union
GDP	Gross Domestic Product
IPCC	Intergovernmental Panel on Climate Change
KSLA	Royal Swedish Academy of Agriculture and Forestry
LRF	Federation of Swedish Family Forest Owners
Mistra	Foundation for Strategic Environmental Research
SEPA	Swedish Environmental Protection Agency
SLU	Swedish University of Agriculture Sciences
SMHI	Swedish Meteorological and Hydrological Institute
SWECLIM	Swedish Regional Climate Modelling Programme
WWF	World Wide Fund for Nature

LIST OF FIGURES

Figure 1: Number of mentions in Swedish daily newspapers of forest issues linked to forest production, climate change, biodiversity or adaptation, 1995–2010	19
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LIST OF TABLES

Table 1: Methodological scheme	4
Table 2: Main policy developments in climate change adaptation and forestry policy, 1990–2011	18

LIST OF BOXES

Box 1: Major storms and related forest damage	10
Box 2: Summary of the Climate and Vulnerability Commission's main policy proposals for the forestry sector	16

1 INTRODUCTION

This report explores how climate change adaptation concerns were integrated into the Swedish forestry discourse in the period 1990–2010. The analysis applies a governance perspective, focused on actors' beliefs and policy learning.

Contemporary policy focuses on mitigating the effects of climate change. However, the Intergovernmental Panel on Climate Change (IPCC 2007) recommends that mitigation efforts should be paired with early climate change adaptation¹ plans and measures to respond to the negative impacts of climate change. According to McCarthy et al. (2001), adaptation can also involve actions that take advantage of the potential opportunities arising from climate change.

Concern about the need for adaptation emerged in the 1980s (Pielke et al. 2007), partly linked to the growing interest in vulnerability studies (Nilsson and Gerger Swartling 2009). The IPCC Third Assessment Report (see McCarthy et al. 2001) presented adaptation and vulnerability as core issues and introduced new ones, such as the technical aspects and socio-economic impacts of climate change. This helped to introduce adaptation more broadly into the policy arena. According to Pielke et al. (2007), it was through the publication in 2006 of the Stern review, calculating the economic costs of climate change, and in 2007 of the IPCC report that the need for adaptation alongside mitigation was acknowledged by a wider policy audience. It was increasingly recognized that adaptation could not be tackled by local policy measures alone. According to Swart et al. (2009), this was reflected by the United National Framework Convention on Climate Change (UNFCCC), which in 2009 announced the need to address adaptation more explicitly in future global climate policy negotiations.² Within the European Union

(EU), the publication of green and white papers on climate change adaptation (European Commission 2007; European Commission 2009) indicated similar levels of urgency on adaptation policy, although Swart et al. (2009) described a wide diversity among individual EU member states with regard to the development of adaptation plans. In 2004, Finland became the first country to adopt an explicit adaptation strategy, and other EU member states have since followed suit. However, Sweden, which is generally considered a forerunner in environmental policy development, does not have a national strategy on adaptation. Instead the Swedish Government has chosen to mainstream adaptation concerns into existing sectors and governance structures (Nilsson et al. 2012).

The forest sector is one of Sweden's biggest industries,³ and it is expected to be significantly affected by climate change, in terms of increased forest growth and increased forest damage and biodiversity loss (Climate and Vulnerability Assessment 2007). There is therefore an obvious need to investigate potential vulnerabilities linked to climate change and to develop adaptation plans to minimize risks and take advantage of potential opportunities. Despite this urgent need, there has so far been only limited action and no common forest strategy has been developed.

Section 2 outlines the research questions and describes the analytical framework and methods employed for this study. Section 3 is a case study analysis of the integration of climate change adaptation concerns into the Swedish forestry discourse. The case study is introduced by a brief historical overview of the development of Swedish and international adaptation policy. Section 4 provides a brief discussion and presents some conclusions.

1 The definition of climate change adaptation in this paper is that given by McCarthy et al. (2001).

2 According to Swart et al. (2009) this announcement by the UNFCCC was partly due to the high level of expectation prior to the climate negotiations at COP 15 in Copenhagen in December 2009.

3 In 2010, the forest industry accounted for 10–12% of total employment, turnover and added value in Swedish industry, and 11 per cent by value of Sweden's exports – a total of SEK 129 billion. In several counties the forest industry accounted for 20% or more of industrial employment. The forest sector accounts for about 3% of Sweden's gross domestic product (GDP). The industry is highly export-oriented: 85% per cent of the pulp and paper and 70% of the sawn timber produced were exported in 2010. Sweden was the second largest exporter of paper, pulp and sawn timber in 2010 (Swedish Forest Industries Federation 2011).

2 RESEARCH FOCUS

This report sets out to answer the question: What were the barriers to and opportunities for integrating climate change adaptation concerns into Swedish public discourse on forestry in the period 1990 to 2010? It explores how the forestry discourse evolved over the period, who the main adaptation advocates and critics were, how the wider context of dominant discourses and external events may have influenced the forestry discourse, the effect this had on forestry policy and the lessons that can be learned for future policymaking.

2.1 ANALYTICAL FRAMEWORK

The analysis departs from the Environmental Policy Integration (EPI) literature. EPI is closely connected with the term “sustainable development” and the idea that environmental policy objectives cannot be achieved by treating them separately, but only by integrating them into conventional policy sectors (Lafferty and Hovden 2003). EPI originated as a policy guideline. Its objective was acknowledged by the 1987 Brundtland Commission and legally recognized by the EU in the 1993 Maastricht Treaty. It has been used extensively ever since (Lafferty and Hovden 2003; Nilsson and Persson 2003). In addition to its normative function, EPI has been used as a framework for analysing the processes and outcomes of environmental policy (e.g. Lenschow 1997, 2002; Nilsson 2005; Schout and Jordan 2005; Ross and Dovers 2008; Jordan and Lenschow 2008). It is grounded in a “governance perspective”, which recognizes that multiple actors from various levels of society influence policy development in a process of continuous negotiation. This perspective is often contrasted with the traditional “government perspective”, in which the government is seen to steer the policy process.

Most EPI studies use it as a framework to analyse how environmental objectives are integrated into wider policy. By contrast, this study focuses on a single aspect of environmental policy, that is, adaptation and its integration into forestry policy. The forestry sector is subject to the normative and legal governance measures set out by various sectoral, organizational, national and international bodies. A problem-based and network-oriented EPI approach is therefore used (e.g. Sabatier and Jenkins-Smith 1999) rather than an organization-focused approach (e.g. Hertin and Berkhout 2001). Because the integration of adaptation into forestry policy is at an early stage, the analysis focuses on the process of mainstreaming adaptation into the

forestry discourse, and the related adaptation policies put in place so far. The analytical framework rests on three central concepts: frames, advocacy coalitions and learning. These are outlined below.

The way in which actors influence a decision-making process is related to their frames of reference. Schön and Rein (1994) define frames as one or several actors’ beliefs about and perceptions of a particular issue. A frame analysis is used to examine a line of argument and/or the activities of selected actors to define their position in a debate.⁴ An analysis of how key actors position themselves in relation to a particular issue, or change position by so-called reframing, offers insights into the negotiation process leading to a policy outcome (Schön and Rein 1994). A network that promotes a particular frame is, in the words of Sabatier and Jenkins Smith (1994), an “advocacy coalition”. The focus of this study is the adaptation advocacy coalition – an emerging network of actors that shared a growing belief that adaptation should be a key concern of the forestry industry. The paper analyses this advocacy coalition in relation to rival coalitions advocating other frames, which sometimes are more broadly shared and therefore more dominant frames. The analysis follows Sabatier’s approach by focusing on only a small number of coalitions and frames.

Sabatier and Jenkins-Smith (1999) define three processes that affect policy change. The first and most important is policy-oriented learning, which is described as “relatively enduring alterations of thought or behavioural intentions that result from experience and/or new information and that are concerned with the attainment or revision of policy objectives” (ibid. 1999: 123). According to the dominant literature on policy change, there are three main types of learning. The first is single-loop learning, a process that may result in small policy changes but keeps the dominant frame (beliefs, norms and cognitive lens) intact (Argyris and Schön 1978, 1996). Comparable concepts are “technical” or “instrumental” learning (Glasbergen 1996; Fiorino 2001). The second type, double-loop learning, stimulates creative thinking and leads to frame-change (Argyris and Schön 1978, 1996). It is also known as conceptual learning (Fiorino 2001; Glasbergen 1996). A third type of learning, “organizational deuterolearning” (Argyris and Schön 1978, 1996), involves learn-

4 A similar concept can be found in Sabatier’s definition of actors’ “core beliefs” (Sabatier and Jenkins Smith 1999).

ing about how to learn – the way in which we learn how to change frames. Similar concepts in the literature are triple-loop learning and multiple-loop learning (Keen et al. 2005), which are concerned with correcting errors by designing governance norms and protocols so that learning provides a reflective mechanism to foster changes to the underlying governance system (Armitage et al. 2008:88).

In the context of policy integration, double-loop learning can be seen as “EPI in practice”, because it can create greater opportunities for efficient environmental policy integration and thereby more sustainable policy outcomes (Nilsson 2005). With this in mind, along with the fact that adaptation is only just emerging in forestry policy, which suggests limited learning to date, this study focuses on the two first types of learning, with a particular emphasis on identifying the potential for double-loop learning.

The two other factors that, according to Sabatier and Jenkins-Smith (1999), affect policy change are: changes in socio-economic conditions and system-wide conditions of governance, and turnover in personnel. These two processes may lead to policy change through, for example, the redistribution of resources or interests, which in turn creates opportunities for new advocacy coalitions to gain recognition. These factors are mainly external to the policy system, which makes them difficult to manipulate to achieve policy change. This implies that learning processes are of greater interest from a policymaking perspective.

Mobilizing learning for policy change is not straightforward. Various coalitions of actors promote their frames as a means for advancing their interests up the policy agenda in a complex process of negotiation. Some coalitions are more successful than others, not only because of their strategies, but also because of the extent to which their frame differs from the conventional and dominant one. Sabatier and Jenkins-Smith (1999) explain this as a hierarchy of frames on three levels, in which the more dominant frames constrain the less dominant. At the first and highest level there are the deep core beliefs, including stable basic ontological and normative beliefs, that operate across all policy domains. Second, there are the policy core beliefs that represent a coalition’s basic normative commitment and which operate across an entire policy domain or subsystem, such as the forestry sector. Third, are the beliefs that are specific to one or several coalitions but do not operate across an entire subsystem, so-called secondary aspects. Because frames (especially deep core and policy core beliefs) affect actors’ norms and cognition, they will resist information that suggests their

beliefs are wrong or unfeasible. This can make policy change particularly difficult. Such resistance to change is recognized in the frame and discourse literature (e.g. Schön and Rein 1994; Hajer 1995) and the neo-institutional literature (e.g. North 1990; Scott 1995; March and Olsen 1989).

In sum, according to Sabatier and Jenkins-Smith (1999), change that does not challenge conventional beliefs, and thus frames, but only involves change in a coalition’s secondary aspect beliefs is the most frequent type of change. According to Argyris and Schön (1978, 1996), such change is based on single-loop learning. By contrast, a frame change challenges policy core beliefs and is triggered by both external events and learning (Sabatier and Jenkins-Smith 1999). This learning, according to Argyris and Schön (1978, 1996), is double-loop in nature. This study focuses on the emerging frame related to climate change adaptation in the forestry sector. Other dominant or less dominant frames are only studied if they contribute to an understanding of the development of the adaptation frame. Although this analysis touches on the issue of power by identifying frames as more or less dominant, it does not analyse power relations in detail.

2.2 METHOD

A case study approach was used to study the integration of adaptation concerns into the Swedish forestry discourse. Three sources of data were used to address the research question, following Yin’s “triangulation” approach to data collection (Yin 2003). First, a literature review was carried out, in particular of policy documents and reports. Second, a range of informants contributed to the data: 11 semi-structured interviews were carried out with key stakeholders linked to forestry, with policy, industry and academic and environmental backgrounds, to obtain a greater understanding of the actors and frames related to the policymaking process. Additional empirical material was collected, such as transcripts of interviews and stakeholder discussions with 26 local forest officials and forest owners in one southern (Kronoberg) and one northern (Västerbotten) county. These activities were carried out in the period 2010–2011 and are referred to as data from “stakeholder interviews” and “stakeholder meetings” (see the appendix to this paper). Third, Sweden’s national daily newspapers were analysed for a given period to determine how often key words appeared that signified important issues in the forestry debate. This analysis indicated when and to what extent the media covered a set of selected issues, making it possible to assess the

priority that newspapers gave to climate adaptation relative to other forest-related issues in the given period (see the appendix to this paper). The methodo-

logical scheme outlined in Table 1 shows how the data collection method was matched to the research questions and analytical concepts.

Table 1: Methodological scheme

Research question	Main method	Concepts	Contribution to the analysis
1. How has the integration of adaptation into the forestry discourse and related policy evolved?	Literature review, content analysis	Dominant frames	Mapped trends in the debate and policy developments of adaptation in the forestry sector. Analysis defines potential dominant frames. Serves as a complement to the discourse analysis.
2. Who were the main advocates and critics of adaptation in the forestry-discourse and policy?	Literature review, interviews	Frames, advocacy coalitions, learning	Mapped actors involved, their frames, potential competition and reframing (learning) in relation to adaptation and forestry over time.
3. How have dominant discourses and external events influenced the integration of adaptation in the forestry discourse and policy?	Literature review, interviews	Dominant frames, external events	Provided insight into the context of the dominant policy frame in the forestry sector (norms and regulations), external events and their potential influence on learning and integration of adaptation.

3 THE EVOLUTION OF SWEDISH CLIMATE CHANGE ADAPTATION POLICY SINCE 1990

The definition of adaptation used in this paper is that found in McCarthy et al.:

Adaptation refers to adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. This term refers to changes in processes, practices, or structures to moderate or offset potential damages or to take advantage of opportunities associated with changes in climate. (McCarthy et al. 2001: 881)

Climate change is thus not only seen as something negative that poses a risk to society, but also as something potentially positive that creates opportunities. This is of great relevance to the Swedish forestry sector, which many (e.g. Sonesson 2006; Swedish Commission on Climate and Vulnerability 2007) expect to both benefit and suffer from the effects of climate change.

This section describes how adaptation has been integrated into the Swedish forestry discourse and Swedish policymaking. Section 3.1 outlines the wider context of international developments in the field of adaptation policy. Section 3.2 describes the Swedish national context. Section 3.3 presents a more detailed account of the way in which the adaptation debate and related policy measures have evolved. Section 3.4 presents a media content analysis that shows the extent to which adaptation and associated key issues have been visible in the wider public debate.

3.1 INTERNATIONAL POLICY ON CLIMATE CHANGE ADAPTATION

Following the publication of the IPCC's first report in 1990, the debate began to address for the first time the need to draw up strategies and plans for adapting to climate change (Nilsson and Gerger Swartling 2009; Swedish Commission on Climate and Vulnerability 2007). However, in this early debate the term "climate change adaptation" was understood quite differently to how it is today. According to Nilsson and Gerger Swartling (2009), the term was used by some to argue against the need to mitigate climate change, because nature and society would simply "adapt" to it. As a result of the growing interest in vulnerability studies in the late 1990s, however, the term came to be commonly used as it is today (see also Pielke et al. 2007). The IPCC's third assessment report (McCarthy et al. 2001), presented adaptation and vulnerability as

core issues. In addition, the report raised a number of new issues, such as the scientific, technical and socio-economic aspects of impacts, vulnerability and adaptation, which according to Nilsson and Gerger Swartling (2009) helped to introduce adaptation more broadly into the policy arena

At the EU policy level, climate change adaptation-related activities, such as ADAM (<http://www.adamproject.eu/>) and CIRCLE (<http://www.circle-era.eu>), were funded through a large European Commission research programme under the sixth Framework Programme, (Commission on Climate and Vulnerability 2007). The publication of the 2007 green paper, *Adaptation to Climate Change in Europe: Options for EU Action*, indicated an ambition to introduce adaptation into EU policy. The paper identified Scandinavia as one of the most vulnerable areas in Europe, because higher temperatures would increase levels of precipitation and replace snowfall with rain (European Commission 2007:5). Following the recommendations of the green paper, a white paper, *Adapting to Climate Change: Towards a European Framework for Action* (European Commission 2009), proposed a framework on adaptation. A phased approach was suggested in which the first phase (2009–2012) would be to draw up and prepare the adaptation strategy and the second phase (starting in 2013) would be to implement it (European Commission 2009).

Early policy documents focused on general adaptation policy but more recent documents have paid increased attention to adaptation in specific sectors. A green paper on the forestry sector, *On Forest Protection and Information in the EU: Preparing Forests for Climate Change*, was published in 2010. The green paper set out the policy context in the sector, including policy problems and opportunities, in order to start a discussion on an EU strategy for, and facilitate the preparation of a policy framework on adaptation in, the forestry sector (European Commission 2010a). Following a stakeholder consultation (European Commission 2010b), the Commission found:(a) a general interest in providing forest information collated at the EU level; (b) a interest in conserving forest biodiversity; (c) demand for continued EU support for research into the relationship between climate change and forests and the forest sector; and (d) a consensus that forests in the Mediterranean region were likely to be most affected by climate change.

3.2 NATIONAL POLICY ON CLIMATE CHANGE ADAPTATION

Like supranational climate policy, the focus of Swedish climate policy in the past two decades, in the 1990s in particular, was on mitigation (Keskitalo 2010). The only policy statement in the 1990s on the consequences of climate change in the Nordic countries was a policy report by the Swedish Commission on Climate Change (1994). This report concluded that Swedish research on climate change and vulnerability was relatively poorly developed, and raised the question of how Swedish research on the impacts of climate change should be organized.

The regional impacts of climate change were highlighted by the Swedish Regional Climate Modelling Programme (SWECLIM), which ran from 1996 to 2003, funded by the Foundation for Strategic Environmental Research (Mistra). The aim of SWECLIM was to provide planners in Sweden with useful information for application in long-term adaptation strategies. The programme led to the establishment of an advanced regional climate model, which was used for educational purposes and as a starting point for an analysis of climate impacts on different sectors (Rummukainen et al. 2004).

Meanwhile, vulnerability and climate change became part of a wider discussion on crisis management in times of peace, which began with the setting up of the Swedish Commission on Vulnerability and Security in 1999. The Commission recommended that research funding should be increased in areas that improved knowledge on vulnerability to climate change. The Commission also proposed a new crisis planning system. The system proposed that the public institutions responsible for a sector or area in times of peace should also take responsibility for that sector or area in times of crisis. Furthermore, it suggested that problems should be resolved at the local level, meaning that the local government bodies closest to the problem should have the main responsibility in the event of a crisis. The national government and a national crisis management organization should take responsibility for problems at the national level (Swedish Commission on Vulnerability and Security 2001). The Commission's proposed crisis planning system could be seen as an attempt to initiate an adaptation plan:

Technical infrastructure is sometimes built without sufficient consideration for weather events that are rare in the present climate. In the Commission's view, analyses of long series of climatological measurements should be made within the framework of security and emergency preparedness activities in order to provide a better ba-

sis for assessment of the vulnerability associated with the present and future climate (Swedish Commission on Vulnerability and Security 2001:18)

Despite the Commission's implicit advocacy of adaptation measures and responses to climate-related vulnerability, the overall focus of the policy documents that followed the Commission's report was disaster management (Swedish Government 2002, 2006; Swedish Ministry of Defence 2007). Climate vulnerability was treated as only marginal.

Several severe weather events occurred in Sweden in the early 2000s, increasing the already growing attention on natural disasters in the policy arena. Unusually heavy rainfall resulted in disastrous floods and landslides in different parts of the country in 2001. Similar events followed in 2002 and 2004 (Swedish Government 2005a). The 2001 floods led County Administrative Boards around lake Vänern collectively to demand that the government take measures to prevent future flooding (Keskitalo 2010:195). Perhaps most significantly, in 2005 an unusually severe storm, Storm Gudrun, hit southern Sweden. It felled 75 million square metres (m²) of forest, damaged telecommunications and electricity distribution infrastructure, and led to electricity outages and major road closures that lasted for several days (Keskitalo 2010; Swedish Government 2005a). The floods and associated regional political pressures led the government to set up a Commission focused solely on climate change vulnerability and adaptation (Keskitalo et al. 2010; 8, personal communication 2011) and the storm added to the urgency of the Commission's work (8, personal communication 2011). However, according to Keskitalo (2010), the main drivers behind the decision to set up the Commission were international developments in the field of climate change, such as the publication of various IPCC reports, which put pressure on the government to act. Keskitalo argues that national politicians were not particularly concerned about climate change. This, however, is contested by a former employee at the Ministry of the Environment (8, personal communication 2011) who spoke of Swedish ambitions to lead climate change mitigation efforts internationally. One example of this is the explicit environmental development agenda set out in 1996,⁵ which involved

5 This "explicit environmental agenda" refers to the ambition of Prime Minister Persson to make Sweden a leader in ecological sustainable development, which was kept alive throughout his time as prime minister (1996–2006). According to SEPA (2011), examples of investment include SEK 5.8 billion on CO₂ mitigation projects through the Local Investment Programme and the Climate Investment Programme in 1996–2008.

high levels of government investment to reduce Swedish carbon dioxide (CO₂) emissions by an additional 4% over and above the percentage reduction required by the Kyoto protocol. According to the same former employee, the delayed attention to adaptation was a “question of political strategy” in order to maintain legitimacy for climate change mitigation efforts.

[. . .] *environmental ministers wanted to keep the focus on an active policy to reduce emissions; not a policy for adaptation. Eventually, we came to reconsider this strategy for two reasons. First, it became ever more apparent that a policy for reducing emissions would not be sufficient. The ratification of the Kyoto protocol was delayed, the US dropped out and researchers started to report that climate change was no longer in the future, it could already be observed.*[. . .] *Second, little by little it became ever more apparent to us that a policy for climate change adaptation did not need to imply reduced interest in a strong emissions reduction policy* (8, personal communication 2011).

Although adaptation was publicly recognized and promoted by the Ministry of the Environment in 2004, the main aim of such promotion remained to increase acceptance for stricter policy instruments on climate change mitigation (8, personal communication 2011). Storbjörk (2006) recognizes that national politicians saw adaptation as highly relevant, but identifies other reasons for the delay in policy implementation. She argues that uncertainties over the division of responsibilities hampered the development of concrete initiatives. In general, agencies with responsibility for providing knowledge, such as the Swedish Environmental Protection Agency (EPA), the Swedish Meteorological and Hydrological Institute, and the Swedish Geotechnical Institute, paid more attention to adaptation issues than agencies responsible for implementing decision-making, planning and handling risks. Nevertheless, Keskitalo et al. (2010), key informants (1, 8, personal communication 2011), Storbjörk (2006) and Rummukainen et al. (2005) all agree that action on adaptation was at a very early stage in 2004–2005.

Adaptation had been mentioned briefly in policy reports and publicly recognized by the Ministry of the Environment, but the launch of the Commission on Climate and Vulnerability in 2005, which involved a team of 150 experts assessing vulnerabilities and adaptation at the national and sectoral levels, marked a policy shift that put adaptation firmly on the policy agenda. This shift was also recognizable in the way in which Swedish policy documents began to discuss climate change. For example, the government bill “National Climate Policy in Global Cooperation” (Swedish Gov-

ernment 2005b), which framed the directive to set up the Commission on Climate and Vulnerability, referred to climate change not as a future phenomenon, but as something that was already happening – reflecting the analysis presented in the IPCC’s third assessment report. Moreover, according to Keskitalo (2010), it was becoming increasingly acceptable to speak of climate change and its impacts as facts. Before the advent of the Commission, if the impacts of climate change had been accepted as fact, this would have implicitly meant that mitigation efforts had been abandoned. After the Commission, however, the two issues were no longer seen as conflicting, but as complementary and equally important measures in the fight against climate change.

In 2007, the Commission on Climate and Vulnerability published a report, *Sweden Facing Climate Change: Threats and Opportunities* (Swedish Commission on Climate and Vulnerability 2007). One of the report’s main conclusions was that, despite the uncertainty, there was sufficient knowledge to motivate Swedish efforts to adapt to climate change:

It is necessary to begin adapting to climate change in Sweden. The main features in the climate scenarios are, despite uncertainties, sufficiently robust to be used as a foundation (Swedish Commission on Climate and Vulnerability 2007:11).

The report’s conclusions also focused on some of the more practical suggestions for how to operationalize adaptation work. According to Rydell et al. (2010), the Commission recommended that the government carry out 59 adaptation activities. Of these, 28 had been either fully or partly included in a variety of tasks assigned to public authorities by mid-2010.

The Commission made several recommendations on where responsibility for adaptation should lie. These were followed up in the parliamentary bill *A Coherent Climate and Energy Policy* (Swedish Government 2009). The main recommendations were that County Administrative Boards should take central responsibility for regional coordination of adaptation, and that various sectoral authorities, such as the Swedish Forest Agency, should take responsibility at the sectoral level (ibid.). Both these recommendations were accepted by parliament. The bill also followed the Commission’s recommendation that the Swedish Environmental Protection Agency (SEPA) should be given responsibility for national and international follow-up and reporting on adaptation activities. The government identified the need for an in-depth evaluation of the progress made, particularly on cross-sectoral cooperation. This evaluation, the Climate Politi-

cal Checkpoint 2015, would include an assessment to ensure that regional, sectoral and cross-sectoral adaptation policies were being implemented as planned (Swedish Government 2009: 164–165).

Despite the action taken by the Government, Rydell et al. (2010) express doubts about successful realization of Swedish climate adaptation plans with current coordination and funding arrangements. Over and above the regional coordination responsibilities held by the county boards, the role given to SEPA represents the only national control mechanism. Currently, there is no national agency to take overall responsibility for coordinating (or indeed ensuring) climate change adaptation in Sweden. To finance all the adaptation activities outlined in the Climate and Energy Bill, including the funding for the County Administrative Boards, the government set an overall three-year budget of SEK 300 million. The government rejected the Commission's suggestion that the state should part-finance large-scale investments that are difficult for municipalities to pay for on their own (Rydell et al. 2010; Keskitalo 2010).

3.3 THE PROCESS OF INTEGRATING CLIMATE CHANGE ADAPTATION INTO FORESTRY POLICY

This section describes the development of adaptation concerns in the context of the discourse on forestry adaptation. The focus is on policy-related activities, in particular the debates and strategic actions linked to knowledge provision and the rules, regulations and responsibilities related to the expected impacts of climate change on Swedish forestry.

Climate change adaptation seen as a non-issue

As is mentioned above, the issue of adaptation was absent from national climate change policy in the early 1990s. The literature and key informant interviews (e.g. 1, 5, personal communication 2010) indicate that this was also true for forestry at the policy level and across the sector in general.

The only adaptation action related to forestry was a new strategy for breeding seedlings introduced by Skogforsk (the Forestry Research Institute of Sweden), a foundation set up in the early 1990s and funded to a large extent by the Swedish forestry sector. According to Rummukainen et al. (2005), the strategy aimed to prepare for the future impacts of climate change, to preserve biodiversity and to improve the general vitality, growth and wood quality of the trees (ibid.). According to an informant at Skogforsk (5b, personal communication 2011), the interest in climate

change impacts and vulnerability was driven by meteorologists rather than the institute, which had plant breeding as its core activity.

Although there may not have been direct concern about climate change adaptation in the forestry sector at the time, general environmental concerns increased throughout the 1990s. Until 1993, production was the only goal of forestry policy. The 1993 Forestry Act (Ministry of Agriculture 1993) introduced secondary goals, which included increased concern for and protection of biodiversity (Ministry of Agriculture 1993). The 1999 government bill, *Swedish Environmental Objectives: Environmental Policy for a Sustainable Sweden*, outlined 15 national environmental objectives, which aimed to resolve major environmental problems within a generation, up to 2015–2020 (Swedish Government 1998; Sundström 2005).⁶ The Swedish Forest Agency has responsibility for only one of these objectives: “sustainable forests”. This states that “the value of forests and forest land for biological production must be protected, at the same time as biological diversity and cultural heritage and recreational assets are safeguarded”.⁷ Since 1993, several attempts have been made to integrate environmental goals into the 1993 Forestry Act and environmental objectives into forestry policy. The most recent attempt was the development of environmental objectives with more practical sectoral goals by the Swedish Forest Agency and a variety of stakeholders in 2005 (Sollander et al. 2005; Swedish Forest Agency 2011a).

Despite these efforts to give environmental and production goals more equal priority, the relevant literature (e.g. Sundström 2005; Appelstrand 2007) and various informants from the Swedish Forest Agency, the Swedish University of Agricultural Sciences (SLU) and the World Wide Fund for Nature (WWF) (1, 6 and 7, personal communications 2011) confirm that the production goal continues to have priority over environmental goals, and that this imbalance is related to the fact that the environmental goals and objectives are voluntary and not fully translated into practical rules connected with sanctions. According to Sundström (2005) and Appelstrand (2007), the 1993 Forestry Act gave forest owners a freedom to manage their forests

6 The environmental objectives are still in force but are constantly updated. For an overview of the recent developments: <http://www.miljomal.nu/Environmental-Objectives-Portal/>, visited on 2011.10.13

7 <http://www.miljomal.se/Environmental-Objectives-Portal/12-Sustainable-Forests/>, visited on 2011.10.30

that they had not enjoyed before. It was hoped that this new freedom would make the forest owners more accountable and better informed, which would enable them to achieve some of the environmental goals set out for the sector. The slogan “freedom under responsibility” was used to promote this policy (Sundström 2005: 16).⁸ According to Appelstrand (2007) and the Swedish Forest Agency (2011b), the main provisions of the 1993 Forestry Act were: (a) that forest should be replanted once felled, and that particular consideration should be paid to valuable hardwood which should be replanted in the same proportion as that felled; (b) that a set of forest management rules should be followed to avoid damage to the forest; and (c) that clearing particularly large areas of forest and clear cutting young forest should be avoided.

However, there was increased attention on environmental concerns in forestry throughout this time, as is indicated in the increasingly environment-oriented forestry policy and the market demand for certified wood. According to Hysing (2009), the development of certified wood was a success story that increased protection of biodiversity in forestry. As a result of lobbying by environmental organizations, a variety of certification schemes were developed in the 1990s, such as the Forest Stewardship Council. In 2004, more than half of Swedish forests were certified (Hysing 2004).

Academics begin to advocate climate change adaptation

In the 1990s, researchers began to promote adaptation alongside the local adaptation activities at Skogforsk. Some of the calls for adaptation by the Swedish forestry sector can be traced to a seminar series on “the climate change of the future” arranged by the Royal Swedish Academy of Agriculture and Forestry (KSLA) in 1997. These seminars brought together public authorities (such as the Swedish Forest Agency and County Administrative Boards), the private sector (such as the forest industry and forest owners) and scientists from different disciplines. One seminar focused on scenarios for future climate change and the potential risks for forestry and agricultural practices. One of the seminar participants, Professor Bert Bolin of the Meteorological Department at Stockholm University, openly promoted adaptation:

The question is, should one take this [gradual climate change] as a warning and adjust society without too large costs in order to be prepared for what could hap-

pen? It is this strategy that I feel is defensible in the contemporary situation instead of just waiting and not doing anything (Bert Bolin cited in KSLA 1998:74).

Many agreed that adaptation would become necessary in the future, but not everyone agreed with Bolin that immediate adaptation planning and action was necessary. The report on the meeting indicates that a majority of the participants expressed a wish for more knowledge about the vulnerability of Sweden’s forestry sector to climate change (KSLA 1998).

Despite such arguments in favour of additional research and planning, it was not until 2002 that more extensive efforts were made to put adaptation on the forestry policy agenda. The KSLA organized another forum and set up a “Climate and Forest Committee” (5a, 5b, personal communication 2011) “to promote interest in climate change issues among scientists and forest managers” (Sonesson 2004:5). The committee included five researchers from SLU, two from Skogforsk, one from the Swedish Meteorological and Hydrological Institute (SMHI/Rosby Centre) and one from the Swedish Forest Agency (Sonesson 2006). The aims of the committee were: first, to review the literature with regard to expected climate-related change in the Nordic countries and the potential risks to the forestry sector; second, to stimulate the setting up of an interdisciplinary programme that could increase knowledge of the biotic effects of climate change; and, third, according to Sonesson, “based on [these] risk scenarios, discuss the eventual need to change the policy direction and planning in forestry with actors in the forestry sector” (Sonesson 2006: 9). The last point in particular indicates an ambition to evaluate the need for an adaptation policy in the forestry sector. According to Sonesson (2006), the committee’s four years of work resulted in a comprehensive literature review and a research agenda for a future interdisciplinary research programme. The literature review concluded that there were gaps in knowledge about the potential effects of climate change on forest ecosystems, but that the most likely effects of climate change could be predicted. These were that expected climate change would, on the one hand, increase opportunities for production but, on the other hand, increase the risk of severe weather events (Sonesson 2004). According to Sonesson (2006), the knowledge gaps identified in the literature review prompted the foundation to organize a two-day workshop at KSLA in 2004. Thirty scientists from a range of disciplines discussed the development of a research agenda for a future forest-oriented interdisciplinary research programme. The goal of this research programme was defined as to “develop support tools to help decision makers in forestry to

8 The latter is still a widely used argument, e.g. in the government bill “En skogspolitik i takt med tiden.” (Swedish government 2008).

adapt forest management practices to meet challenges posed by anticipated, but uncertain, climatic changes” (Sonesson 2006: 7).

The KSLA committee was not alone at this time in promoting increased support for climate change vulnerability and adaptation research. Bolin and other informants (5, personal communication 2011) indicate that the inspiration behind the committee came from meteorologists. In addition, many scientific publications (e.g. Blennow and Sallnäs 2002; Lindner 2000; Sykes and Prentice 1995; Jönsson et al. 2004; Bergh et al. 1999; Sonesson 2001) expressed the need for more knowledge on climate change, its effects on, and the need for adaptation in, the boreal forest zone. It appears that this issue became established in the scientific community at the turn of the century and that a common discourse on adaptation for the Swedish, or boreal, forestry sector began to emerge. In addition, organized efforts by the KSLA to influence policy indicate the formation of an advocacy coalition for adaptation.

The advice set out in the 2006 report by the Climate and Forest Committee led to the Mistra-funded research programme, Future Forests, which was launched in 2009 (Future Forests 2011). The programme had a much wider research perspective, focusing on adaptation to change in general and not only climate change, which was the original focus of the KSLA committee.⁹ This was probably a result of negotiation on the various interests, and indicates the difficulties the SLU, Skogforsk and SMHI had in keeping the promise made to the KSLA committee to carry out the programme as planned (see Sonesson 2006: 5). This failure by the research institutes indicates that the advocacy coalition was relatively weak compared to other forestry research interests.

The storm triggers policy action

Many of the key informants (1, 5, 6, 7, personal communication 2011) and the local forest officials and forest owners who participated in the stakeholder meetings (Stakeholder meetings 2010; Stakeholder interviews 2011) argued that storm Gudrun was the main trigger for growing interest in adaptation in the forestry sector. A variety of climate adaptation-related policy activities were initiated after the storm. As is outlined in section 3.5, other natural disasters and political pres-

⁹ URL: <http://www.futureforests.se/program/futureforests/hem/omfutureforests.4.1b27248111ee6cfde1e80001557.html> ; <http://www.futureforests.se/program/futureforests/hem/omfutureforests/visionochmal.4.1b27248111ee6cfde1e80001603.html>.

Box 1: Major storms and related forest damage



Gudrun, January 2005

Damaged forest: 75 million m³

Cost: 15 billion SEK for the forestry sector alone

Per, January 2007

Damaged forest: 16 million m³

Sources: Swedish Commission on Climate and Vulnerability 2007; Svensson et al. 2011

sure are also likely to have contributed to the initiation of these adaptation-related measures.

An early adaptation-related policy response to the storm was a government-led evaluation of the consequences for the forestry sector, for the Swedish Forest Agency and related ministers. It concluded that there was no reason for a complete change in forestry policy, but that improvements could be made to increase the level of preparedness for future storms. The effects of climate change were to be included in future planning tools “if possible” (Swedish Forest Agency 2006). This peripheral treatment of climate change can be explained partly by the level of uncertainty. The report recognized that climate scenarios predicted that stronger winds in the south of Sweden were more likely, and that the expected warmer and wetter climate increased

the risk of wind-felling, but uncertainty about how, when and where these phenomena would impact on forests and interact with different ecosystems, as well as changing forestry methods and changing trends and markets for forest products, were seen as too great a barrier to the extrapolation of clear policy advice.

Uncertainty related to climate change was also evident in the information campaign about climate effects and adaptation launched by the Swedish Forest Agency after the storm. A pamphlet (Fransila et al. 2005) for forest owners based on an internal climate policy drawn up by the Agency in 2003 (Swedish Forest Agency 2003) was key to this campaign. However, both the internal climate policy and the pamphlet lacked straightforward recommendations on how forest owners should deal with climate change. The only clear policy recommendation made was that there was no need to change the type of species planted, mainly because young seedlings were vulnerable to climate change. New recommendations on what species to plant would only be necessary once radical climate impacts had started to appear. Other recommendations were vague references to risk spreading, imbued with a respect for the forest owners' own decisions to adapt (Swedish Forest Agency 2003; Fransila et al. 2005). In addition to uncertainty, this reaction can be traced to the increased freedom of forest owners and weaker powers of the Forest Agency following the 1993 Forestry Act.

The majority of policy responses to the storm were taken immediately. Because only 40% of the forest owners in the storm-hit area were insured, many took a big financial hit from the damage (Blennow 2008, Svensson et al. 2011). The government provided SEK 3 billion in subsidies to aid forest owners and speed up the clearance of felled timber – in order to prevent further damage from the invasion of insects (Svensson et al. 2011).¹⁰ Of the various policy measures, tree replanting was an example that could be linked to climate change adaptation because it aimed to increase forest variety, which many scientists and the environmental organization the Swedish Society for Nature Conservation argued increased resilience to future weather events (Hermansson Török 2006). Consequently, SEK 250 million was dedicated to coniferous forest and SEK 200

million to mixed forests dominated by deciduous trees (Swedish Forest Agency 2010; Hermansson Török 2006). However, the higher costs of planting deciduous forests due to the need to protect it from grazing elks and roe deer meant that only 10% of the planting would be mixed forests in practice (ibid.). The Swedish Forest Agency recommended spreading the risk (Swedish Forest Agency 2003, Fransila et al. 2005), but it is likely that the forest owners, who have a significant interest in planting coniferous forest (particularly spruce, which is known to give large yields) put the government under pressure. For example, informants at both the local and the national levels (stakeholder meetings 2010; 3, personal communication 2011) referred to Södra, a major forest owners' organization with over 51,000 members, which strongly promoted spruce planting and continued to do so after Gudrun, despite the devastating effects that a future storm could bring in terms of tree-felling. According to an informant from Södra, however, its message was based on scientific risk calculations and was much more nuanced than was generally argued:

... to get some kind of counterweight in this [replanting] debate that came and hit very hard, we said that the spruce still had its place. Actually we went out with a very open message [...] but since someone dared [to say] that one should replant with spruce, the media coverage became very slanted towards the message that Södra wanted spruce (3, personal communication 2011).

Södra was one of the few actors to openly support spruce planting, and its stance caused a lot of debate (stakeholder meetings 2010; 3, personal communication 2011). The debate is likely to have been fuelled by the fact that spruce was known to be especially sensitive to wind-felling and was dominant among the trees felled by Gudrun (Blennow 2008; Swedish Forest Agency 2006; SkogsEko 2005).

However, it was clear early on in the subsidy process that there was a strong preference among land owners for planting coniferous trees, particularly spruce. Consequently, the government decided to use part of the subsidy originally intended for mixed forests for other measures, the majority of which served to prevent the increase of harmful insects that thrived among storm-felled trees. According to the Swedish Forest Agency (2010) the expected take-up of the SEK 450 million in subsidies for the period 2006–2011 was SEK 323 million, or SEK 357 million including administrative costs. From the available data on 2006–2010, about SEK 315 million of the budget was used for subsidies (including administrative costs, this figure was SEK 347 million). Of this sum, SEK 251 million was used

¹⁰ Examples of activities supported by the government were: tax reductions on storm damaged timber, tax exemptions on diesel used by forestry machines in the wind damaged area, subsidies for the maintenance of forest roads damaged by the heavy traffic, wood storage subsidies, exemptions on transportation fees for storm-felled timber on railways and waterways, and tree replanting subsidies (Svensson et al. 2011).

to plant coniferous forests and only SEK 63 million was used to plant mixed forests, including deciduous trees (Swedish Forest Agency 2010). Hence, more than the allocated budget for planting coniferous forest was used for that purpose, while only 32% of the budget allocated for planting mixed forests was used for that purpose. Gardiner et al. (2010: 86) observe that Sweden's total area of deciduous forest reduced by more than half compared with before storm Gudrun and the subsequent replanting. This is surprising given the existence of a forest regulation (Swedish Government 1984) that dictates that if an area of valuable deciduous hardwood is felled, it should be replanted with a similar area (ibid.). Regardless of whether these rules were broken, it is likely that the preferences of forest owners and forest owners' associations such as Södra meant that forest more dominated by coniferous species was planted. This was against the recommendations made by the government, the Swedish Forest Agency and scientists for increased variety in forests, and also ignored the fact that spruce is one of the trees least able to stand up to high winds (see Blennow 2008). This was confirmed when it became clear that more spruce was felled by the storm than any other species of tree (Blennow 2008; Swedish Forest Agency 2006; SkogsEko 2005).

In 2007, storm Per, although much weaker than Gudrun, also contributed to the adaptation debate. While stakeholders were better prepared to deal with the storm's effects, the fact that two storms followed each other so closely resulted in much storm-felled timber, and warm, dry summers after 2007 brought with them increases in insect populations. The population of bark beetles in particular increased drastically, damaging wind-felled timber and standing trees (Bergquist 2009). According to Bergquist, in the period 2006–2008 approximately 2–3 million m³ of forest died due to the invasion of spruce bark beetles. Since 2006, various methods have been used to curtail bark beetle numbers, including the removal of storm-felled timber and a variety of extermination methods (ibid.). In another policy change linked to adaptation, the government asked the Swedish Forest Agency to monitor, analyse and inform forest owners about the development and potential effects of insect populations, and the SLU delivered scientific back up. These monitoring activities began in 2007.¹¹

The growing level of debate on adaptation after Gudrun would be surprising if it were attributable

only to the storm. Scientific studies did not show a significant relation between climate change and more extreme weather events either at the time Gudrun hit (see Sonesson 2004; Swedish Forest Agency 2003; Fransila et al. 2005) or afterwards (SMHI 2007; Swedish Commission on Climate and Vulnerability 2007). It was not only the storm that pushed adaptation higher up the agenda, however, but also the increasing focus on climate change in wider society as well as a growing understanding that forests become more storm sensitive if ground frost is reduced by a warmer climate (see Sonesson 2004; Swedish Forest Agency 2003; Fransila et al. 2005). For example, SMHI (2007) and the Commission on Climate and Vulnerability (2007) both claimed that the lack of ground frost partly explained why Gudrun and Per had felled so many trees.

However, viewed in a wider context, the debate on adaptation could seem rather limited. Both the Swedish Forest Agency's storm review (Swedish Forest Agency 2006) and the policy actions post-Gudrun (summarized in Gardiner et al. 2010) indicate that policy action focused mainly on optimizing short-term productivity, while long-term efforts to tackle climate vulnerability and adaptation, such as government subsidies for mixed forests, were only peripheral. Forest owners also prioritized short-term productivity through their preference for the less wind-resistant spruce. An informant from Södra recently observed reduced preparedness for storms among southern forest owners outside the storm-hit area:

I can partly see that the knowledge is beginning to deteriorate. Especially in the areas unaffected by Gudrun and Per, where the forest owners are equally unaware as they were here before the storms. So we [Södra] have an important advisory function here. One forgets that it is hard when these kind of things happen only every 50 years or so (3, personal communication 2011).

The informant argued that the reason for increasingly careless forest management was the fading memory of the impact of the storm. This suggests (like the forest owners' preference for replanting spruce after the storms) that forest owners do not consider the risks of climate change to be enough of a threat to apply long-term precautionary management. This seemingly risky behaviour is nuanced by the findings of Gardiner et al. (2010), which highlight the increasing number of forest owners who have taken out insurance since storm Gudrun. Taken together, the potentially increased risk of forest damage that forest owners take by planting trees that offer the best short-term yields is acknowl-

¹¹ See <http://www.skogsstyrelsen.se/Aga-och-bruka/Skogsbruk/Skador-pa-skog/Insekter->, visited on: 01.10.2011.

edged and covered for by increased levels of insurance premiums. Hence, like the general adaptation debate, the actions taken by forest owners indicate that climate change vulnerability is acknowledged, but only in a limited manner.

The debate takes off

In parallel with the various policy responses to the storms, the development and publication of the report by the Commission on Climate and Vulnerability, and the subsequent public consultation, further contributed to the debate on adaptation in the forest sector. The Commission produced the most elaborate analysis so far of the effects of adaptation to climate change on the forestry sector (Swedish Commission on Climate and Vulnerability 2007). Like the KSLA committee (Sonesson 2004), it concluded that the expected rise in temperature would contribute to increased growth and thus increased profits for the sector, while the damage from insects, fungi, and potential storms and forest fires would increase costs. The Commission identified several adaptation policy measure as well as areas in need of further research and knowledge dissemination. A summary of the relevant policy measures is outlined in Box 1. The areas of research, development and dissemination identified were: climate change scenarios, risk spreading strategies, new and expected forestry practices, accounting for biodiversity, potential pests, the effects on game, the development of management tools for forestry practices, the consequences of fires and the consequences for the environment and biodiversity of adaptation measures in the forest sector.

According to several informants (1, personal communication 2011), the working group preparing the forestry and agricultural section of the report was generally cooperative and appeared to broadly agree on its contents. However, the public consultation that followed the report revealed conflicting perspectives. For example, SEPA (2008) emphasized that it approved of the Commission's recommendation that adaptation efforts should begin immediately, but the Swedish Forest Industries Federation took a "wait and see" position, arguing that adaptation was an important issue that needed to be discussed, but that "one has to be conscious of the time horizon and the risk of making rash decisions that precede research, experience and efficient use of resources" (Swedish Forest Industries Federation 2008). Swedish forestry has traditionally managed uncertainty by relying on experience (Blennow and Eriksson 2006), while scientific arguments for adaptation tend to rely on prediction rather than experience. This is likely to have contributed to the hesitancy and antagonism towards adaptation in the industry. Similar perspectives were expressed by local forest of-

ficials and forest owners during the stakeholder meetings (Stakeholder meetings 2010) and informant interviews (Stakeholder interviews 2011) on the topic of adaptation in the forest sector. According to Dessai et al. (2008), this phenomenon is not isolated to forestry. The lack of scientific observation of or other more precise scientific evidence to support the uncertain predictions of the effects of climate change is an argument that is widely used to explain the lack of adaptation measures. The argument of Dessai et al., however, that prediction-based scientific evidence is a perceived barrier to adaptation is weakened by the fact that it is not equally problematic in other similar policy areas, such as earthquake risk and national security.

The most divisive aspect of the debate was the conflict between those arguing for high productivity in the sector versus those advocating the preservation of biodiversity. Both SEPA and the Swedish Biodiversity Centre (CBM)¹² argued that the report's discussion of biodiversity was flawed and incomplete (SEPA 2008; CBM 2008). The CBM (2008) went further, arguing that the issue of increased productivity dominated the report at the expense of biodiversity issues. The CBM's key point was that the effects of land and resource use on biodiversity, and how these effects would interact with climate change, were severely underrepresented in the Commission's final report when compared to the Commission's preparatory work leading up to the report. According to the CBM, land and resource use will always have a greater effect on biodiversity than climate change. It argued that only by ignoring land use could the Commission propose a measure such as introducing exotic tree species to increase production, while offering no plans for how to evaluate the consequences of the plan for ecosystems. According to CBS the Swedish Forest Agency should have clear responsibility for evaluating the effects of forestry and related adaptation measures on forest ecosystems, but the advice of the commission is the opposite. CBS states that the report of the Commission clearly signals that the Forestry Agency will have reduced responsibility for the forest ecosystems as a whole, and get increased responsibility for forest production. This is according to CBM unacceptable at a time when the need to secure the function of ecosystems is becoming ever greater (CBM 2008: 3).

According to the CBM, the Commission's apparent prioritization of forest productivity over environmen-

12 The CBM is a national centre for coordinating and initiating research on biodiversity operated by the Swedish University of Agricultural Sciences and Uppsala University.

tal goals should come as no surprise. It argued that current forest management practices were having an increasingly important impact on forest ecosystems: “This is the way it has been up to now and this is the way it will be to an even greater extent in the future when the forestry sector is adapting to climate change” (2008: 3). A similar line of reasoning was put forward by environmental organizations such as the Swedish Society for Nature Conservation (Eklöf and Rudberg 2009) and WWF Sweden (WWF 2008a, 2008b). Both expressed concern about the future management of biodiversity as well as other natural and social benefits from the forest if the intensification of forestry continued to increase. Both mentioned climate change as an additional influence on forests but, like the CBM, saw it as having less impact than forest management.

The public consultation following the report involved actors such as the forest owners’ organization Sveaskog and the Swedish Forest Industries Federation, which promoted high levels of forest productivity. Both recognized that adaptation was important in order to avoid risks and secure gains for forestry, but argued that the report did not sufficiently cover the potential benefits of increased forest production, the chief of which, they argued, was climate change mitigation. Their reasons for this were that: (a) forests would grow more actively and so take more CO₂ from the atmosphere; and (b) recyclable forest products could replace other non-recyclable and more carbon-intensive products. Both organizations claimed that the report did not weigh the costs and benefits of adaptation versus mitigation activities in the forestry sector (Sveaskog 2008; Swedish Forest Industries Federation 2008). Moreover, Sveaskog and the Swedish Forest Industries Federation argued that there was a conflict between adaptation and mitigation activities in the forestry sector:

Measures to adapt forestry are important in order to avoid too large negative climate change effects on biodiversity. But it is also important to consider the positive aspects of additional measures for optimal forestry, including increased growth (different species, fertilizer etc.) which thereby increase the carbon sink [effects], thus helping to minimize climate change (Sveaskog 2008:2)

Although Sveaskog avoided commenting negatively on measures to preserve biodiversity, the above quote indicates that the conflict between adaptation and mitigation activities is really about biodiversity preservation versus intensive forest production. Similar comments were made by forest officials and owners

during the stakeholder discussions on the national environmental policy objective, Sustainable Forests, which deals with increased protection of biodiversity:

As a political decision, the environmental objective Sustainable Forests will soon be met. And it is certain that this will chip away at forest production (Forest official, Kronoberg, meeting 3; Stakeholder meeting, 2010)

The 2010 stakeholder meetings strengthened the perception that forest owners and local officials continued to prioritize increasing production above all other aims. Participants referred to inconsistencies in policy advice over time as a reason for not taking the increased attention paid to climate change vulnerability and adaptation seriously. They explained that in the 1970s the government had encouraged forest owners to drain wetlands by trenching, and to remove deciduous trees in coniferous forest in order to increase production, but the opposite advice was being given today:

Forestry sector policy has generally moved from one extreme to another. As late as the 1970s there were quite generous subsidies to trench and drain swamps to increase production. Then the environmental movement woke up and saw that doing this might have negative effects, and now they have way too much say (Forest owner, Västerbotten meeting 3, Stakeholder meeting 2010).

Long ago when I took over the property I received leaflets from the Swedish Forest Agency ordering me to take away deciduous trees – clear away deciduous trees! Today they say you should leave them be. You just can’t tell what will happen next (Forest official, Västerbotten, meeting 1, Stakeholder meeting 2010).

Similar references were made to findings on the link between acidification and dying forests in the 1970s and 1980s, links which many stakeholders doubt today (Stakeholder meetings 2010). Many stakeholders deemed these policy responses unnecessary or unsatisfactory, and blamed them on the strong environmental lobby and ignorant politicians.

The arguments that emerged from the public consultation by the Commission on Climate and Vulnerability and the stakeholder accounts presented above undermine the argument that the conflict between biodiversity preservation and intensive forest production can be reduced to a conflict between issues of mitigation and those of adaptation. Rather, the debate stems from the radical policy change initiated by the 1993 Forestry Act (reinforced by the 1999 environmental objectives), which aimed to place a new envi-

ronmental goal on an equal footing with the goal of increasing production. However, as is noted above, equality between the two goals has not been achieved. This can be explained by the continuing dominance of producer interests. One recent way in which producer interests have been defended is through the new aim to meet the growing demand for biofuel and other “environmental products” by using wood as a feedstock. It is hoped that such products will substitute for fossil fuel-intensive ones, thereby contributing to climate change mitigation. This aim was apparent in the 2008 forestry bill (Swedish Government 2008) and in the climate bill published in 2009 (Swedish Government 2009).

The 2008 forestry bill marked a political turning point. It stated that the production goal and the environmental goal in forestry should carry equal weight, while at the same time prioritizing the production goal and promoting further intensification. Among the measures suggested to increase intensification were: increased planting of foreign and fast growing species; increased forest fertilization; and the harvesting of tree stumps, the part of the tree usually left in the forest after logging, for use in the production of bio-energy. These measures were among the reasons why defenders of biodiversity, including environmental organizations (Greenpeace 2008; WWF 2008b) and some Swedish scientists (e.g. Jonsson et. al. 2008) strongly objected to the bill. According to Eklöf and Rudberg (2009), the Swedish Forest Industries Federation launched a large scale environmental campaign using the slogan “forestry is good for the climate” at about the same time as the forestry bill was published. Eklöf and Rudberg also allege that the forest owners’ association, Södra, made the bold statement that the climate problem would be solved if half the forests in the world were managed like they were in Sweden. Unsurprisingly, this statement was heavily criticized by environmental organizations (ibid.). The forest intensification debate was also taken up in a KSLA seminar in October 2008, with contributions from the Agriculture Ministry, the Swedish Forest Agency, the SLU, the Federation of Swedish Family Forest Owners (LRF Skogsägarna) and the Energy Agency. KSLA produced a summary of the seminar (KSLA 2008), which gave a generally positive account of intensified production and suggested that it did not necessarily conflict with biodiversity goals. The foreword to the summary report indicates that the seminar was a means to prepare for future international negotiations to safeguard the interests of Swedish forestry, which it was argued has a crucial role in Sweden’s economy and the potential to contribute to its climate change mitigation targets. It was published during

the Swedish EU chairmanship and in preparation for the climate negotiations at the UNFCCC Conference of the Parties (COP 15) in Copenhagen in 2009, at a time when expectations were high that a new global climate agreement would be signed. The KSLA report and the different accounts summarized above reveal divergent opinions as well as uncertainty about how best to manage forests in the light of climate change, whether the purpose is to support industry and the Swedish economy, mitigate climate change, preserve biodiversity or pursue other social aims. Adaptation is given a different meaning depending on the purpose of forest management: whether to preserve production potential or preserve biodiversity. The debate on adaptation in forestry is therefore both competing with and influenced by other ongoing debates.

Policy measures on the way?

The Climate and Vulnerability Commission recommended a number of policy measures directly relevant to forestry and adaptation. The main policy suggestions are summarized in Box 2.

The Commission proposed measures to gather and consolidate knowledge on how to protect biodiversity in a changing climate. While the report was criticized (e.g. by the CBM) for neglecting the issue of land and resource use in the future protection of biodiversity, the Commission did recommend that the SEPA and SLU further investigate the issue, indicating that to some extent it recognized the shortcomings of its report. Moreover, the Commission addressed the conflict between preserving forest biodiversity and maintaining forest productivity with its proposal that the Forest Agency develop management advice and support for combined action on bio-energy and nature conservation.

The public consultation raised questions about the Commission’s policy proposals on reindeer husbandry in forests. According to the Commission (ibid.), reindeer husbandry would be particularly vulnerable to climate change, and to compensate for this it suggested that the Sami, the indigenous people who manage the reindeer industry, should have more influence over forestry in reindeer herding areas. Sveaskog (2008) and the Swedish Forest Industries Federation (2008) argued strongly against this recommendation, and Sveaskog (2008) questioned whether the reindeer industry was as vulnerable as the Commission claimed. These objections were predictable because according to forest owners and officials in the north (stakeholder meetings 2010), there was an existing conflict in the region between forest owners and the Sami. While the Sami need access to forest owners’ land for the reindeer, the forest owners claim that the

Box 2: Summary of the Climate and Vulnerability Commission's main policy proposals for the forestry sector

General suggestions:

- The regional level authorities, the county administrative boards, should carry the main responsibility for climate change adaptation and coordinate the work between municipalities, industry and regional sector authorities.
- The SEPA should have responsibility for national and international monitoring of and reporting on climate change adaptation activities.
- All sectoral authorities (e.g. the Swedish Forest Agency) should have clear responsibility for adaptation within their specific sector.
- The environmental demands of the forestry sector should take more consideration of reindeer husbandry practices.
- The Swedish Forestry Act should be changed, to require an increased degree of consultation when logging in reindeer husbandry areas.
- The SEPA, together with the SLU, should map the vulnerability of different ecosystems and species, and also account for land use and suggest necessary protection measures.
- The SEPA and the Swedish Forest Agency should evaluate current systems for enabling migration of various species in case of climate change and suggest suitable changes, support systems and regulations.
- The government should continue to finance fire monitoring.
- Various authorities, including the Swedish Forest Agency, should be involved in expanding and improving the public accessibility of early-warning systems for e.g. storms, drought and intensive rainfall.

Proposed tasks to be assigned to the Swedish Forest Agency:

- Involve other authorities and organizations in the revision of the Swedish Forestry Act.
- Develop a system of reporting, follow-up and evaluation of damage to forests together with SLU.
- Evaluate the potential to reach current environmental goals (e.g. sustainable forests) in relation to the changing climate.
- Run a broad information campaign on the effects of climate change and adaptation among forest owners in collaboration with forest owner organizations and other interest groups.
- Increase the consideration of reindeer herding areas in current forest management legislation in collaboration with the Sami council.
- Develop management advice and support for combining bioenergy aims and nature conservation.

(Swedish Commission on Climate and Vulnerability 2007)

reindeer cause damage to the forests and a consequent loss of revenue (*ibid.*).

The Commission also made a key proposal on how to finance adaptation. It suggested that adaptation could potentially be paid for: (a) by the actors causing climate change; (b) by those who stand to profit from climate change; (c) through a tax to discourage undesirable adaptation measures that for example could have negative environmental effects; and (d) through public-private partnerships (Commission on Climate and Vulnerability 2007: 664–667). The second point was strongly opposed by both Sveaskog (2008) and the Swedish Forest Industries Federation (2008). Sveaskog highlighted the greater

risks associated with climate change, and the radical and unexpected way in which it might devastate the sector. Sveaskog argued that this made it “illogical” for the forestry sector to finance adaptation (Sveaskog 2008). The Forest Industries Federation agreed, arguing that the suggestion was counterproductive and contradicted the first (Swedish Forest Industries Federation 2008).

To summarize, the forestry sector's aspiration to intensify production was at odds with a range of other interests, including the interests of those promoting biodiversity, the Sami, and other social and industrial sectors which saw the sector as a climate change “winner” that could assist those most vulnerable to climate change.

As is described above, the government followed up on the Commission's recommendations in its bill "A Coherent Climate and Energy Policy" (Swedish Government 2009). The bill assigned SEK 4 million to the Swedish Forest Agency for the period 2009–2011 – SEK 6 million less than the Commission recommended – to set up a system to inform forest owners and others active in the sector about climate change and potential adaptation action (Swedish Government 2009: 165). Stakeholders in the public consultation process generally agreed that there was a need for more and better information for the forestry sector with regard to climate change and potential adaptation. For example, the CBM pointed out that large gaps in knowledge make it difficult to decide which information is most suitable to disseminate to forest owners, and suggested that the planned Commissions of enquiry on forestry law and management related to, among other things, environmental goals and bio-energy production should be carried out before the information system was set up by the Forest Agency. The government agreed that knowledge was limited, but argued that it was sufficient to meet the need and for the planning purposes of landowners (Swedish Government 2009: 176–177). Despite the CBM's objections, parliament agreed the sum of SEK 4 million (Rydell et al. 2010).

In 2005 the Swedish Forest Agency disseminated information on climate change effects and adaptation to forest owners. Additional information provision was enabled through the Rural Development Programme, set up in 2007, which was co-financed by the government and the EU to support regional development (Swedish Forest Agency 2011c). However, even at this stage the Swedish Forestry Agency realized that more personnel and better routines were needed to handle the increased demands of climate change (1, personal communication 2011). According to one informant (1, personal communication 2011), the increased attention being paid to climate change was partly due to demands from the Agriculture Ministry to give more priority to climate change issues within the Swedish Forestry Agency as well as the increased number of questions from forest owners. Consequently, an internal climate group was set up within the Swedish Forestry Agency in 2007. Part of the work of this group was to set out a climate strategy and revise the agency's internal 2003 climate change policy. The publication of its revised climate policy (Swedish Forest Agency 2009) coincided with the Agency being asked by the government to set up an information system on the effects of climate change and adaptation for forest owners. Although the revised climate policy gave greater prominence to climate change and adaptation to it, it

did not differ significantly from the original. Nor did the way in which the agency publicly communicated the issue change significantly. The agency still advised forest owners to think about the potential risks of climate change and not to "put all their eggs in one basket", while giving them the freedom to make their own decisions in response to climate change.

Following the establishment of the internal climate group, the Swedish Forest Agency held a variety of workshops on the effects of climate change and adaptation. It had developed an education programme for local employees long before it was given its government assignment (Eriksson 2009). According to informants (1b, c, personal communication 2011), education programmes for district employees and the development of information material for forest owners is ongoing. In this way, the agency has integrated climate change and adaptation issues into its overall practices.

The government also suggested various measures for researching and monitoring the effects of climate change in its bill on Climate and Energy Policy (Swedish Government 2009). These measures were in line with the Commission's proposals and were not contested during the public consultation process. According to Rydell et al. (2010), many of these activities had already begun, such as the revision of the forest regeneration law and activities to support reindeer husbandry. Some initiatives had already been completed before the publication of the 2009 bill, such as an evaluation linked to the "sustainable forests" objective. Other activities had not yet started or been addressed by the government, such as the expansion and improved public access to early-warning systems on extreme weather, an evaluation by the SEPA and the Swedish Forest Agency of the potential for improving current systems for enabling the migration of species and the development of advice and support on combining bioenergy and nature conservation. According to Rydell et al. (2010), the Swedish Forest Agency planned to integrate this last activity into the Rural Development Programme.

Table 2 lists the key developments in the process of integrating adaptation and forestry policy. Early developments in this process were led by the academic community. The government and the Swedish Forest Agency began to advocate adaptation after storm Gudrun in 2005. Adaptation shifted from an internal matter for the agency and the scientific community to a public issue, culminating in the work of the Climate and Vulnerability Commission and adaptation initiatives linked specifically to the effects of Gudrun. The public consultation that followed the publication of the Commission's report led to the involvement of a

Table 2: Main policy developments in climate change adaptation and forestry policy, 1990–2011

Date	Policy-related development
1997	KSLA seminar: promoted adaptation research and an action plan
2002	KSLA Climate and Forestry Committee: promoted adaptation research programme (Future Forests) and an action plan (Sonesson 2006)
2003	Publication of internal climate change policy by Swedish Forest Agency: promoted adaptation research but no action plan
2005, January	Storm Gudrun (damaged forest: 75 million m ³)
2005, June	Government set up the Commission on Climate and Vulnerability: adaptation put on the forestry policy agenda.
2007, January	Storm Per (damaged forest: 16 million m ³)
2007	Publication of report by Commission on Climate and Vulnerability: policy suggestions presented; Adaptation debate takes off
2009, November	Based on Commission's report, the government funds the Swedish Forestry Agency (SEK 3 million for the period 2009–2011) to integrate vulnerability and adaptation into its information and advisory work

wider range of stakeholders in the adaptation debate. A number of policy decisions were made based on the Commission's recommendations, including increased funding for integrating adaptation into the work of the Swedish Forest Agency – a significant achievement for Swedish forestry.

3.4 COVERAGE OF CLIMATE CHANGE ADAPTATION AND FORESTRY IN SWEDISH DAILY NEWSPAPERS

It is evident from the above that certain policy issues were particularly prominent in steering the adaptation policy integration process: forestry production, climate change mitigation and biodiversity. To gain a picture of the general trends in the forestry debate, as well as the relative dominance of one policy issue in relation to another, we translated these issues into keywords and calculated how often they occurred together with the keyword “forest” in Swedish daily newspapers in the period 1995–2010 (see Figure 1).

Figure 1 plots the annual number of mentions in national daily newspapers of the given topics in the period 1995–2010. Generally, the graph correlates with the qualitative discourse analysis since adaptation is the new issue that enjoys the least attention, while the other policy issues are more popular.

There was a slight increase in the number of mentions of forest and adaptation from 2002 onwards, with a slight peak in 2007 and another in 2009. The latter correlates with the events described above. For instance, the increase from 2002 coincides with growing international recognition of adaptation and Swedish researchers' growing interest in the issue. The slight peak in 2007 can probably be explained by storm Gudrun and storm Per, as well as the 2007 publication of the final report of the Commission on Climate and Vulnerability. The 2009 peak coincides with the publication of the Climate and Energy Bill, which was a reaction to the report by the Commission on Climate and Vulnerability. The publication of the bill is also likely to have triggered publicity due to the adaptation measures related to forestry and the specific roles given to the Swedish Forest Agency.

As in the discourse analysis, forest and production issues are clearly dominant. The media analysis shows that from 1995 to 2004 the number of mentions of forest production remains steady at around 900 per year. Thereafter, the reporting increased, and more than doubled in 2008 to 2000 mentions, followed by a steep decline. There was a similar trend in the reporting of forest and climate change, which began to increase after 2003, when it was mentioned 60 times, to a peak in 2007 of almost 400 mentions, followed by a decline. Like the discourse analysis,

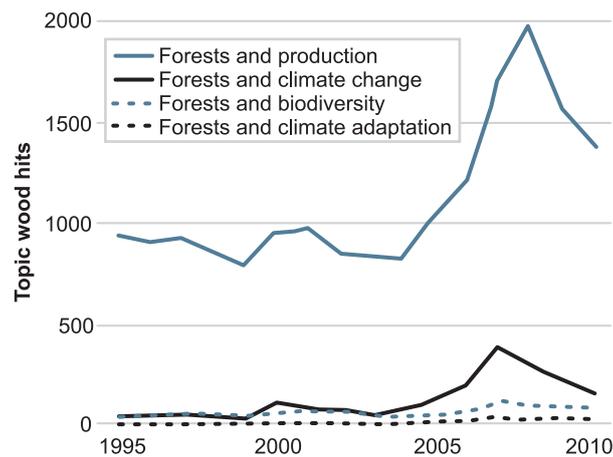


Figure 1: Number of mentions in Swedish daily newspapers of forest issues linked to forest production, climate change, biodiversity or adaptation, 1995–2010

both trends can be related to the coupling of these issues to the forestry discourse. This was mirrored in the increased interest in bioenergy and other forest products as a means to increase the carbon sink, which was reflected in both commercial campaigns and policy proposals. The steep declines in the number of mentions of climate change after 2007 and of production after 2008 are more difficult to explain. The debate on intensified forest production for bioenergy was still going strong, according to the data presented in the discourse analysis. At a later stage, some argue that the general interest in climate change mitigation declined as a result of the failure to meet the high expectations of the climate negotiations in Copenhagen in 2009. For example, an informant from the Swedish Forestry Agency said: “One could say that the work was very intensive in the beginning until Copenhagen, then we kind of lost wind” (1, personal communication 2011).

The slight increase in media attention on adaptation is unlikely to account for the fast decline in media attention on production and climate change. On the contrary, the discourse analysis indicates that the focus on mitigation was a barrier to the development of adaptation and that once adaptation issues were recognized, these issues were able to coexist. However, mitigation was still predominant at the end of this

period, which, among other things, was indicated by the argument that acceptance of mitigation measures increased with the level of recognition of climate change vulnerability and the need for adaptation.

The media attention on forest and biodiversity is also slightly higher than that on adaptation, but still limited in comparison with production and climate change issues. It stays even over time with only a slight peak in 2007. The growing demand for environmentally certified wood, as well as the increasing debate as a result of the storms and the publication of the report by the Commission on Climate and Vulnerability are likely to have contributed to an increased media focus on forests and biodiversity. Nonetheless, the fact that the media reporting on biodiversity remained limited can be related to its competition with the dominant production concerns of the forestry sector, evident not least in the difficulty in gaining attention for environmental goals and objectives. That the discourse analysis describes adaptation as first and foremost a biodiversity concern explains the difficulty adaptation had in gaining public attention.

In sum, the content analysis indicates an even larger dominance of production concerns in the forestry discourse, and that the producer focus is a barrier to integrating adaptation into the forestry discourse.

4 DISCUSSION AND CONCLUSIONS

4.1 DISCUSSION

This study set out to analyse the barriers to and opportunities for integrating climate change adaptation concerns into the Swedish forestry discourse and Swedish forestry policy in the past two decades. The analysis focuses on the way in which the perspectives on, or framing of, central forestry issues, including adaptation, were negotiated and evolved in the context of advocacy coalitions, learning processes and exogenous events.

The study found that this integration occurred as a result of beliefs, activities and events that developed in tandem on multiple levels in society. Academics advocating adaptation, together with exogenous developments such as the political pressure for adaptation responses in general and the devastating effects of storm Gudrun, contributed to learning and an increased awareness of adaptation issues in the forestry sector. The work by the Commission on Climate and Vulnerability extended and deepened the debate and spurred the integration of adaptation issues into policy. Summarized below are six general observations on the integration process and a discussion of their implications for ongoing efforts to adapt Swedish forestry to a changing climate.

The first observation is that dominant frames have acted as a barrier to integrating adaptation concerns. Examples include the reluctance to accept the importance of adaptation compared with mitigation, and the focus on production and conservation in the debate on forests and climate change at the expense of issues such as environmental degradation and the use of forests for recreation and other social purposes. The dominant “production frame” has had wide support in the sector and generally contributed to a resistance to policy change.

It is clear that conventional ways of viewing and dealing with the policy problems and solutions within forestry, that is, the dominant frames, have prevented a recognition that climate change vulnerability and adaptation represent “new” challenges. Climate mitigation has long been seen as something that cannot coexist with adaptation. In many circumstances discussing adaptation was even perceived as not taking the need for mitigation seriously. Consequently, early international climate negotiations primarily focused on the challenge of reducing emissions. This focus was also reflected in Swedish na-

tional policy, in which adaptation was not addressed properly before the establishment of the Climate and Vulnerability Commission in 2005.

The mitigation frame also contributed to the exclusion of discussion of adaptation in forestry policy. Two key stakeholders in the forestry policy debate, the forest industries and the environmental organizations, had a strong interest in climate change mitigation, which in turn prevented the recognition of adaptation issues in forestry. Nevertheless, with the preparation and publication in 2007 of the report of the Climate and Vulnerability Commission, these actors were more or less obliged, or at least persuaded, to join the adaptation debate.

In the adaptation debate that followed publication of the report, the forest industry and the environmental organizations formed two opposing camps: production and biodiversity. The forest industries used the dominant mitigation frame to argue for adaptation measures to safeguard continued and even increasingly intensive forest production. They argued that a focus on biodiversity would hamper climate change mitigation and the economic survival of the industry. At the other end of the spectrum, some environmental organizations and research interests rejected the focus on production because of its negative effects on biodiversity, and argued for adaptation measures that would either safeguard or increase biodiversity. The biodiversity frame was prominent in forestry, but nonetheless secondary to the production frame, largely due to its recent position in forestry policy in comparison with the long history of prioritizing producers’ economic interests. Although the stakeholders defending biodiversity recognized the need for continued forest production and vice versa, it was difficult to find compromises between the two camps, and adaptation for production and adaptation for biodiversity became conflicting issues which in turn became a barrier to furthering the integration of adaptation.

It is not only the controversy between the production and the biodiversity frames and the resilience of the mitigation and production frames that have hindered the integration of adaptation into forestry. Additional frames and historical factors seem to have added to the resistance to accept and learn about the potential effects of climate change and adaptation needs. Thus, a second observation is that the tradition of relying on experience or scientific observations has contributed to the resistance to integrating adaptation into

forestry policy, and Swedish forestry has just such a long tradition. Törnqvist (1995: 134) refers to forestry research based on observation and experiment dating back as far as 1882. In contrast, the climate change argument has been largely built on prediction rather than observation, although this changed with the publication of the fourth IPCC report in 2007, in which observations of current climate change were key (IPCC 2007). The reliance on modelling future possible climate conditions did not match the prevalent tradition in forestry, and meant that such research findings were easier to reject. This experience-based tradition within forestry may also explain why learning on adaptation was mainly of the “single loop” type, whereby only known problems were recognized as potential future climate vulnerabilities. Examples of the latter are a lack of ground frost in winter, which causes increased storm felling and makes roads unusable, leading to problems transporting wood.

Another factor that has complicated the uptake of new knowledge is that many local actors perceive past policy advice from state agencies on forest management practices to have been contradictory and characterized by sudden shifts in priorities and recommendations. Examples reported by informants in this study are the changes in recommendations on draining land to encourage forest growth, and measures to avoid acidification during the 1970s and 1980s. This perception seems to have created a particular scepticism among forestry officials and forest owners about new findings and measures related to the environment. Although difficult to formally prove, it is likely that this scepticism has acted as a barrier to generating support for adaptation research and integration.

Third, this study indicates that the absence of a strong advocacy network for adaptation has slowed policy integration. Few actors have a clear vested interest in adaptation and there are no powerful proponents of the adaptation agenda in the Swedish forestry sector. A lack of clear leadership on adaptation (cf. Meijerink and Stiller 2011) has resulted in weak organization and disjointed promotion of the issue in the sector. These shortcomings made it difficult to involve key stakeholders, such as industry and environmental organizations, in adaptation at an early stage, and have led to a failure to maintain the original adaptation focus when planning and implementing the Future Forest research programme.

Since the 1990s, the academic community has increasingly articulated the need for more research to help plan and prepare for the potential effects of climate change. Climate change scientists have

long promoted research and increased preparedness, and activities at the Swedish Forest Research Institute addressing adaptation in forestry were already under way in the early 1990s. The KSLA served as an arena for the further development of this thinking in the late 1990s and early 2000s, particularly through the establishment of the Climate and Forestry Committee which advocated further research and planning on adaptation in forestry.

However, this interest in adaptation by the academic community was not matched by sector representatives. Neither the industry nor government agencies at the national and local levels backed up those few scientists who represented the adaptation advocacy network. Nor did they actively promote adaptation. This is likely to have created uncertainty in the wider forestry community and to have severely hampered local initiatives.

A fourth, albeit weaker, observation is that external factors such as storm Gudrun have facilitated the integration of adaptation into the forestry sector. These factors generated the support needed for the advocacy coalition to put adaptation on the forest policy agenda. Measures taken in response to storm Gudrun, as well as the setting up of the Commission on Climate and Vulnerability, indicated an increased interest in climate change vulnerability and adaptation issues in the forestry sector. In particular, storm Gudrun can be identified as the most significant external event to trigger learning about adaptation. Lesser factors include the hot summers, insect infestations and storm Per, which all followed soon after Gudrun.

The fifth observation is that a key step in the adaptation learning process was the recognition that mitigation and adaptation are not necessarily conflicting issues. While academics realized early on that reducing climate risks globally would require both mitigation and adaptation efforts, it was not until the late 2000s that this idea began to take hold within the Swedish forestry community. From a general climate change discourse perspective, the acceptance of adaptation alongside mitigation indicates double-loop learning, since it completely changes the climate change frame. This opens the door for a more diverse debate on how far Swedish forestry practices should change to capitalize on opportunities and reduce the risks associated with climate change. So far, however, adaptation is not being discussed in an integrated way within the forestry discourse, but as a means to increase either production or biodiversity. This is due in part to cognitive path dependencies as a result of the dominance of the forest production frame in the forestry discourse

as well as its conflict with the biodiversity frame. This conflict in particular has resulted in a mechanistic integration of the adaptation concept into the forestry discourse based on single-loop learning alone.

The sixth and final key observation is that arenas for learning on adaptation are important, and that the KSLA and the Commission on Climate and Vulnerability played key roles in creating such arenas. The KSLA's seminars and committee created a space for scientists to meet, debate, and share and co-create knowledge. The Commission had a similar function, but expanded the production of knowledge by inviting key stakeholders to participate in the debate in a public consultation.

These arenas were part of the many processes that aided the acceptance of adaptation within the forestry debate, alongside the dominant and previously opposing mitigation frame. Although both arenas appear to have facilitated learning on adaptation, the process was limited to single-loop learning. This again is due in part to the dominant position of the forestry production frame and its conflict with the biodiversity frame, which has created cognitive path dependencies that prevent reflexive exploration of adaptation concerns. Examples of such single-loop learning include the production problems or benefits that may occur with warmer and wetter weather, such as increased wind felling, problems with forest roads due to the lack of ground frost in winter, damage from insect pests, and increased tree growth.

4.2 CONCLUDING REMARKS

Our empirical study of how climate change adaptation has been integrated into Swedish forestry discourse and policy takes as its theoretical point of departure the wider literature on frame analysis and policy learning. Our analysis of the rich empirical material available from interviews and stakeholder meetings focuses on identifying possible signs of change resulting from learning about climate change vulnerabilities and adaptation in the Swedish forestry sphere. Our analysis indicates that single-loop learning processes have dominated – that problem framing and subsequent problem solving appear to have followed conventional ways of thinking. The only example of double-loop learning identified in the study is the way in which key actors in wider society as well as within the forestry sector itself came to change their view of adaptation and mitigation efforts as mutually exclusive, and that a legitimate policy position can be formed in which such ambitions

coexist. In line with the theoretical framework, this double-loop learning is likely to have been stimulated by external events. At the national level this was exemplified by the severe weather events that occurred in the early 2000s as well as international research findings which observed that the effects of climate change are a fact and something that is already happening. This example of double-loop learning has proved powerful for the framing of adaptation and recent policy developments, indicating the significance of more advanced learning.

The message from the academic literature on policy learning is that double-loop learning is the only way to efficiently integrate novel environmental policy and secure sustainable policy outcomes. For this reason, we do not consider the pattern of learning in the context of adaptation and Swedish forestry – a pattern dominated by single-loop learning – to be optimal. Despite this, compared with the early 2000s there have been advances in integrating and legitimizing adaptation issues in forestry policy. For instance, adaptation has become an integral part of the advisory and information activities of the Swedish Forest Agency and appears to have gained further momentum since this study was undertaken. It is also a factor in the advice on planting and forest management given by Skogforsk and forest owner associations such as Södra. However, the manner in and extent to which adaptation concerns have been truly integrated into decision-making is open to debate. Policymakers still have a difficult task to create opportunities for different perspectives to be heard and to learn from each other. They need to consider an integrated approach to tackling the future survival of a range of economic, social, cultural and environmental interests tied to forests, not only dominant interests such as forest production and biodiversity. In this way, new sustainable policy pathways can be developed.

Given that Sweden is considered a forerunner in environmental policy, and that the forestry sector is of such importance to the economy of Sweden, the pace at which adaptation has moved up the forestry agenda must be seen as slow and inadequate.

Some may argue that resistance to integrating adaptation into the Swedish forestry sector is defensible because the sector has bigger problems to worry about. After all, the Commission on Climate and Vulnerability (2007) concluded that the sector that will be one of the least harmed by climate change, and may even benefit quite substantially due to the expectation of increased forest growth. However, even harnessing benefits from climate change will require

adaptation, especially since these will inevitably be accompanied by increased risks from, for example, pests and pathogens. A continued focus on measures to support the integration of adaptation into forestry policy and practice will be essential.

It is reasonable to believe that responding to climate change will continue to be an important issue for forestry for decades to come. With this in mind, a number of lessons can be drawn from this analysis. A key lesson is that barriers can be overcome, something which has been proved by the increasing coexistence of climate change mitigation and adaptation issues which were previously seen as conflicting. Further-

more, a strong advocacy coalition with a range of different actors and strong leaders is key to further policy integration. Policymakers and authorities that take a clearer position and strategic action on adaptation can stimulate the formation of such coalitions.

Planned and deliberate action by centrally placed actors, such as the KSLA Committee and the Commission on Climate and Vulnerability, can be conducive to fruitful double-loop learning. As the need for adaptation develops in the coming years, organizations and policymakers will continue to play an important role in setting up and nurturing arenas and spaces for learning.

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APPENDIX: METHODOLOGY

1. INTERVIEWS

Key informant interviews

A semi-structured interview approach was chosen in order to give informants the freedom to express their perspectives, and to be able to capture issues that were not yet apparent from the literature study. The names of informants were found through the literature study, a review of institutes relevant to the study and using a “snowballing” method by which informants and interviewees were asked to provide ideas on other suitable candidates who could have relevant information. To increase the ability of informants to speak freely about politically sensitive issues, they were treated anonymously in this study. The only references made are to their respective institutes.

Twelve informants were interviewed, 11 following the semi-structured approach. All were audio taped if possible. These informants either are or were associated with the institutes listed below:

Swedish Forest Agency: the Swedish agency for forest-related issues. The authority is responsible for the communication and realization of the Swedish forest policy.

The Federation of Swedish Family Forest Owners (LRF Skogsägarna): part of the Federation of Swedish Farmers (LRF) and the biggest national branch organization for family forest owners in Sweden.

Södra: an economic association for forest owners in southern Sweden.

The Swedish Forest Industries Federation (Skogsindustrierna): the trade and employers’ organization for the pulp, paper and wood mechanical industries and the national branch organization for the forest industry in Sweden.

Skogforsk: the central research body for the Swedish forestry sector, financed jointly by the government and the members of the institute (forest owners and industry).

Swedish University of Agriculture Sciences (Svenska lantbruksuniversitetet, SLU): the agricultural science university of Sweden, which is spread geographically over four locations in Sweden.

World Wild Fund for Nature (WWF): an environmental organization.

The Swedish Ministry of the Environment.

Suitable informants at the Ministry of Agriculture were approached but unfortunately had no opportunity to give an interview.

Complementary material from local actors: interviews and stakeholder meetings

Additional material was collected in collaboration with other Mistra-SWECIA colleagues involved in the project: Åsa Gerger Swartling, Louise Simonsson and Karin André. The purpose of the overall research project “The Process of Adaptation to Climate Change” was to gain knowledge on risk perceptions and social learning in relation to climate change adaptation. Forest officials and forest owners were invited to participate in stakeholder meetings. They were gathered from one southern region (Kronoberg) and one northern region (Västerbotten) in order to access a collection of actors who mirrored general forestry interests in Sweden. In addition to the general discussions on the topic, various scientists were invited to speak on issues related to the effects of climate change and vulnerability in relation to forests. The participants in the meetings were also interviewed by Maja Dahlin, formerly of SEI. The interview questions were formulated to meet the needs of several studies, among others, for this paper. The interviews were semi-structured.

2. CONTENT ANALYSIS

The content analysis was carried out in the Swedish national newspapers found in the Swedish media database Mediearkivet, via the subscription at the Stockholm University library. The search was carried out in 2011 and covered the years 1995–2010. The decision to look at national newspapers exclusively was guided by the fact that national newspapers were the only media with long-term coverage from 1995. Trade journals and other potentially relevant popular journals had far more limited coverage. There are a few outliers in the sample, such as new newspapers and newspaper supplements that have been added in recent years. These changes are marginal, but are likely to result in a slight increase in the number of hits over time.

Based on literature reviews and communication with informants, three issues, or “topic words”, in addition to adaptation, were selected based on relevance to the forestry sector: climate change, biodiversity and production. When possible, synonyms and short versions

of the topic words were also used in order to find as many articles as possible that might relate to the issues being measured.

It is likely that many articles may have dealt with several topic words and that such articles may appear several times in Figure 1. This does not necessarily affect the results, since each count indicates the media attention we want to measure. A more serious potential problem is that the articles including the topic words do not necessarily discuss these words in a relevant manner or link them to a Swedish context. This would imply a faulty count. Nevertheless, this type of deviation is likely to be the same over the whole sample, in which case it would not affect the general trend significantly. A limitation with the exercise is that the number of hits does not say anything about the arguments in the articles, for example, whether the discussion on adaptation is becoming increasingly negative or positive. However, the value of the content analysis is to indicate whether, when and the extent to which the issues selected were of public interest, which makes it possible to say something about the relevance of adaptation in relation to other issues.

The following search combinations were applied in Mediearkivet:

Searches in the Swedish media: major city press in the years 1995–2010

Search on climate change adaptation and forest with the following search words: (växthusef* OR klimatföränd*) AND anpass* AND skog*

Search on climate change and forest with the following search words: (växthusef* OR klimatföränd*) AND skog*

Search on biodiversity and forest with the following search words: (“biologisk mångfald*” OR “genetisk varia*” OR artrik* OR biodivers*) AND skog*

Search on production and forest with the following search words: (produkt* OR produc*) AND skog*

SEI - Africa
Institute of Resource Assessment
University of Dar es Salaam
P.O. Box 35097, Dar es Salaam
Tanzania
Tel: +255-(0)766079061

SEI - Asia
15th Floor Witthayakit Building
254 Chulalongkorn University
Chulalongkorn Soi 64
Phyathai Road Pathumwan
Bangkok 10330
Thailand
Tel: +(66) 22514415

SEI - Oxford
Suite 193
266 Banbury Road,
Oxford, OX2 7DL
UK
Tel: +44 1865 426316

SEI - Stockholm
Kräffriket 2B
106 91 Stockholm
Sweden
Tel: +46 8 674 7070

SEI - Tallinn
Lai 34, Box 160
EE -10502, Tallinn
Estonia
Tel: +372 6 276 100

SEI - U.S.
11 Curtis Avenue
Somerville, MA 02144
USA
Tel: +1 617 627-3786

SEI - York
University of York
Heslington
York YO10 5DD
UK
Tel: +44 1904 43 2897

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