Swedish FES-related policy: Integration of national objectives and factors affecting local actors' policy respons

Anna Gebre-Medhin

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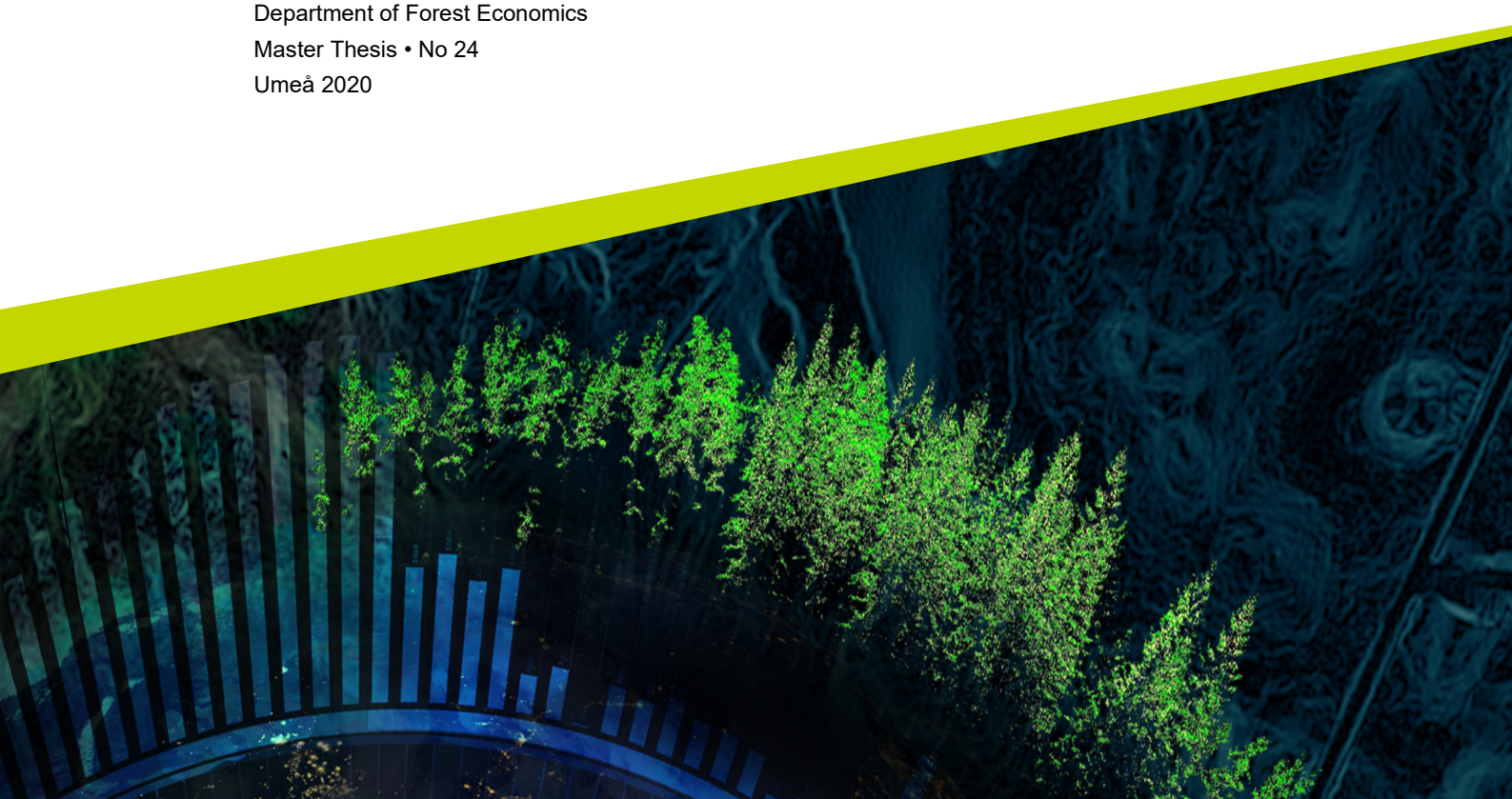

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Anna Gebre-Medhin

Supervisor:	Camilla Widmark, Swedish University of Agricultural Sciences, Department of Forest Economics
Assistant supervisor:	Karin Beland Lindahl, Luleå University of Technology, Department of Business Administration, Technology and Social Sciences
Examiner:	Peichen Gong, Swedish University of Agricultural Sciences, Department of Forest Economics

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Swedish University of Agricultural Sciences
Faculty of Forest Sciences
Department of Forest Economics

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Paper 1. Gebre-Medhin, A. & Tanse, K. Objectives for forest ecosystem services and their integration in Swedish policy

Paper 2. Gebre-Medhin, A. Factors affecting local actors' policy response and land use strategies – a local case study of assessment of synergies and trade-offs regarding usage of forest ecosystem services in northern Sweden

Paper 1

Objectives for forest ecosystem services and their integration in Swedish policy

Gebre-Medhin, A. & Tanse, K.

Abstract

There is a trend towards intensification of forest use in many European countries, fuelled by an increased demand for forest products and services, driven by the global population, income growth and an increasing per capita consumption of forest products and forest ecosystem services, and politically promoted by a shift towards a bio-based economy. Based on the assumption that decisions on forest management relate to synergies—e.g. using forest residues for bioenergy and climate mitigation—synergies should be identified and promoted. Most countries have national legislations to safeguard the provision of forest ecosystem services. However, it is unclear to how legislations for different ecosystem services are integrated. The aim of this study is to investigate how Swedish policy objectives and regulatory frameworks regarding climate, energy, nature conservation and forest policy are integrated, and if environmental aspects are prioritized. A qualitative thematic analysis of Swedish policy objectives and the regulatory framework was performed, guided by theories on policy integration and environmental policy integration. Policy is traced from the national to the local forest management level, where synergies and trade-offs in achieving objectives are analysed interdisciplinarily. There are several conflicting objectives between the policy areas which could hinder goal achievement on a national level. The results indicate that only nature conservation policies achieve both a high level of integration and strong environmental policy integration.

Keywords: decision-support, forest ecosystem services, policy implementation, policy integration, Sweden

Sammanfattning

Det märks en trend av intensifierad skogsanvändning i många europeiska länder, driven av en ökad efterfråga på skogliga produkter. En växande befolkningsmängd, i kombination med en höjd levnadsstandard gör att efterfrågan på skogliga produkter växer. Det är pådrivet av en strävan mot en grön, biobaserad ekonomi. Baserat på antagandet att beslut om skoglig förvaltning styrs av synergier, eg. skogliga restprodukter kan användas som bioenergi för en minskad klimatpåverkan, bör dessa synergier identifieras och främjas. De flesta länder har idag en nationell lagstiftning för att styra tillhandahållandet av skogliga ekosystemtjänster. Det är dock oklart hur regelverk och mål för skogliga ekosystemtjänster är integrerade. Syftet med denna studie är att undersöka hur Svenska nationella mål och regelverk inom policyområdena klimat, energi, naturvård och skog är integrerade, och i vilken utsträckning miljöaspekter prioriteras. En kvalitativ analys av svenska politiska mål och regelverk kopplade till skogliga ekosystemtjänster har utförs, med stöd i teorier om politisk integrering (PI) och miljöpolitisk integrering (EPI). Regelverk och strategier undersöks, från en nationell nivå, ner till lokala policys, där synergier och avvägningar för att uppnå mål analyseras. Det finns flera motstridiga mål mellan policyområdena, vilket försvårar måluppfyllnaden på nationell nivå. Resultaten indikerar att endast policyområdet naturvård uppnår en hög grad av att prioritera miljöaspekter.

Nyckelord: beslutsfattande, policyimplementering, policyintegrering, skogliga ekosystemtjänster, Sverige

Preface

This study is carried out within the framework of the research programme POLYFORES:

> The project results will contribute to policymakers learning to how policy ideas and goals in relation to ecosystem services are being implemented in EU member countries to potentially increase synergies and decrease contradictions between policies (Swedish University of Agricultural Sciences, 2018).

This is one of two papers, within two master theses of 60 hp. The authors have each one additional paper.

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Abbreviations

EPI	Environmental Policy Integration
FAO	Food and Agricultural Organization of the United Nations
FES	Forest Ecosystem Services
GDP	Gross Domestic Products
GHG	Greenhouse Gas
NEQO	National Environmental Quality Objectives
NFP	National Forest Program
PI	Policy Integration
SFA	Swedish Forestry ACT

1. Introduction

Forests offer a multitude of ecosystem services. According to the Millennium Ecosystem Assessment (2005), ecosystem services can be understood as the benefits people obtain from ecosystems. Accordingly, forest ecosystem services (FES) are those benefits people obtain from forest ecosystems. Sweden has a long tradition of forest management. Swedish forest policy has varied between more regulatory policy with command and control instruments (such as law) and the present less regulated. This is illustrated by *freedom under responsibility* and sectoral responsibility, utilizing advisory and voluntarily instruments (Appelstrand, 2012; Skogsstyrelsen, 2017). For Swedish forest policy development, two main years are stated as turning points. The first is 1903, when the first Swedish Forestry Act was established. The challenge during the nineteenth century was to increase wood production without the result of degraded forest with poor regeneration due to lack of management, and to secure regrowth. This led to the 1903 Forestry Act, aiming for economical sustainable use of the forest and the requirement of regeneration after harvest. The second turning point was at the end of the twentieth century, when the challenge of balancing production and environmental issues became prioritized in forest policy, and is the core of forest policy at present. The two main goals of the 1993 Swedish Forestry Act—production and environmental goals—were equal, and placed more emphasis on environmental issues compared to the previous forest policy decisions, including reporting planned final felling to the Swedish Forestry Board, securing re-growth and taking general environmental considerations into account. Freedom under responsibility constitutes a cornerstone in the Swedish forest sector (Appelstrand, 2012; Ekelund & Hamilton, 2001, Skogsstyrelsen, 2017).

Due to the history of Swedish forest industrialization, the forest sector has influenced both economic and social national development, where environmental issues and nature conservation (henceforth denoted conservation) have been secondary (Appelstrand, 2012). Conflicts appear between several FES goals—e.g. the production goal and the environmental goal in the Swedish Forestry Act (Beland Lindahl et al., 2017), reindeer husbandry and forest production (Widmark, 2009), and protection of cultural values (Holmgren et al., 2017; Sandström & Lindkvist, 2009). The trend of intensification of forest use in many European forests is fuelled

by an increasing demand for forest products and services. It is driven by, for example, global population growth, income growth, climate change and an increasing per capita consumption of forest products, politically promoted by a shift towards bioeconomy (Pülzl et al., 2014). In the Swedish case, the forest sector argues that forests can serve as carbon storage to mitigate climate change, for example, and produce sustainable wood material to replace fossil products. The conservation sector in turn argues that forests need to be protected to safeguard biodiversity. However, how trade-offs between forest production and conservation interests are to be handled is not agreed upon (Beland Lindahl et al., 2017; Beland Lindahl & Westholm, 2010).

There are great aspirations to overcome conflicts resulting from an intensification of forest use and to facilitate synergies between the provision of different FES within the framework of multifunctional forestry and bioeconomy (Giltrap et al., 2010). There are, however, different interpretations as to the extent to which it is possible to realize these synergies (Lagergren & Jönsson, 2017; Triviño et al., 2015), and different priorities based on varying understandings of FES exist in different policy areas (Riera et al., 2012; Scheller et al., 2006). Swedish forest policy emphasizes a highly integrated forest management approach aiming at multiple use, which has led to FES being regulated in several different policy areas, such as climate, conservation, energy and forest policy. How forests, with their multiple use character, are to be governed thus becomes complex as, for example, FES are governed based upon multiple policy areas (Johansson, 2018; Sotirov & Storch, 2018). Consequently, meeting the growing demand for forest biomass together with growing demands on the environmental and social values of the forest inevitably leads to decisions involving synergies and trade-offs in the provision of FES (Hansen & Malmaeus, 2016; Pohjanmies et al., 2017; Sandström et al., 2016). Consequently, there is a need for better understanding where synergies arise and can be promoted, and where trade-offs occur and conflicts can be avoided or dealt with.

Two theoretical approaches that are commonly used to explore how policies and their objectives relate to each other are policy integration (PI) (Underdal, 1980) and environmental policy integration (EPI) (Jordan & Lenschow, 2008, 2010). This study addresses the question of integration and prioritization by applying theories about PI (what is integrated with what?) and EPI (to what extent are environmental concerns privileged or subordinated?) EPI has two-fold vertical and horizontal integration. The vertical dimension refers to how policy objectives are implemented and integrated across different administrative levels within sectors. The horizontal level—the focus of this paper—addresses how policy objectives are integrated across different sectors (Lafferty & Hovden, 2003). The results can facilitate an

understanding of where improvements need to be made to ensure strategies and objectives regarding sustainability can be met and implemented, and to provide decision support to safeguard the provision of FES.

Results from previous research on PI and EPI show that the traditional policy sectors—e.g. forest and energy—appear to be more integrated in comparison to, for example, bioeconomy, which is sometimes seen as a separate policy area (Hogl el al., 2016; Soto Golcher & Visseren-Hamakers, 2018). However, to understand the effect of policy objectives, there is still a need to understand further the integration of policy sectors where multiple environmental objectives are to be fulfilled at the same time (Nilsson & Eckerberg, 2007; Söderberg, 2011). This study addresses this gap on a national level.

The aim of this paper is to use theories of PI and EPI to explore the coordination and integration of the Swedish policy framework regulating the provision of FES. The policy areas of climate, nature conservation, energy and forest are investigated in this study, focusing on the policy objectives and their justification (underlying ideas) for the investigation of integration between the policy areas (Lenschow & Zito, 1998; Nilsson & Nilsson, 2005; Persson, 2007). The study thus emphasizes three research questions:

- What FES objectives (and underlying ideas) are addressed in Swedish FES-related policy?
- How are FES-related objectives integrated with each other in Swedish FES-related policy (PI)?
- What is prioritized—how are environmental concerns weighted in the process of integration (EPI)?

2. Theoretical framework

This paper focuses on the horizontal integration of policy objectives—in other words, the integration between different policy sectors. Vertical integration refers to the integration between administrational levels within a policy sector, which is not investigated in this study (Lafferty & Hovden, 2003; Underdal, 1980).

2.1. Policy integration

The aim of this study is to investigate how Swedish policy objectives and regulatory frameworks for FES are integrated. This will be explored by identifying objectives (and underlying ideas) within the Swedish FES-related policies and investigating how they are integrated with one another. To analyse the integration, the PI and EPI frameworks are useful. EPI and PI are two concepts that both address integration, but they assess different aspects of the integration process. The concept of policy integration goes back to Underdal's (1980) general definition. He describes PI as follows:

> …a policy is integrated to the extent that it recognizes its consequences as decision premises, aggregates them into an overall evaluation, and penetrates all policy levels and all government agencies involved in its execution (Underdal, 1980, p. 162).

The focus of this paper is to investigate how FES-related sectoral policy objectives impede or hinder the integration of objectives (Lenschow & Zito, 1998; Nilsson & Nilsson, 2005). As a first step, the most important FES-related overarching policy objectives and, if present, sub-objectives need to be identified. The identification of objectives facilitates the concretization and assessment of policy integration. Furthermore, justification of the objectives and sub-objectives needs to be identified to understand the underlying ideas of the policy documents—that is, what the documents state on the challenges and opportunities, and/or central ideas that justify the objectives (Persson, 2007).

In line with Lenschow (2002), the next step is to evaluate the relationship between different policy objectives. One way to do this is to use the concept of comprehensiveness. According to Underdal (1980), comprehensiveness refers to what the documents state on the interdependencies between objectives, and if and

how they affect each other and/or are coordinated in any way—e.g. if they are portrayed as synergetic, conflictual or neutral. Interdependencies may be strong/weak, many/few and of different kinds—synergetic/conflictual/neutral. The level of comprehensiveness is primarily relevant to the input stage—e.g. the goal formulating stage—that is the focus of this paper (Lafferty & Hovden, 2003; Underdal, 1980). Comprehensiveness can be assessed by investigating four dimensions:

- Time – refers to taking long-term consequences into consideration.
- Space – refers to extending the geographical area for which consequences of policy decisions are recognized.
- Actor – refers to extending the group from whose perspectives policy options are evaluated.
- Issue – refers to the recognition of issues, or issue aspects, and interdependencies/ interactions within the policy framework (Underdal, 1980).

In terms of the horizontal analysis, and the general question on the integration of objectives, the concept of comprehensiveness and its actor and issues criteria appear to be most useful. Accordingly, the requirement of comprehensiveness for PI in this analysis is assessed as:

- Issue – recognition of interdependencies between objectives: if/how they affect each other and/or are coordinated in any way—e.g. if they are portrayed as synergetic, conflictual or neutral.
- Actor – range of perspectives—i.e. challenges, opportunities, justifications, options—for the main and sub-objectives addressed in the policy documents.

Strong, intermediate or weak comprehensiveness reflects a strong/intermediate/weak integration of objectives.

2.2. Prioritization and Environmental Policy integration

Although Underdal's (1980) definition is recognized and well developed in practice, its application in an environmental context has been debated as it lacks a value hierarchy and tools to deal with trade-offs, which is common in environmental politics (Kleinschmit et al., 2017; Lafferty & Hovden, 2003). Lafferty and Hovden (2003) address this weakness in their definition of EPI as:

> The incorporation of environmental objectives into all stages of policy making in non-environmental policy sectors, with a specific recognition of this goal as a guiding principle for the planning and execution of policy (p. 9).

According to Lenschow (2002), the purpose of EPI is not to find consensus regarding trade-offs between, for example, economic and environmental objectives, but rather to prioritize environmental objectives from a normative point of view.

EPI is often expressed as 'strong' or 'weak' to describe the degree of EPI, meaning the extent to which a policy has integrated and prioritized environmental concerns (Jordan & Schout, 2006; Kleinschmit et al., 2017; Söderberg, 2011). According to Jordan and Schout (2006), weak EPI describes a situation where environmental issues are considered but assessed as equally or less important than other issues. Strong EPI occurs when environmental issues are prioritized over other issues. One way to assess how different objectives are weighted in relation to each other is to analyse how they are motivated and justified in the policy documents.
EPI is assessed based on two parameters:

- Prioritization of identified objectives – that is, what the documents say about the relationships between objectives: more specifically, whether there is any reference to a value hierarchy or prioritization of objectives.
- Dominating justification – refers to which set of ideas, challenges, opportunities, justification and rationale is given a more privileged position than others.

Hence, the parameters of prioritization and dominating justification of main and sub-objectives—i.e. what the documents state on the relationships between objectives and how they are justified—indicate if there is any reference to a value hierarchy or prioritization of objectives. Depending on how the documents elaborate this, conclusions about levels of EPI can be drawn.

2.3. Analytical framework

Table 1 show how the theories discussed above (PI and EPI) are integrated and used to explore integration and coordination of FES-related objectives in four policy sectors; climate, nature conservation, energy and forest. This framework has guided the empirical analysis and is reflected in the structure of Appendix 1.

Table 1. Framework for analysis of horizontal policy integration of FES related policy objectives

Objectives and sub-objectives
- objectives identified in analyzed policy documents (column 1 of appendix 1)
- sub-objectives identified in analyzed policy documents (column 4 of appendix 1)
Justification of objectives
- rationale(s) underlying the objectives based on identified challenges and opportunities (column 3 of appendix 1) and identified ideas, etc. (column 2 of appendix 1)
Comprehensiveness (PI)
- recognition of interaction/inter-dependences (synergetic/conflictual/ neutral) between objectives (column 7 of appendix 1)
- range of challenges, opportunities, justifications, options etc. that are addressed (columns 2, 3, 5, 6 of appendix 1) (Degree of integration of objectives)
Prioritization (EPI)
- prioritization of identified objectives (column 7 of appendix 1)
- dominating rational/justification (Weak/strong Environmental Policy Integration)

3. Method & Material

3.1. Selection of policy documents

The aim of this study is to investigate the objectives that are addressed in Swedish policy and regulatory frameworks for FES, and how they are coordinated and integrated in policy. Four policy areas (climate, nature conservation, energy and forest) that influence the provision of FES due to their interests (Hansen & Malmaeus, 2016) have been selected for analysis. Policy texts that address forest-related issues are the focus of the analysis. The selection of official documents is based on either of two criteria: (1) it is a national law, bill or other authoritative document, and/or (2) it is authored by or on behalf of the Swedish government. Additionally, the document is the most recent of its kind. A total of ten documents are selected with variation in the types of document (see Table 2).

Table 2. Selected documents for analysis

Document	**Content**	**Relevance to paper**
Climate Act (2017:720)	Law that describes the Swedish governments climate policy work, aims and how it should be conducted.	Regulating the Swedish climate work.
A climate policy framework for Sweden (Bill 2016/17:146)	Describes the total climate policy work in Sweden. Contains the Climate Act, climate goals and a climate policy advisory board.	Explains the total climate work for Swedish climate policy.
The Direction of Energy Policy (Bill 2017/18:228)	Political aims to reach a fossil free energy production.	Broad political agreement on future energy politics.

Budget Bill for 2017, category 21 Energy (Bill 2016/17:1)	Budget for energy policy.	Show implementation of energy politics.
A Swedish strategy for biodiversity and ecosystem services Strategy (Bill 2013/14:141)	Describes the aims for biodiversity and ecosystem services and its importance in the Swedish community.	Show the aims to protect and increase biodiversity and ecosystem services.
Biodiversity and ecosystem services. Control station 2016 (Government decision Ds: 2017:32)	Describes what objectives has been reached in the Biodiversity partial goals and ecosystem services.	Show the work done for protection and increase of biodiversity and ecosystem services.
Biodiversity partial goals and ecosystem services (Government decision M2014/593/Nm)	Describes the national goals for biodiversity and ecosystem services.	Show concrete objectives of the policy work for biodiversity and ecosystem services.
Environmental act (Law 1998:808)	Regulates the environmental impact in Sweden.	Describes the legal framework for different environmental areas.
Strategy for Swedish national forestry program (Policy strategy, 2018)	Describes the future use of forest and forest ecosystem services.	Show the broad use of the Swedish forests and following synergies and conflicts
Swedish forest policy (collection of regulations and guidelines: Swedish forestry act 1993:1096 (law) Forestry regulation 1979:429 (policy plan) General advice SKSF 2011:7 (policy plan))	Regulates the forestry in Sweden.	Describes the legal framework for forestry and its interpretation.

In this study theories about PI and EPI are operationalized as explained in the theoretical framework and outlined in appendix 1.

3.2. Method of analysis

The theoretical framework and the factors in Table 1 are the guide for a qualitative thematic document analysis of the selected policy documents due to the qualitative and detailed properties of the data set (Braun & Clarke, 2006). A total review of the documents is performed first. Focused coding (based on the questions) is used to identify central themes and statements that are collected in summarizing templates, identifying main objectives, challenges and opportunities, and justifications. PI and EPI are assessed as outlined in Table 1, using the empirical material collected in the summarizing tables (see Appendix 1). The dominating rationale is identified based on the collected statements of justification. EPI can be assessed together with the prioritization of objectives. All documents analyzed are written in Swedish; quotations in the results section are translated with the original in footnotes, and summarized and aggregated in Table 3.

4. Policy objectives and their justification

The answers to the first research question in the paper—'What FES objectives (and underlying ideas) are addressed in Swedish FES-related policy?'—are presented below. A total review of the documents was performed, using focused coding to identify objectives, challenges and opportunities, and justifications as described in method section (Chapter 3.2). Concluding results are illustrated in Table 3.

4.1. Climate

The concluding main objectives in Swedish climate policies aim to minimize the effect society has on the climate, such as greenhouse gas emissions. Climate change is presented as an existential threat that can bring extensive consequences if human impacts are not limited.

An additional main objective of climate policy is to reduce greenhouse gas (GHG) emission. Objectives in the policies regarding GHG emissions are presented as direct targets with measurable values within a time range, such as:

> Sweden shall, no later than 2045, not have any net greenhouse gas emissions, and thereafter reach negative net emission.[1] (Bill 2016/17:146, p. 1).

Other objectives are more vaguely presented, such as:

> The government shall carry a climate policy agenda that relies on scientific grounds, and with relevant technical, social, economic and environmental considerations"[2] (Bill 2016/17:146, p. 1).

The climate framework bill (Bill 2016/17:146) further justifies the objectives, as humans are dependent on the services provided by ecosystems but threatened by the effects of climate change, such as extreme weather, rainfall, drought, storms or

[1] "Målet ska vara att Sverige senast år 2045 inte ska ha några nettoutsläpp (nå nettonollutsläpp) av växthusgaser till atmosfären, för att därefter uppnå negativa utsläpp" (Prop. 2016/17:146, s.1).
[2] "Regeringen ska bedriva ett klimatpolitiskt arbete som vilar på vetenskaplig grund och baseras på relevanta tekniska, sociala, ekonomiska och miljömässiga överväganden" (Prop. 2016/17:146, s.1).

fires. These effects are referred to as "...serious, pervasive and irreversible for humans and ecosystems"[3] (Bill 2016/17:146, p. 8).

Because of this, a need to reduce climate change to enable ecosystems to continue to deliver services for all species on earth, now and in the future, is what justifies the objectives in the climate policies.

Bioeconomy is also referred to as a justification: hence it is seen as an opportunity to reduce fossil fuels, replaced by bioenergy. Another objective identified is to protect ecosystems. The justifications of the objective are secondary effects due to climate change as yet unknown, and therefore precautions need to be taken in policies (Bill 2016/17:146).

4.2. Nature conservation

The conservation policy documents are focused on biodiversity and climate change. Biodiversity is often described as the foundation for all life, and forests hold biodiversity important for ecosystems. For example:

> Biodiversity is a prerequisite for ecosystems' long-term capacity to contribute to the wellbeing of humans. Ecosystems are a foundation for national economy and welfare. Both the public and the private sector are directly or indirectly dependent on the services delivered by ecosystems[4] (Bill 2013/14:141, p. 16).

Biodiversity and ecosystems are to varying degrees threatened by today's land and forest use. This is one of the main reasons for conservation objectives to include the protection of forest land—to ensure reduced loss of biodiversity. Protection of forest land is also motivated by climate reasons, as climate change is a highly relevant topic with the increase of extreme weather, a warmer climate, or diseases and insects. To meet these demands, conservation policies advocate the protection of forest land to store carbon in wood and the ground, as well as more varied forest management to create different types of forest. A more varied forest is thought to be less vulnerable and more resilient (Bill 2013/14:141).

[3] "Om utsläppen av växthusgaser fortsätter i nuvarande omfattning ökar risken för allvarliga, genomgripande och oåterkalleliga effekter för människor och ekosystem" (Prop. 2016/17:146, s.8).

[4] "Biologisk mångfald är en grundförutsättning för ekosystemens långsiktiga kapacitet att bidra till människors välbefinnande. Ekosystemtjänsterna är en bas för samhällsekonomin och välfärden. Både den offentliga och privata sektorn är direkt eller indirekt beroende av de tjänster som ekosystemen levererar" (Bill 2013/14:141, p. 16).

Conservation policies also include objectives for the protection of cultural heritage sites and recreation. Cultural heritage sites in Swedish forests are important to protect for the future. However, many sites are ruined by forest management activities. The Swedish people also like to spend time in the forests, whether working out, hunting, or picking berries or mushrooms, which needs to be considered during different forest use activities such as forest management (Bill 2013/14:141).

In Biodiversity Partial Goals and Ecosystem Services (Government Decision M2014/593/Nm), the structure of Swedish environmental work is presented. First is the generation goal that sets the vision for transition to a more sustainable society:

> The overarching goal of environmental policy is to hand over a society where the major environmental problems in Sweden are solved for the next generation, without causing increased environmental and health problems outside Sweden's borders[5] (Government Decision M2014/593/Nm, p. 27).

Secondly, there are 16 national environmental quality objectives that present the desired state of nature; and thirdly, there are ten partial goals that serve as milestones to reach the national environmental quality objectives and the generation goal. In summary, these goals aim to maintain and protect biodiversity; to reduce the human impact on climate; to make sure that water in lakes, rivers and seas is clean for both animals and humans; to protect important habitats, forests and land areas; and to secure clean air and reduce dangerous substances in our environment. Similar to other policy areas, there are objectives with set targets along with objectives that are vaguely formulated (Government Decision M2014/593/Nm).

4.3. Energy

The main objectives identified in energy policies aim for sustainability, efficiency and competitiveness to build sustainable energy production and energy use, today and in the future. A transition to more sustainable energy production and energy use is mentioned in several set objectives. This is summarized in the overarching goal for energy policy in the budget bill (Bill 2016/17:1):

> The overarching objective of energy policy is to secure long- and short-term supply of electricity and other energy in conditions that are globally competitive. The energy policy shall create conditions for an efficient and sustainable energy use and a cost-efficient Swedish energy

[5] "Det övergripande målet för miljöpolitiken är att till nästa generation lämna över ett samhälle där de stora miljöproblemen i Sverige är lösta, utan att orsaka ökade miljö- och hälsoproblem utanför Sveriges gränser" (Bill 2013/14:141, p. 27).

> supply with low impacts on health, environment and climate, and facilitate the transition to an ecologically sustainable society[6] (p. 15).

This is later detailed in specific objectives such as The Direction of Energy Policy (Bill 2017/18:228):

> In 2040, 100 per cent of energy production shall be renewable … 10 per cent of energy used in the transport sector shall come from renewable sources in 2020 … in 2020, energy use shall be 20 per cent more efficient[7] (p. 14).

Sustainability is presented as the foundation for the energy sector's long-term existence and justifies the objectives set in the energy policies, as is also shown in the efficiency goals and competitive goals. Efficient energy production and energy use are presented as important factors to reduce the climate impact of the sector. Competitiveness is argued to bring good economy to the energy sector, and the demand for more sustainable energy makes it important to be competitive (Bill 2017/18:228).

4.4. Forest

Forest is considered to be an important resource, providing ecosystem services and products, and the forest sector has a long history in Sweden (National Forest Programme, 2018). The sector is important for the development of the country; it is an important part of the GDP and thus important for welfare and the provision of jobs. The bioeconomy is repeatedly mentioned as important for the future, where the forest plays a key role.

The Swedish Forestry Act (SFA) (1993) is the main law that regulates forestry. Two main objectives, of equal importance, form the core of the law: the production objective and the environmental objective. These aim to maintain efficient and sustainable forest production while maintaining biodiversity in forests and safeguarding other values (e.g. cultural and recreational values).

[6] "Det övergripande målet för energipolitiken är att på kort och lång sikt trygga tillgången på el och annan energi på med omvärlden konkurrens-kraftiga villkor. Energipolitiken ska skapa villkor för en effektiv och hållbar energianvändning och en kostnadseffektiv svensk energiförsörjning med låg inverkan på hälsa, miljö och klimat samt underlätta omställningen till ett ekologiskt uthålligt samhälle. På så sätt främjas en god ekonomisk och social utveckling i hela Sverige" (s. 15).

[7] "År 2040 ska 100% av energiproduktionen vara förnybar"; "Andelen förnybar energi i transportsektorn ska vara minst 10 procent år 2020"; "Energianvändningen ska vara 20 procent effektivare till år 2020" (s. 14).

The National Forest Programme (NFP, 2018) aims to guide the forest sector to improve forest production and sustainability, but also to inform others about Swedish forestry and its contribution to the society. The NFP is more focused, however, on forest production and the forest sector providing jobs as a prerequisite for rural development. It is mentioned as a key factor for an increased bioeconomy and to mitigate climate change, where fossil-based products are replaced by renewable fuels such as forest-based materials.

4.5. Summarizing discussion on objectives and their justifications

In Table 3, the objectives and justifications are summarized. The results show that the four sectors of climate, conservation, energy and forest all focus on sustainability and the need to reduce climate change. The objectives all aim to reduce climate change, to protect valuable forest land and to use nature's resources more efficiently. The differences between the sectors lie in their approach to sustainability and the justifications of their objectives. Climate and conservation policies mostly focus on the need to reduce climate change and to become more sustainable from an existential and biological point of view, whereas the energy and forest sectors mostly focus on the need to replace fossil-based materials and head for a bioeconomy. This indicate a willingness and recognition of the need to become more sustainable. However, it is not clear to what extent each sector aims to work not to bring negative effects to other sectors.

Table 3. Main objectives and justification for each policy area

	Climate	**Conservation**	**Energy**	**Forest**
Objectives and sub-objectives, identified in analyzed policy documents	Limit human impact on climate. Reduce climate change due to greenhouse gas emissions. Reduce greenhouse gas emissions, with zero or negative net emissions (forests used as both an alternative energy source and	Maintain biodiversity, and if possible, increase it. Ensure resilience through diverse forests and species. Ensure recreation possibilities and	Increase renewable energy use and production to get a more sustainable energy sector. Increase efficiency in both use and production of energy. Also, be more efficient	Maintain an efficient and sustainable wood/biomass production while maintaining biodiversity in forests and social values obtained from them. Using forest

	to reach negative net emissions). Protect ecosystems (forests seen as an ecosystem with several important ecosystem services).	protect cultural heritage through adopted forest management.	with energy sources. Increase competitiveness in the energy sector. Take the lead in renewable energy.	products for a growing bio economy (replacing oil-based products and energy). The forest sector is important for rural development.
Justification underlying the objectives, based on identified challenges and opportunities	Climate change is an existential, increasing threat to the planet and all living things (more people and higher prosperity equals more emissions), that needs to be reduced. Green (bio-, circular-) economy as an opportunity (forest as a provider of products and energy). Secondary effects of climate changes, such as risks for conflicts, combating poverty etc., combined with yet unknown effects need to be limited.	Biodiversity is important for all life on earth. Diverse forests and species will create a resilient landscape and are less vulnerable to climate change, diseases, extreme weather etc. The cultural heritages sites in forests is often an important part for biodiversity and other natural values, there is also a historical and knowledge/scientific value. Forests are important for people's health.	Urgent need for energy transition to meet future challenges, e.g. climate change. A more efficient production and use of energy will both save money, resources and reduce the impact on the climate. Efficiency can help to become more sustainable. Competitive advantage for Sweden. Growing demand for bioenergy, Sweden has technology interesting for others.	Forest as an important resource, energy, replacing oil-based products. Providing ecosystem services, such as recreational values, etc. Forests are key to the increased bio economy. Forest sector is creating jobs, in the forest as well as in the research, innovative sector.

5. Policy Integration and Comprehensiveness

The second research question is 'How are FES-related objectives integrated with each other in Swedish FES-related policy (PI)?' The integration of policy objectives was analysed by using Underdal's (1980) comprehensiveness requirement, being (1) to what extent they recognize their connection to other policy areas and (2) to what degree they assessed challenges and opportunities for main and sub-objectives.

5.1. Climate policy

Three main objectives are found in climate policy. The first objective, "to reduce greenhouse gas emissions with zero or net negative emissions and reduce climate change due to greenhouse gas emissions"[8] (Bill 2016/17:146), and its justification have a strong connection to energy policy. Climate policy recognizes the importance of a transition of energy and other products to renewable resources, but also its challenges, such as how to maintain a sufficient and competitive energy supply within an energy transition.

Adaptations to decrease impact on climate is also described as an opportunity for Sweden's position in global climate work, to demonstrate that reduced climate change is compatible with a maintained welfare; economically and socially, and international competitiveness (Bill 2016/17:146). This implies a high assessment of challenges and opportunities, which implies a high level of comprehensiveness due to reflections on a broad range of perspectives between climate policy and energy policy. Increased usage of bioenergy is compatible with the objective to increase the use of forest-based products—i.e. an increased bioeconomy. However, it is not further elaborated in terms of challenges and opportunities regarding other energy resources or the forest sector. The comprehensiveness between climate policy and forest policy is therefore suggested to be intermediate.

[8] "Målet ska vara att Sverige senast år 2045 inte ska ha några nettoutsläpp (nå nettonollutsläpp) av växthusgaser till atmosfären…" (Bill 2016/17:146, p. 1).

The second main objective, limiting the human impact on climate (Bill 2016/17:146), is connected to energy, forest and conservation policy, but not further elaborated in terms of how to reach it or in terms of opportunities. Challenges discussed in the document include whether the goal of limited human impact is distinct enough to enable the goal to be reached. The importance of non-affected economic growth within climate work is mentioned as a challenge in the policies. The adaptations thought to be required to reduce climate change should not be at the expense of economic growth, and the trade-off is mentioned in the policy document.

The third main objective in climate policy, to protect ecosystems (Bill 2016/17:146), has a strong connection to nature conservation policy. Both challenges and opportunities are referred to in the climate policy documents—that is, the difficulties in where and how to protect ecosystems, and to what extent. Opportunities between the climate policy and conservation policy are, for example, the protection of ecosystems, forest land and nature conservation (Bill 2016/17:146). There is therefore a high level of comprehensiveness between the policy areas of climate and conservation.

Forests are mentioned as an important source of ecosystems (Bill 2016/17:146), but not further elaborated in terms of challenges and opportunities. Hence, as mentioned above, an intermediate comprehensiveness between forest and climate policy is implied.

5.2. Conservation policy

Climate, energy and forest policy are strongly connected with conservation since they all connect to forest use and conservation mainly concerns forest land. The objectives in the conservation policies mainly discuss the aspects of reducing loss of biodiversity and limiting the negative effects of climate change. The policies discuss the synergies, trade-offs, challenges and opportunities regarding climate issues and elaborate them through the effects climate change can have on nature and ecosystems. For example:

> The ability of the forest and forest land to absorb and store carbon dioxide is important for the work to limit climate change and is a prerequisite for continued increased sustainable

> production of bioenergy and climate friendly materials ... Climate change will in an influential way affect biodiversity and ecosystem services[9] (Bill 2013/14:141, p. 153).

Therefore, conservation policy has a high level of comprehensiveness with climate policy.

Energy issues are connected to the conservation policies' discussions of climate. As described earlier, the energy sector has a big impact on the reduction of climate change, and this is mainly discussed through the increased demand for bio-based energy sources such as wood.

> A goal conflict between the goals for biodiversity and limited climate impact can arise through increased biomass withdrawal from the forest for, for example, energy recovery[10] (Bill 2013/14:141, p. 118).

There is a fine line between the climate and energy issues discussed in conservation policies, which means that the same arguments are used for both policy areas. This gives conservation policies a high level of comprehensiveness with energy policies.

Forest policy is clearly connected to conservation policy, since several of the objectives in conservation policy have a direct or indirect connection to the forest. For example, today's forestry is mentioned as an aspect that needs to change to be able to cope with the loss of biodiversity and disturbance of ecosystems. Both the negative effects and synergies are mentioned. For example:

> ...there is a situation in which the spread of different forest biotopes has been limited by forestry and by the fact that hydrology has been negatively affected in wetlands such as marshes and swamp forests through previous dredging activities. Part of this is due to a lack of environmental consideration in large-scale forestry during the 1960s–1980s ... but some also depends on today's forestry[11] (Bill 2013/14:141, p. 117).

[9] "Skogens och skogsmarkens förmåga att ta upp och binda koldioxid är betydelsefull för arbetet med att bromsa klimatförändringarna och är en förutsättning för en fortsatt ökad hållbar produktion av bioenergi och klimatsmarta material... Klimatförändringarna kommer på ett ingripande sätt påverka biologisk mångfald och ekosystemtjänster" (Bill 2013/14:141, p. 153).

[10] "En målkonflikt mellan målen för biologisk mångfald och begränsad klimatpåverkan kan uppstå genom ökat uttag av biomassa från skogen för exempelvis användning för energiutvinning" (Bill 2013/14:141, p. 118).

[11] "Samtidigt råder en situation där olika skogsbiotopers utbredning har begränsats genom skogsbruk och genom att hydrologin har påverkats negativt i våtmarker som myrar och sumpskogar genom tidigare dikningsverksamhet. En del av detta beror på bristande miljöhänsyn i det storskaliga skogsbruket under 1960–1980-talen... men en del beror även på dagens skogsbruk" (Bill 2013/14:141, p. 117).

> Environmental considerations in forestry are an important part of environmental policy: at the same time, good environmental considerations are a prerequisite for opportunities for developing forest production[12] (Bill 2013/14:141, p. 118).

Conservation policy elaborates forest issues from different points of view and aspects and therefore has a high level of comprehensiveness with forest policy.

5.3. Energy policy

Mitigating GHG emissions to prevent further climate change is the essence of several objectives in energy policies. This is discussed and elaborated through the objectives of efficiency (Bill 2016/17:1). As described, it is argued that climate impact can be reduced if the energy sector can become more efficient in terms of both energy production and the resources used in it. This means that energy policy has a strong comprehensiveness with climate policy.

In the energy policy, conservation issues are mainly discussed in connection with climatic issues, but there is no elaboration on how the energy policies will affect conservation issues. Instead, the positive effects the policy will have on climate change are used to describe the effect it will have on conservation issues such as biodiversity. For example:

> The unwanted environmental effect should be low in a long-term reliable and sustainable energy system. It is therefore also important to consider changes in natural and cultural environments[13] (Bill 2017/18:228, p. 17).

Furthermore, in the Direction of Energy Policy (Bill 2017/18:228), ecology is presented as a way for the energy sector to be competitive:

> Ecological sustainability should be seen as a competitive advantage for Sweden since in many cases it can make companies decide to invest in Sweden instead of other countries and the opportunities for export of Swedish energy solutions increase[14] (p. 17).

These two examples show that energy policy aims to take ecological or cultural aspects into account but they do not fully address the goal conflicts that can appear.

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[12] "Miljöhänsynen i skogsbruket är en viktig del av miljöpolitiken samtidigt som att en god miljöhänsyn är en förutsättning för möjligheterna att utveckla skogsproduktionen" (Bill 2013/14:141, p. 118).
[13] "Den oönskade miljöpåverkan bör vara låg i ett långsiktigt tillförlitligt och hållbart energisystem. Det är därmed också viktigt att beakta förändringar av landskapets natur- och kulturmiljöer" (Bill 2017/18:228, p. 17).
[14] "Ekologisk hållbarhet bör snarast ses som en konkurrensfördel för Sverige eftersom det många gånger kan göra att företag väljer att investera här i stället för i andra länder och att möjligheterna att exportera svenska energilösningar ökar" (Bill 2017/18:228, p. 17).

This gives the energy policy documents studied a weak comprehensiveness with conservation policy.

Forest issues are not raised as a specific topic in energy policies but can be found in terms of biofuels or bio-based renewable energy sources (Bill 2016/17:1). The transition to more sustainable energy production and the need for biofuels and other renewable energy sources connects forest issues to energy policy. However, forest as an energy source is merely one of the services provided, since forest creates a variety of different services. Some issues connected to ecosystem services are raised, mostly regarding the negative output an increased use of bio-based energy sources (e.g. wood, water, wind) may have on nature, species and cultural heritage sites. This gives energy policy intermediate comprehensiveness with forest policy.

Overall, the energy policies do mention different conflicts and challenges but do not elaborate to a high extent. The Direction of Energy Policy bill acknowledges the lack of elaborated discussion between different policy objectives: "The challenges in the energy policy mainly consist of balancing the three cornerstones to achieve the desired result"[15] (Bill 2017/18:228, p. 17).

5.4. Forest policy

Forest policy recognizes its connection to the policy areas of climate, energy and conservation. The NFP (2018) mentions the provision of renewable resources from forests as a current but in the future potentially even more important key factor to reduce climate change and increase bioeconomy. Adaptation in the forest sector to achieve limited climate change is not supposed to be implemented at the expense of economic growth, according the NFP (2018). The potential conflict between the production of renewable energy and materials from the forest, considered an important opportunity within a growing bioeconomy, and decreased human impact on the climate, and potential solutions or trade-offs are not elaborated further. The comprehensiveness between forest policy and climate policy is therefore intermediate.

The objective of using forest products for a growing bioeconomy and "to be world leading regarding innovations and production of refined raw material"[16] (NFP, 2018, p. 22) is described as an opportunity for the forest sector. To replace fossil fuels and other oil-based products with renewable and more sustainable forest-

[15] "Utmaningarna i energipolitiken består till stor del i att balansera de tre grundpelarna för att nå önskat resultat" (Bill 2017/18:228, p. 17).
[16] "…svensk skogsnäring är världsledande när det gäller att skapa och tillvarata innovationer och att hållbart producera förädlad skogsråvara för en växande bioekonomi…" (NFP, 2018, p. 22).

based energy and products in the bioeconomy interplays well with the goals regarding Swedish energy policy. However, the assessment of current and possible future conflicts due to different interests in how to use the forest resource is not further elaborated. There is therefore an intermediate level of comprehensiveness between the policy areas of forest and energy.

The objectives of maintaining an efficient biomass production while maintaining biodiverse forests and social values are found in all forest documents (SFA, 1993; NFP, 2018, etc.). Just over half of the Swedish land area consists of productive forests, according to the United Nations Food and Agricultural Organization definition (FAO, 2015). Furthermore, the majority of ecosystem services provided come from forests (Hansen & Malmaeus, 2016) and are in several cases disfavoured by the traditional forest management in Sweden, where clear cutting is the main approach (Environmental Protection Agency, 2018; Fahrig, 2017). The policies mention the conflict between forest management for production purposes, and conservation for ecological values, but are not further elaborated in terms of trade-offs. Therefore, the comprehensiveness between forest policy and conservation policy is intermediate.

5.5. Summarizing discussion on Policy Integration

The level of comprehensiveness varies between the different policy areas. The main synergies, trade-offs, challenges and opportunities found in each policy area are summarized in Table 4 below. In the policy documents, a high level of comprehensiveness is found between climate and energy policies. Several of the climate objectives to reduce climate change rely on a transition of energy production and energy use to reduce GHG emissions. In turn, energy objectives are justified by the reduced effect that transition of the energy system can have on climate change, but also by competitive and economic factors. If energy production and energy use can be more effective, both competitive and economic advantages are expected, and Sweden can take a leading position on the international map.

Conservation policies have a high level of comprehensiveness with all the other policy sectors studied. The fulfilment of conservation objectives regarding FES greatly relies on the extent to which other sectors activities take FES into consideration. Departing from this, conservation policies elaborate synergies, trade-offs, challenges and opportunities that can be found with the other sectors studied. Several sectors show an ambition to be more sustainable and demonstrate that they take conservation issues into account. However, few sectors fully elaborate how and to what extent that will be done and what synergies, trade-offs, challenges and opportunities can be found between the sectors regarding conservation issues. Only

climate policies are assessed as doing this and thereby have a high level of comprehensiveness with conservation policies. Energy and forest policies are assessed as having low or intermediate levels of comprehensiveness respectively because of the lack of elaboration with conservation issues.

Forest policies have an intermediate level of comprehensiveness with all other policy sectors studied. In forest policies, it is argued that forest products and ecosystem services might be a solution to many of the challenges we face today and will face in the future. They recognize several synergies and trade-offs, but do not fully manage to elaborate on how these can be handled. This give the impression that it is possible to utilize almost all FES at the same time, which is questionable. Although forest policies see the potential of FES, other policy sectors do not to the same extent. As mentioned above, only conservation policies are assessed as having a high level of comprehensiveness with forest policy. Climate and energy policies achieve an intermediate level of comprehensiveness with forest policy. As mentioned, the climate and energy sectors and policies are strongly connected, and they elaborate forest issues in the same way. Forests and FES are rarely mentioned explicitly in the policy documents. Instead, words as "biofuels", "bio-based" and "renewable energy sources" are used. These words can conceal forest products like wood and harvest residues which can be used as a sustainable energy source.

Finally, all policy sectors recognize each other and can be assessed as being integrated, but to a varying extent because of the variation of elaboration of challenges, opportunities, synergies and conflicts.

Table 4. Comprehensiveness between the four policy areas, presented as recognition of synergies (+), conflicts (-) and justification of challenges (-) and opportunities (+) between objectives in different policy areas, i.e. Policy Integration

	Climate	**Conservation**	**Energy**	**Forest**
Recognition of interaction (synergetic/conflictual/ neutral) between objectives (*degree of integration*)	- To reduce human impact on climate, limitations in silviculture need to be done + A transition to more renewable energy will reduce human	- Increased use of biofuels from forests will have negative impact on e.g. biodiversity. - Protection of forest land/species shall not	- Using more renewable energy sources (e.g. from forest) can have negative impact on nature/ecology and cultural heritage sites. "Need to be	- Protection of biodiversity can be in conflict with increased use of forest products. - Protection of cultural heritages sited can be in conflict with

	impact on climate, synergetic to objectives within both energy and forest policies. + Protected ecosystems will increase protection of cultural heritage sites and ecological values.	intervene on forest production + Protection of forest land will benefit climate, forest production, bring resilience, knowledge etc.	considered” + Climate: renewable energy will reduce impact on climate/climate change + Swedish innovation and technology can bring jobs and be sold on a global market (competitiveness)	increased silviculture. + Increased use of forest products is synergetic to limited climate changes. + Increased use of biofuels from forests is synergetic to increased use of renewable energy.
Range of challenges, opportunities, justifications	- Guidelines on how to reach goals are vague - Goals shall not be achieved on behalf of the economic growth or the competitiveness for Swedish companies - Uncertainty, if the goals are accurate or enough, to reduce climate change + Increased bio economy, seen as an opportunity to reach the climate goals	- Economy - Land use is thought to increase (population growth, fossil free/renewable material - Many different interests + Actors have a willingness to do right + Technology + Certification	- Find resources to manage 100 % renewable energy production - Manage to maintain the same energy efficiency during winter with only renewable energy - Bring stability to the system with renewable energy + Big investments already done- a lot of renewable energy already + Strong in	- Challenge: increased forest production, while protecting ecosystems and biodiversity - Environmental objectives shall not be achieved on behalf of the economic growth or the competitiveness for Swedish companies - Different views on what sustainable forest management means + Reduced use of fossil fuels and products,

+ Opportunity for more climate friendly sectors, for their competitiveness and increased market shares + An opportunity for Sweden, who shall be in the front edge in climate the seen from an international perspective		energy science and innovation + A lot of renewable resources	opportunity for increased use of bio-based, i.e. forest products for limited impacts on the climate + Growing bio economy, within the forest sector + An interdisciplinary cooperation is seen as an opportunity, where synergies can be found between different sectors

6. Environmental policy integration

The results for the third research question—'What is prioritized—how are environmental concerns weighted in the process of integration (EPI)?'—is presented below. The EPI framework is used to identify weak or strong EPI. In line with the theoretical framework, EPI is assessed based on two parameters:

- Prioritization of identified objectives – i.e. what the documents say about the relationships between objectives; more specifically, if there is any reference to a value hierarchy or prioritization of objectives.
- Dominating justification – refers to which set of ideas, challenges, opportunities, justification and rationale is given a more privileged position others.

Hence, what the documents specifically state on the relationships between objectives indicates if there is any reference to a value hierarchy or prioritization of objectives. Depending on how the documents elaborate this, conclusions about EPI can be drawn.

6.1. Climate policy

In Swedish climate policy, the objectives of climate change mitigation and economic growth are both prioritized. Synergies between climate objectives and energy objectives can be found throughout the policy documents. They mainly occur under the bioeconomy umbrella, through the economic advantages to which transition to an energy sector with less climate impact can lead. Conservation through forest protection is mentioned as being important to mitigate climate change but is not highlighted to the same extent as issues related to the provision and efficient use of energy. Because of this, climate mitigation is a high priority. However, climate mitigation shall not be achieved at the expense of economic growth. This indicates weak EPI in the national climate policy.

Integration of climate policy with energy, nature conservation and forest policy is to be found in all of the documents investigated. That is, several of the objectives are synergetic and prioritized. The Swedish Energy policy is well integrated with

the climate policy due to the close connection between energy use and GHG emissions. Sustainable use of energy and reduced human impact on the climate go hand in hand. They correspond well. The forest is mentioned as a key factor for more sustainable climate transition. The forest is described as an energy resource as well as its use for other products, replacing fossil products. Nature conservation and climate policy have similar and synergistic goals, and are well integrated, such as maintained ecosystems and the provision of ecosystem services. The objectives are considered essential on a national level but shall not be achieved at the expense of economic interests and competitiveness among Swedish companies (Prop. 2016/17:146). In conclusion, this indicates weak EPI within climate policy.

6.2. Conservation policy

Protection of forest land and forest species is the most prioritized objective in conservation policy, closely followed by climate objectives, because of the effect climate change could have on the composition of species in the forests. Forest objectives are again prioritized, since conservation policies argue that more must be done to protect the forests. Energy objectives are not prioritized but are mentioned linked to the climate objectives, since forest products can be a part of the energy transition mentioned earlier.

Nature conservation policy often raises the impact that climate change can have on nature and conservation's ability to mitigate climate change. A strong correlation is also found with forests, since there is a clear connection between the two policy areas, and different aspects of forests are often discussed in nature conservation policy. How conflicts should be handled, and synergies promoted are not very clear, though.

There is a vague integration with energy policy, since little is mentioned about energy. In some policies, renewable energy is mentioned, but this is not very specific. In some cases, conflicts or synergies can be connected to forestry and are therefore not mentioned in connection to energy. However, there is one partial goal that says that in 2018 the value of biodiversity and ecosystem services shall be well known and integrated into different decisions made by politicians. This goal has not been achieved and the reason is said to be that it is hard to understand how to manage this goal, it is expensive, and it is hard to see the benefit of integrating the goal into other policy areas. The clear focus on environmental aspects throughout the documents indicates strong EPI.

6.3. Energy policy

Energy policy prioritizes objectives aiming at securing energy supply and creating a competitive energy market. It is preferred to be achieved through an energy sector with reduced climate impact; however, reduced climate impact is not the main objective, though it may appear to be. This is linked to the synergies described earlier regarding climate policy. Both policy sectors—energy and climate—work under the umbrella of bioeconomy and can find synergies to achieve their desired future, which in energy policy is to secure the energy supply and create a competitive energy market. Forest products are also described as being useful in the transition to an energy sector with reduced climate impact due to their renewable nature, which makes forest objectives important for the energy sector where synergies can be found, while conservation objectives are less prioritized since there are trade-offs with the more forest production-oriented objectives.

Energy policy has a strong connection to the objectives in climate and forest policies. Energy has a big impact on climate and is a key sector in solving climate change challenges. Since there are economical aspects motivating the energy sector to act accordingly, climate is often the motivation for different actions and is often discussed in the documents. Energy policy also has a strong connection with forest policy, but not as clearly. Forests as a resource for energy production are often hidden behind terms like “bioenergy” and “biofuel”, which occur often throughout the documents. Since residues from forest harvesting and the wood industry are the main source of production of bioenergy and biofuel, forests are an important part of the energy sector’s transition to more sustainable energy production.

Forest use causes conflicts. This is rarely mentioned in energy policy; however, conservation aspects and nature's boundaries are mentioned, but mostly through phrases such as “must be taken into account” and “need to be considered”. Where potential conflicts are discussed, it is with the argument that if the energy sector manages to become more sustainable and reduce climate change, it will benefit conservation through, for example, reduced loss of biodiversity.

The conclusion is that the energy sector wants to transition to more sustainable and renewable energy production. One of the driving forces for that is the potential competitive advantage. Efficiency in terms of resources and the use of energy will be the tool to secure the energy supply in both the short and long term. How it is to be done within nature's boundaries is not very much addressed, though, and indicates weak EPI.

6.4. Forest policy

There are several findings in the documents regarding integration with other policy areas. Forest policy differs in prioritization between law and strategy documents. By law, the policy objectives are of equal importance. In the strategy document, though, there is prioritization of climate and energy objectives before conservation objectives. Forests are referred to, directly or indirectly, as providers of sustainable energy. Forest products are said to be one of the solutions to the climate change issues and energy transition, but without harming nature. This indicates a strong integration with energy policy—i.e. the forest as a resource of renewable energy. Sustainability, due to forests' renewable character, integrates with climate policy. Both bioenergy and renewable products replacing fossil-based products are discussed in the documents. How this will be done, however, is not elaborated further. The climate goal of protecting ecosystems is well integrated with the Swedish forest policy. The majority of Swedish ecosystems are found in the forest; therefore, they interact closely. The activities within silviculture overlap the policy area of nature conservation, since it is also a goal in forest policy. The environmental objectives referred to in the forest policy are prioritized. However, the goals are not to be reached at the expense of economic growth and competitiveness for Swedish companies on a global market. In conclusion, this indicates weak EPI.

6.5. Summarizing discussion on environmental policy integration

The degree of environmental policy integration—i.e. prioritization and justification of objectives in relation to environmental aspects—differs between the policy areas. The results are summarized in Table 5.

Weak EPI was found within the climate policy. The national objectives for climate—mitigation of GHG emissions, limited human impact on the climate and protection of ecosystems—are several but are not to be reached at the expense of economic growth and competitiveness. The objectives stated are of high importance, but are not above economic interests. According to the framework used in the assessment, climate policy achieves weak EPI, and with weak EPI, in combination with a lack of hard laws, regulations and strategies, there is a risk of failing to achieve the climate objectives.

EPI within the energy policy is similar to climate EPI. Environmental aspects are highlighted, such as increased used of bioenergy and increased efficiency of energy use. However, as for climate policy, objectives and strategies incorporate economic

issues which are stated to be more important than environmental aspects. Competitiveness is stated to be of primary importance, and environmental transitions are not supposed to be performed at the expense of it. Accordingly, the EPI for energy policy is weak.

The national conservation policy stands out in comparison to the other policy areas. Environmental aspects within the objectives of maintained or increased biodiversity, guaranteed resilience, and maintained recreation possibilities and cultural heritage sites are stated to be of high importance. What differs from the other policy areas is the absence of economic aspects: environmental aspects are highlighted and stated as being of higher importance than other values. This gives conservation policy strong EPI.

Within forest policy, environmental aspects are found in several objectives. Maintained biodiversity, using biofuels and biomaterials replacing fossil products are stated as important objectives. Increased use of forest products is suggested as a solution for climate issues. However, in SFA, production and environmental objectives are stated as being of equal importance and in other documents—e.g. the NFP—trade-offs between forest use and other values such as biodiversity are not discussed further, and economic aspects are highlighted most. Therefore, EPI within forest policy is assessed as being weak.

To ensure that environmental objectives within all policy areas are achieved, and to secure the provision of FES, great responsibility lies with the actors, whether companies or private. Further research is needed to investigate which factors affect the actors' policy response and land use management strategies, and the understanding of forest-related policy among actors.

Table 5. Prioritization of objectives per policy area, in comparison to objectives in the other policy areas, graded strong or weak, and the justification of the prioritization.

	Climate	**Conservation**	**Energy**	**Forest**
Prioritization of identified objectives.	Limit human impact, and reduce climate change prioritized, but not above economic interest.	Maintain biodiversity, and if possible, increase it, prioritized	Increase use and production of renewable energy, prioritized	Maintain efficient and sustainable wood/biomass production and biodiversity and social values, prioritized equal.
	Reduce greenhouse gas	Ensure resilience through diverse	Increase efficiency in both	Using forest products for a

	emissions, with zero or negative net emissions, prioritized, but not above economic interests.	forests and species, prioritized.	use and production of energy, prioritized, but not on behalf of competitiveness	growing bio economy, prioritized
	Protect ecosystems prioritized, but not on the behalf of economic interests and competitiveness.	Ensure recreation possibilities and protect cultural heritage through adopted forest management, prioritized.	Increase competitiveness in the energy sector, prioritized	The forest sector is important for rural development, prioritized.
Dominating rational/justification	Climate change is an existential, increasing threat to the planet and all living things Secondary effects of climate changes, such as risks for conflicts, combating, poverty etc., combined with yet unknown effects need to be limited	Biodiversity is important for all life on earth. Diverse forests and landscapes are more resilient and less vulnerable to climate change etc. Diverse forests are important for people's heath	Urgent need for energy transition to meet future challenges More efficient use and production of energy will both save money, recourses and reduce the impact on the climate.	Forests are an important resource for energy and other bioproducts. Forests are key to provision of ecosystem services. Forests sector creates jobs.
Environmental Policy Integration within the policy area (*Weak/Strong*)	Weak: Environmental issues highlighted and prioritized, but not above economic interests.	Strong; environmental issues highlighted and prioritized above other interests	Weak: Environmental issues highlighted, but not prioritized above economic interests.	Weak: Environmental issues highlighted, prioritized equal economic interests.

7. Concluding discussion

The aim of this paper was to investigate which forest ecosystem service objectives are addressed in Swedish FES-related policy and how the objectives for forest ecosystem services are integrated with each other in Swedish FES-related policy. The analysis was performed with a full review of selected national policy documents for the policy areas of climate, energy, nature conservation and forest. The selection was conducted based on three criteria: all documents should either be a bill or other authoritative document, authored by or on behalf of the Swedish government, and be the most recent of its kind. To limit the amount of input data due to the frames and time regarding this paper, a limited number of policy documents were analysed. The point of saturation was assessed to be reached without further policy documents. However, additional documents would be interesting to analyse. Regulations and strategies on an international level could be of interest for the research questions, such as EU strategies affecting the forest sector.

The method used for the analyses derives from the theoretical framework of Underdal (1980) and theories developed by Lenschow (2002), Lafferty and Hovden (2003), and Jordan and Schout (2006), among others, regarding policy integration and environmental policy integration. To limit the number of analyses, only parts of their frameworks were used. The assessment of policy integration was based on two of four parameters (see Underdal, 1980) for assessing comprehensiveness. This was assumed to be enough to answer the research questions, since the analysis primarily regards the horizontal dimension and not the vertical—i.e. not the integration between different governmental levels. However, whether this was accurate is open to discussion. The frameworks had not previously been used partially, and the lack of evaluation of that needs to be considered. Whether this affects the ability to draw conclusions on the EPI is debatable. There is a risk of inaccurate conclusions regarding the level of PI and EPI.

The results indicate a strong comprehensiveness between conservation policy and forest and climate policy. The comprehensiveness between the other policy areas is found to be weak or intermediate. One reason for the strong level of comprehensiveness for conservation policy could be the lack of economic aspects

in the objectives: instead, the focus is on existential aspects. The main message from the policies is that humans are dependent on FES, so protection of forest land and species and a transition to a sustainable society cannot be ignored.

The policy areas where more synergies can be found tend to imply stronger integration, such as climate and energy policies, or climate and conservation policies. The policy areas with more conflicts between objectives tend to result in weaker integration, such as conservation and energy policies.

Both energy and conservation policies claim that their objectives will solve many of the problems we have today or will face in the future. Both say that their objectives will reduce climate change and benefit biodiversity. Different prioritizations are made, probably due to the different perspectives as a starting point. Conservation policies say that we need to protect what is left before it is too late. It is important for both ecosystems and energy supply to manage the effects of climate change. Energy policies aim to reduce climate change to be sure that ecosystems can survive and continue to work. Hence, it is not a matter of different time perspectives, but rather about the prioritization of objectives and the steps to reach them.

Both climate and conservation policies have quite well formulated objectives. Many do have a set target and a timeframe. The problem is are that they are dependent on other sectors to implement them. This is not the case for energy and forest policies, since they are specific sectors with industries, companies, etc. The climate and conservation sectors are more about ‘issues’ and are not driven by economic interests.

The energy policies do not elaborate on the implementation of the objectives. They do not consider other issues to a great extent. In the forest policies, forestry is often promoted as the solution for all the world’s problems. This is especially the case with the NFP, which often promotes more wood production and does not fully elaborate the effect on conservation. The climate change challenge is often used as a motivation for more wood production, ignoring the effects it can have on threatened species, etc.

Within the different policy areas, economic aspects are considered in all but conservation. The adaptations thought to be required to achieve environmental objectives should not be at the expense of economic growth. These primarily include policies regarding climate, energy and forests, all with a weak environmental policy integration. It is difficult to measure the benefit of reduced climate change, but it is easier to measure decreased economic growth or and this

can obstruct the achievement of climate objectives. This could be one reason why aspects outside economic values are less prioritized.

The connections to FES are not always described in the policy documents. Several assumptions are made in terms of how FES relate to the objectives. For example, bioenergy is assumed to contain energy from forests, since it is one of the main resources for bioenergy in Sweden. As previously mentioned, one solution to make a transition to a more sustainable energy use is to use forest products in energy production.

The recurring mention of freedom with responsibility, primarily in forest policy, highlights the responsibility of the actors and stakeholders within the sector. Without hard laws and regulations with monitoring or sanctions, the policies impact on the actual outcome of forest management and on whether national objectives are achieved, and the provision of FES can be debated. Whether actors within the sector are affected by national policy, or to what extent, is as yet unanswered. The understanding and implementation of national regulations and strategies regarding the provision of FES among forest actors need to be investigated further.

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Appendix 1

Table 6. Table for policy analysis

Form policy analysis	***Column 1***	***Column 2***	***Column 3***	***Column 4***	***Column 5***	***Column 6***	***Column 7***	***Column 8***
Policy area	**FES related climate goals**	**Ideas, justification, rationale underlying climate goals**	**References to challenges and opportunities related to climate goals**	**Other FES related goals**	**Ideas, justification and rationale underlying other FES related goals**	**References to challenges and opportunities for other FES related goals**	**Relationship between goals: co-ordination/ integration/ prioritization**	**References to other FES related policy documents**
Policy document 1: Title in English				Goal 1:				
				Goal 2:				
				Goal 3:				
Policy document 2: Title in English				Goal 1:				
				Goal 2:				
				Goal 3:				
Policy document 3: Title in English				Goal 1:				
				Goal 2:				
				Goal 3:				
Policy document 4: Title in English				Goal 1:				
				Goal 2:				
				Goal 3:				
Policy document 5: Title in English				Goal 1:				
				Goal 2:				
				Goal 3:				
Policy document 6: Title in English				Goal 1:				
				Goal 2:				
				Goal 3:				
Policy document 7: Title in English				Goal 1:				
				Goal 2:				
				Goal 3:				
Policy document 8: Title in English				Goal 1:				
				Goal 2:				
				Goal 3:				

Paper 2

Factors affecting local actors' policy response and land use strategies and their assessment of synergies and trade-off regarding usage of forest ecosystem services in northern Sweden

Gebre-Medhin, A.

Abstract

Sweden has a long tradition of forestry and forest policy, with the first Forestry Act in 1903 aiming to secure forest regeneration. The Forestry Act was revised multiple times during the twentieth century, ensuring sustainable use of the forest resource. However, until the 1990s, the main focus of forest use was production. As the demand for different goods and services from the forest grew (e.g. climate mitigation, bio-based products and energy, recreation, biodiversity), the concept of forest ecosystem services (FES) was introduced when discussing forest use. With the extensive revision of the Forestry Act in the 1990s, the challenge of balancing forest production and environmental issues came into focus. This resulted in e.g. two main goals of forest production and environmental issues, set to be considered equally important. With this, the Swedish forest policy increased the freedom under responsibility to achieve the two objectives. This meant that the responsibility to achieve goals such as a sustainable forests management, making trade-offs and synergies of FES became even more the responsibility of forest owners. With the further increasing needs of FES, and an increasing number of stakeholders, the forest became connected to several different activities, resulting in goal conflicts. Looking at forest policy in Sweden, there are several national objectives regarding the provision of FES. In this paper, we study the factors that affect forest actors' policy responses and land use strategies, and how these actors assess trade-offs and synergies regarding the usage of FES. The results show several trade-offs in the usage of FES according to the actors. The regulations need to be clearer to ensure that the objectives set for FES and sustainability can be reached and implemented, and to safeguard the provision of FES.

Keywords: conflict management, decision-making support, forest ecosystem services, forest policy, policy implementation

Sammanfattning

Sverige har en lång tradition av skogsbruk och således skogspolitik, initialt med den första skogsvårdslagen från 1903, som syftade till att säkra den skogliga föryngringen. Skogsvårdslagen reviderades ett flertal gånger under 1900-talet, för att säkerställa ett hållbart brukande av skogsresursen. Fram till 1990-talet var skogsbrukets primära fokus på produktion. I samband med att efterfrågan på olika, diversifierade varor och tjänster från skogen växte, e.g. flertalet biobaserade produkter utöver sågtimmer och massaved, bioenergi, rekreation och biologisk mångfald, myntades begreppet skogliga ekosystemtjänster när man diskuterade skogsbruk. Med den omfattande revideringen av skogsvårdslagen på 1990-talet stod utmaningen att balansera produktion och miljöfrågor i fokus. Det resulterade bland annat i två likställda huvudmål, ett produktionsmål och ett miljömål. Det skapade en större ”frihet under ansvar” för skogsägarna att säkerställa att de två likställda målen uppfylls. Det innebar även att ansvaret för att uppnå mål, som hållbar skogsförvaltning, att göra avvägningar och synergier av FES, lades ännu mer på skogsägarna. Den ökade efterfrågan på skogliga ekosystemtjänster, och de ökade antalet aktörer och intressenter skapar intresse- och målkonflikter. Den svenska skogspolicyn innehåller ett stort antal mål rörande tillhandahållandet av skogliga ekosystemtjänster. I denna studie undersöks vilka faktorer som påverkar skogliga aktörers förståelse för, och användning av nationell skogspolicy, samt vilka synergier och avvägningar de upplever sig behöva göra beträffande nyttjandet av skogliga ekosystemtjänster. Resultaten visar på att aktörerna upplever konflikter i nyttjandet av skogliga ekosystemtjänster, och att regelverken behöver förtydligas för att underlätta stödet från, och implementeringen av dem. Detta för att skapa bättre förutsättningar för att nationella mål rörande skogliga ekosystemtjänster ska kunna uppnås, och säkerställa tillhandahållandet av skogliga ekosystemtjänster.

Nyckelord: beslutsfattande, konflikthantering, policyimplementering, skogliga ekosystemtjänster, skogspolitik

Preface

This study is carried out within the framework of the research programme POLYFORES:

> The project results will contribute to policymakers learning to how policy ideas and goals in relation to ecosystem services are being implemented in EU member countries to potentially increase synergies and decrease contradictions between policies (Swedish University of Agricultural Sciences, 2018).

This is one of two papers, within this master thesis of 60 hp. The other paper is titled “Objectives for forest ecosystem services and their integration in Swedish FES-related policy” (2020), written together with Karolina Tanse

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Abbreviations

EPI	Environmental Policy Integration
FAO	Food and Agricultural Organization of the United Nations
FES	Forest Ecosystem Services
FSC	Forest Stewardship Council
GDP	Gross Domestic Products
GHG	Greenhouse Gas
MEA	Millennium Ecosystem Assessment
NFA	National Forest Agency
NFP	National Forest Program
PEFC	Program for the Endorsement of Forest Certification Schemes
SFA	Swedish Forestry ACT

1. Introduction

Sweden is historically heavily affected and shaped by forestry. Forests have been an important source of income and employment, have contributed to welfare and are part of the Swedish cultural core. Forests offer a multitude of essential ecosystem services (Hansen & Malmaeus, 2016). Ecosystem services can be defined as the benefits people obtain from ecosystems (Millennium Ecosystem Assessment, 2015); accordingly, forest ecosystem services (FES) are obtained from forests. Four categories of services are distinguished: supporting, such as habitat provision, pollination and soil formation; provisioning, such as food, energy, clean water; regulating, e.g. carbon sequestration, purification of water and air; and cultural services, such as spiritual, recreational services and educational values. Discussions on the provision and protection of ecosystem services and the increased demand for forest products cause increased debate on conflicts (Beland Lindahl & Westholm, 2010).

Since its industrialization, forests and forestry have been an important part of Sweden's national development. Economic growth, employment, welfare and the Swedish culture are all affected by forestry. Today, around 10 per cent of the GDP comes from the forest sector. Historically, economic growth and social development have mainly been prioritized, while nature conservation and environmental issues have been secondary (Appelstrand, 2012). The first Swedish Forestry Act (SFA) was established in 1903. During the twentieth century, policies regarding silviculture were government-oriented, with hard laws and regulations. Subsidies for pre-thinning and forest road construction were incentives to engage forest owners in actively managing and increasing forest production. In 1993, a new SFA was established, discarding the subsidies and some of the demands on forest owners. The policy, as for today, was thereby of a softer legal character. The requirements for forest owners are, for example, to inform the National Forest Agency regarding their management plans, such as final fellings, to secure regrowth and to undertake general ecological consideration. The main difference between the previous and current SFA, in addition to the discarded incentives, is that the two main goals of forest production and environmental/nature conservation are established as being of equal importance. The focus has shifted from sustainable yield management to sustainable forest management (Hahn & Knoke, 2010),

including additional environmental and societal values (MacDicken et al., 2015). There are several voluntary actions to be taken, such as certifying forest according to the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC). Hence, forest owners are required to consider both environmental and societal issues (Brukas et al., 2013) alongside economical values. The forest owners are assigned freedom with responsibility (Appelstrand, 2007; Beland Lindahl, 2015; Hysing, 2009; Swedish Forestry Agency, 2017). This requires both knowledge and dedication on the part of the forest owners, and a sectoral responsibility.

Of Sweden's total area, approximately 58 per cent (23.6 million hectares) is covered by productive forest land (National Forest Inventory, 2019), according to the Forest Resources Assessment (2012) definition. Approximately 48 per cent of the forest land is owned by private landowners, and the remaining 52 per cent by private companies, the state and others (National Forest Inventory, 2019). The majority of large Swedish forest companies are certified according to FSC and/or PEFC standards. This involves requirements for the design of forest management, such as the minimum number of everlasting trees to be left after final fellings, high stumps, percentage of broadleaf trees, etc. To maintain certification for the companies and their final products, all raw materials included in the products need to come from certified forests. There are therefore great incentives for the forest owners to certify their forests to be able to sell their raw materials.

Although soft legal instruments dominate, the number of objectives regarding forests has increased, including objectives for the provision of FES. There are great aspirations to overcome environmental issues and mitigate greenhouse gas emissions using bio-based products. At the same time, discussion on the secure provision of ecosystem services and biodiversity, etc. is loud. However, since forest management today is mainly steered by freedom with responsibility, and to ensure that the objectives are fulfilled, it is important to investigate whether the actors within the sector are actually guided by laws, regulations and objectives that exist on a national level, or other factors.

The complexity of how forests are to be governed is increasing (Johansson, 2018; Sotirov & Storch, 2018). To reach multiple goals regarding silviculture and the provision and protection of FES, important decisions involving synergies and trade-offs need to be made (Hansen & Malmaeus, 2016; Pohjanmies et al., 2017; Sandström et al., 2016). Consequently, with the system of soft laws and regulations in mind, there is great responsibility on the actors within the forest sector. Several studies find a trade-off between the provisions of different ecosystem services (Carpenter et al., 2009; Gamfeldt et al., 2013; Millennium Ecosystem Assessment,

2005; Nordström et al., 2015; Raudsepp-Hearne et al., 2010; Tanse & Gebre-Medhin, forthcoming; Triviño et al., 2017), in particular regarding traditional forest management with clear cuts and homogeneous stands (Beland Lindahl et al., 2017; Kilpeläinen et al., 2018), reindeer husbandry (Widmark, 2009) and cultural values (Holmgren et al., 2017; Sandström & Lindkvist, 2009).

Previous studies have investigated, for example, forest actors' behaviours using social science behavioural theories and decision support systems and models (behaviour models; Sotirov et al., 2019), focusing on the perception of forest sector development and its challenges and opportunities (Beland Lindahl, 2015; Deuffic et al., 2018; Sotirov & Storch, 2018), and on future provision of FES during different forest management models, using decision support systems for simulations (Nordström et al., 2019). However, previous studies do not include the actors' perspective on which factors affect the actions they take today and how they assess trade-offs and synergies regarding the provision of FES (Eggers, 2017; Höjer et al., 2011).

There is a knowledge gap in the understanding of Swedish forest policy among actors, in whether the national policy de facto is what influences the decision-making among forest actors or if other factors have more impact on forest management. It is important to include affected actors in policymaking processes to ensure the goals can be reached and that sustainable forestry is performed (Appelstrand, 2012). Knowledge about forest actors' understanding of forest policy needs be investigated further (Eggers, 2017). Therefore, this paper aims to investigate the factors that affect actors' policy response and land use strategies and how they assess trade-off and synergies in forest management. The following research questions are investigated:

- What factors affect local actors' policy responses and land use strategies?
- How do local actors assess trade-offs and synergies regarding the usage of FES?

The case study area covers one municipality in northern Sweden. The forest actors interviewed are situated in the municipality and are all in one way or another in contact with forests.

2. Theoretical background

2.1. The concept of policy and policy response

To examine the policy response among actors, the term ‘policy’ needs to be defined. There are several definitions. The term is often used as a general description, including several sets of aspects in different contexts. Harman (1984, pp. 13–14) defines policy as a “specification of courses of purposive action being followed or to be followed in dealing with a recognized problem or matter of concern and directed towards the accomplishment of some intended or desired set of goals.” Furthermore, he exemplifies a policy as being conceived through a position developed in response to a problem and directed towards a particular objective. Jennings (1977) takes a similar position, arguing that policy is a guide for making appropriate choices or decisions in order to accomplish something intended or desired. Nudzor (2009) examines the so-called traditional problem-solving definition, stating that policy is seen as “a conception of events and/or guide to setting out solutions to problems”, going back to Nakamura and Smallwood (1980). They summarize policy in this traditional foundation as a set of instructions from policymakers to those implementing the policy, outlining both goals and how to achieve them.

The term ‘policy response’ is a highly complex and fragmented term (Ward et al., 2016). However, to examine the results from policies—i.e. the effects in practice—the response to a given set of policies needs to be determined. Weiss (1982, p. 23), defines policy response thus:

> ... consider a number of alternative courses of action with more or less explicit calculation of the advantages and disadvantages of each opinion, weigh the alternatives against their goals or preferences, and then select an alternative that seems well suited for achieving their purposes. The result is a decision.

Instead of policy response, the term ‘policy enactment’ is sometimes used, including creative processes of interpretation—i.e. taking policy as an abstract form into a contextualized practice (Braun et al., 2010).

Critique on the definitions of policy and policy response is mainly due to simplification. According to Trowler (1998), there three main sources of the complexity of policy: firstly, there is frequent conflict between policymakers and actors using the policy in terms of formulating the problem; secondly, the interpretation of policy is an ongoing process of interpretation of policies, depending on who is making the assessment; and finally, the simplicity within policy descriptions does not capture the complexity needed to describe issues and how to approach or solve them, which inevitably almost always leads to a different outcome in practice than was intended with a policy. Critique on the term 'policy response' also focuses on the lack of socio-cultural dynamism within policy response (Nudzor, 2009). However, to be able to investigate and examine policies and policy responses, a definition is needed. To avoid conceptual complexity, and to limit the extent of this paper, this is not investigated further within the scope of this study.

For this paper, the definition of policy response derives from the abovementioned definitions; more explicitly, it is how (if) the national policy is used and implemented in practice for decision-making.

2.2. Framework

In Sweden, there are several national policies regarding forests and FES. The work of Tanse and Gebre-Medhin (forthcoming) investigates the four policy areas of climate, conservation, energy and forest, all containing national objectives regarding the provision of FES. Their study is a horizontal investigation of policy integration (Lafferty & Hovden, 2003), addressing how objectives within the four policy areas are justified and integrated across sectors. They find several conflicting objectives, stating that not all objectives can be achieved at once.

Departing from the work of Tanse and Gebre-Medhin (forthcoming) and their findings showing conflicts between the national objectives regarding the provision of FES, this study continues to investigate actors' role in goal achievement and their policy response. The question regarding the actors' policy response and, in the end, the actions taken by them is crucial to ensure satisfactory goal achievement.

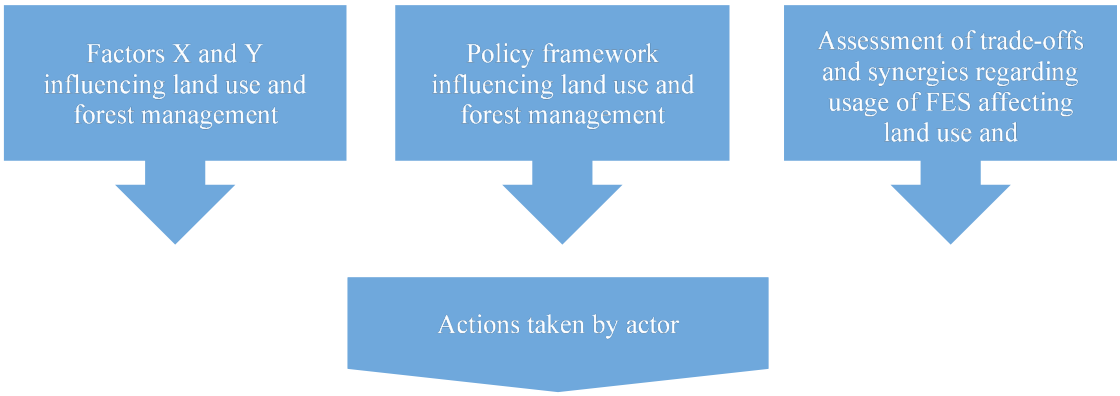

Figure 1. Schematic approach for investigating what factors affecting actors' policy response, and assessment of trade-offs and synergies.

This study is part of the POLYFORES project, hence part of the investigation into how actions taken by forest actors are assessed. For this paper, the policy framework developed by Tanse and Gebre-Medhin is used as a foundation to investigate actors' policy response. Together with an investigation of their assessment of trade-offs, in line with the findings of Tanse and Gebre-Medhin, actions taken by the actors can be stated (see Figure 1). For this paper, the actual actions are not investigated further, but rather which factors affect the policy response and the assessment of trade-off and synergies regarding the provision of FES. The knowledge and importance of factors among actors are investigated. This, together with their assessment of trade-offs and synergies, form part of the investigation of how actions taken by actors are assessed. Further studies will be conducted on the matter.

3. Method

The method used is a semi-structured interview survey, interviewing relevant local actors regarding the factors that affect their policy responses and land use strategies, and how they assess trade-offs and synergies regarding provision of FES. The results are analysed through a qualitative thematic analysis. The study is not longitudinal, but aims to show the state of the art within the case study location and is part of the international research project POLYFORES.

The aim of this study is to get a better understanding of the complex image of the actors' perceptions and choices and actions within the case study, not to investigate a general truth (Holme & Solvang, 1997; Holter & Kalleberg, 1996). The choice of a qualitative rather than a quantitative method is explained by the type of research questions. The qualitative method is motivated by the qualitative and detailed properties of the data set (Braun & Clarke, 2006).

3.1. Selection of case study location and actors

The purpose of the case study is to get a representative selection of actors—i.e. actors with different activities and functions, views and ideas regarding the forest sector and the provision of FES.

To identify a diverse area containing actors with different points of view and interests, Piteå municipality was selected: it fulfils the criterion of representativeness and is home to a broad range of actors and interests. Within the municipality, there are several forest companies with a long history, forest-owning companies, private forest owners, Sami actors, recreation organizations, etc. The municipality is also officially committed to working towards an active adaptation regarding climate change. The area for the case study was selected following discussion with one main forest owner in the selected municipality. In addition to the abovementioned criteria, the case study location is selected due to the diverse forest types, including productive and non-productive forest land.

As stated in previous studies, the main actors in the Swedish forest sector are forest owners, forest industry corporations, the state and its authorities, and, in large parts of northern Sweden, Sami people (Beland Lindahl, 2008; Eckerberg, 1998). The actors were identified within the case study location, meeting at least one of the following criteria:

- Landowners/tenure holders/authorities who are involved in forestry/forest management activities on the ground (in the case of individual private forest owners, target forest owners' associations or representatives of owners).
- Industries/businesses of different kinds that use/buy/rely on biomass (timber, pulp, bioenergy feedstock, other wood-based materials) or other FES (tourism enterprises, reindeer husbandry, etc.).
- Local/regional authorities overseeing land use/forest management or that are involved in FES-related strategy development.
- NGOs that are capable of influencing current and future use of FES and forest land in the case study area.
- Other relevant actors identified within the area.

The actors within the municipality were identified based on the criteria and contacted with a request to participate in the study. Nineteen different actors accepted (see Table 1). Due to geographical spread, some actors are situated outside the municipality but handle questions regarding the municipality of the case study. The actors represent diverse interests to reflect the FES provided in terms of products, services, activities and opinions. Conflicts identified by Tanse and Gebre-Medhin (forthcoming) also underlie the selection to ensure that different perspectives are included. All actors in one way or another are affected by and/or affect the provision of FES. The majority of the respondents were men (74%), and it would be preferable for more women to participate in the interviews to give a broader range of perspectives. However, the contacted actors are in decision-making positions—i.e. high positions—where the lack of women is obvious. They are chosen due to their insight into and knowledge and understanding of their organizations on both an operational and strategic level. This is to ensure the results reflecting the organizations actual visions.

A response analysis was performed. The actors who did not wish to participate gave reasons of not having the time or lack of interest and/or knowledge on the subject. Among the actors who accepted the invitation, there was a slight overrepresentation of landowners, or actors representing industries and/or in close contact with

landowners (11 of 19). This could affect the result, but to what extent is hard to know. Since landowners are de facto the ones who make decisions regarding forest management, the composition of actors is considered satisfactory.

Table 1. Actors divided in groups according to their type of business. The numbers represent the interview order.

Type of actor	Actor no.
State governed actors	9 10 15
Recreation actor	1 3 4
NGO	5
Sami actors	16 19
Innovation organization	12
Energy actors	8 14 17
Actors with own industries	2 6
Forest owning actors	7 13 18
Forest owning compound	11

3.2. Interview survey

The interview survey method is chosen due to the complexity of the research questions regarding policy response and the identification of trade-offs and synergies. A semi-structured interview method is chosen as it contains pre-formulated questions with follow-up questions. The interview method is chosen due to the perks of standardization, to avoid biased perspectives, and to ensure the interviews are equivalent and are not manipulated by the interviewers and/or their relationship with the respondents (Holme & Solvang, 1997). The composition of the interview survey, containing partly open questions and partly multiple choice

and ranking questions, offers the possibility to determine the actors' opinions through open, more profound questions, while a large data set is collected in the multiple-choice questions.

The basis of the interview survey is the documents analysed through a complete review, where objectives and sub-objectives and their justification were identified, along with the integration between the four policy areas of climate, energy, nature conservation and forest (for further details, see Tanse and Gebre-Medhin, forthcoming). The policy documents and objectives are used as a starting point in the interview survey design to analyse the actors' views on the national regulations and identify possible synergies and trade-offs regarding the provision of FES according to the actors and the factors that affect their policy response. See Appendix 1 for the full interview survey guide.

The interview survey guide is divided into four sections as described in Table 2. Section A contains open questions about the organization the respondent is representing, the work tasks of the respondent, etc. This is to create a more familiar atmosphere between the interviewer and the respondent. The questions in section B aim to capture the actors' understanding of forests and usage of FES. Section C contains questions to capture key factors influencing the actors' FES-related land use management and decisions. The last section, section D, aims to capture the actors' understanding of national FES-related policies.

Table 2. Description of the four different parts of the interview survey.

Section	Type of questions
A	Questions about the organization and the respondent, and the work tasks of the respondent etc.
B	Questions regarding the actors' understanding of forests and usage of FES'
C	Questions to capture actors' understanding of key factors that influence FES related land use/ management/planning/ procurement decisions
D	Questions to capture actors' understanding of the FES-related policy

3.3. The interview situation

All interviewees were contacted by mail, e-mail and/or telephone, including a reminder in case of no first response. The mail and e-mails included a letter of invitation. A comprehensive information sheet in Swedish was attached with the background of the POLYFORES project. The interviewers were introduced to the type of information the interviews would address. The respondents were not provided with the complete interview survey beforehand, but were given enough

information to enable them to decide whether or not to participate. All interviews were conducted in person with two interviewers, one asking questions and one taking notes. In two of the interviews, two respondents participated. The interview survey was used as a guide during the interviews, with open questions and ranking questions, using cards to place in groups as a tool for ranking. The interviews were recorded with the interviewee's permission, notes were taken, and the results from the multiple-choice questions were photographed with the permission of the respondents. Information on General Data Protection Regulation and storage of the collected data was communicated. To examine how the interviews worked in practice, three test interviews were conducted. This ensured that the interview survey guide was understandable and gave an idea of the time required. Two of the test interviewees were students who were not familiar with the research project. The third test person was involved in the project, to give input on the setup. The interviews were intended to last approximately 90 minutes; however, the majority lasted around 120 minutes, with a range between 70 and 150 minutes. This resulted in a shortage of time; in two cases, the interviews are completed by e-mail. The results from part D should therefore be analysed with caution.

3.4. Choice of analysis method

The analysis seeks to investigate how sectoral objectives, identified by Tanse and Gebre-Medhin (forthcoming), and trade-offs and synergies for the provision of FES, are seen by local actors. To answer the research questions, a qualitative thematic analysis is performed, with the goal of gaining an understanding and opinions on the policies from the perspective of those who affect or are affected by them—in this case, the local actors (Vaismoradi et al., 2013). Thematic analysis is chosen due to the qualitative and detailed properties of the data set (Braun & Clarke, 2006). An inductive approach is taken in the analysis; hence the results emerge from the collected data (Thomas, 2006), as opposed to a deductive approach, where a hypothesis is the foundation of the analysis.

The themes are defined as resembling coherent pieces of data that constitute the results (Sandelowski & Leeman, 2012). They capture something of relevance to the research questions to ensure that representative patterns in the data are identified (Braun & Clarke, 2006; see Table 1). Furthermore, thematic analysis is chosen as it does not necessarily rely on quantifiable measures, "but rather on whether it captures something important in relation to the overall research question" (Braun & Clarke, 2006).

4. Knowledge and assessment of regulations and FES

To achieve a deeper understanding of which policy instruments the actors are familiar with and which are considered most relevant and important to their policy response and forest use/management decisions, the actors' knowledge and the importance they ascribe to them are investigated. The following section describes the results.

4.1. Knowledge regarding national FES-related policy

Figure 2 illustrates the respondents' knowledge regarding FES-related policies. All actors were asked to grade their knowledge in three groups—i.e. they were familiar with/know the regulation, they had heard of it, or the regulation was unknown to them. All actors were familiar with or had heard of the Environmental Code, nature reserves, and forest certification schemes, such as FSC or PEFC. All three policy instruments concern the protection and conservation of natural resources. Other policies familiar to the majority of the actors were the Forest Act and Reindeer Husbandry Act.

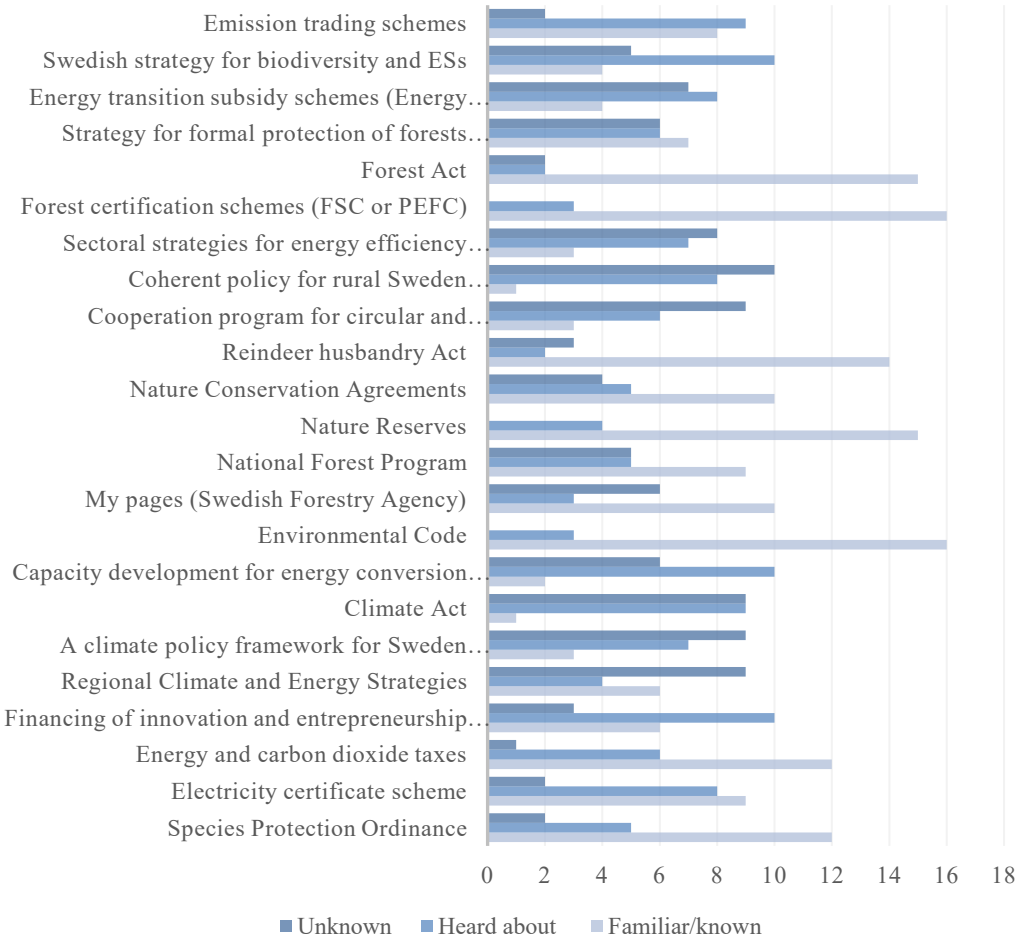

Figure 2. The actors' knowledge regarding national FES related policy.

Less known are Capacity Development for Energy Conversion and Reduced Climate Impact (Energy Agency), Coherent Policy for Rural Sweden (proposition 2017/18:179), the Climate Act, and the Cooperation Programme for Circular and Bio-based Economics (Government and Vinnova).

4.2. Ranking of FES for the own business

To gain an understanding of the general importance of FES to the actors, they were asked to rank predetermined FES in relation to how important they are for the own business.[1] 18 FES were investigated, chosen according to the definitions from the Millennium Ecosystem Assessment (2005). The actors were asked to rank the

[1] Question B2a. "Which FES are most important/relevant to the activities of your organization? Rank the importance/relevance by sorting the cards into three groups, most important, less important and least important."

importance of each FES as either *most important, less important or least important.* The results are displayed in Figure 3.

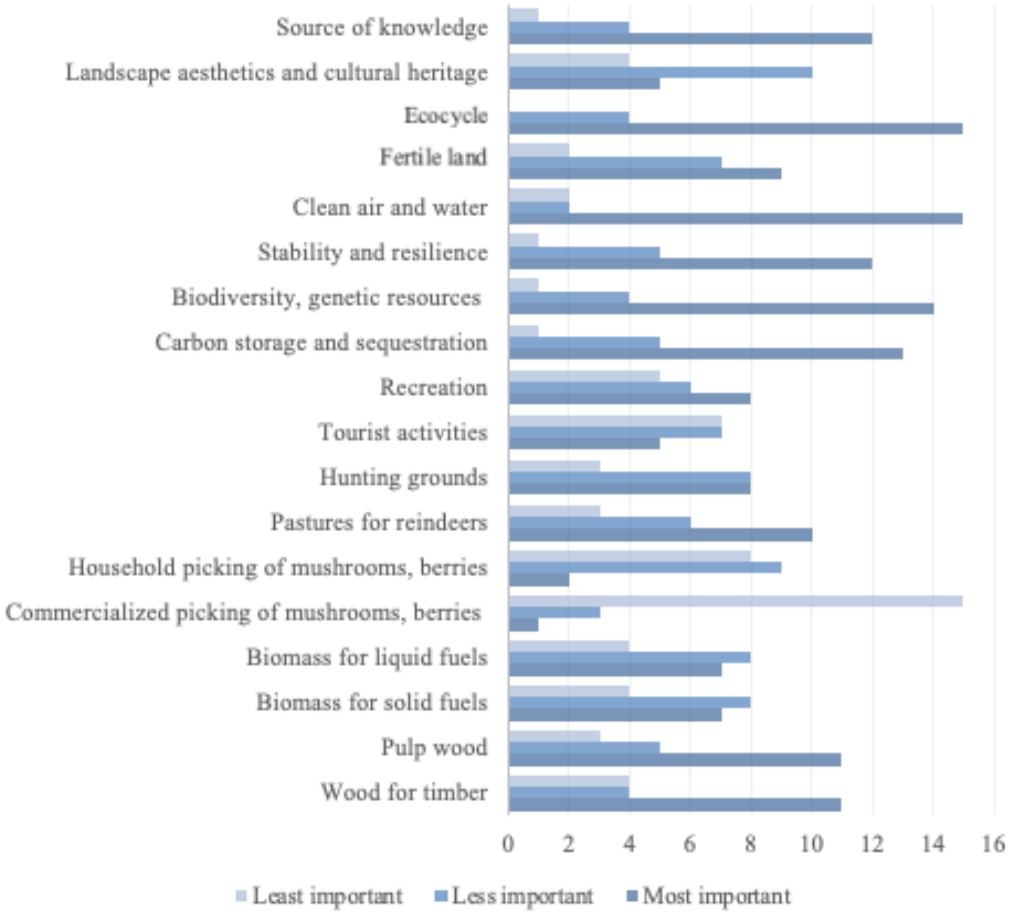

Figure 3. Importance of FES according to the actors, ranked most important, less important or least important.

According to 15 of 19 actors, clean air and water, and ecocycle are the most important. This goes for different types of actor, including those related to industry, recreation, government, nature conservation, etc. The majority of the remaining actors ranked the two FES as less important (six actors), and two actors as least important. The justification is that without ecocycles of different kinds (water, forests, animals etc.) and clean air and water, their business would not exist, depending on the type of organization. Biodiversity and genetic resources, and carbon storage and sequestration are two other factors ranked most important, according to 14 and 13 actors respectively, with the justification that they are essential to the businesses.

Hunting ground, tourist activities and recreation divided the actors, equally ranked most, less or least important. Pastures for reindeer are also divided between the

three grades, with a slight overweighting for the rating most important, due to Sami actors' and forest management actors' consultation with reindeer herders, which can affect their decisions regarding land use strategies. The actors rated pastures for reindeer as least important, arguing that there is no connection to their business, as did the actors rating it as less important. The importance given to biomass for solid fuels and biomass for liquid fuels is similar, and about equally spread on the scale of importance.

The results indicate that wood for timber and pulp wood are of similar importance to the actors, with a majority rating them as most important or less important. This goes for different types of actors, including both those with business close to the production and usage of timber and/or pulp, and those with businesses far from the forest industry, such as recreation actors.
Commercialized picking of mushrooms and berries was of least importance to the majority of the actors (15 of 19), and the least important of all the FES investigated. Three actors rated the FES as less important. One actor rated it as most important, with the justification of recreation possibilities (interviewee 3). In comparison, household picking mushrooms and berries was of least importance to more respondents.

To ensure that important FES were highlighted, the actors in the interviews were able to add other FES that were missing. Two of the actors had additional FES—health (interviewee 9) and socioeconomic values (interviewee 3), both of high importance to their organizations. The justification for health is the connection to the actor's business (government organization), which concerns all aspects of the provision of FES. Furthermore, socioeconomic value and ecology are justified by an interdisciplinary view according to the actor's business (nature tourism), which contributes to the Swedish national economy and to public health. Another justification for socioeconomic values mentioned was dissemination of knowledge regarding nature tourism, along with sustainability.

4.3. Overall assessment of the FES related national policy

The majority stated that the policies were unclear (11 of 19). In addition to the predetermined words, the actors were able to comment or describe national FES-related policies in their own words. Eight of the nineteen actors described the national FES-related policies as "complex" (interviewees 3, 4, 8, 9, 14) or "difficult to interpret" (interviewees 12, 13, 18). Other used the words "weak", due to the lack of sanctions to substantiate them, "legal uncertainty" (interviewee 12) due to the

complexity, and “not grounded in reality” (interviewee 18). All actors requested more developed or changed policies.

4.4. Summarizing discussion of knowledge and assessment of regulations and FES

As shown above, the majority of the actors stated that national regulations were of high importance for their decision-making, which is why knowledge regarding FES-related regulations is interesting to investigate. All the actors were familiar with or had heard of the Environmental Code, nature reserves and forest certification schemes, all relating to conservation policy. However, several of the other national regulations were beyond what the actors knew. The general perception is that the regulations are too difficult to understand to incorporate in all levels of the businesses, both on a long-term, strategic level and in the daily operative business, and too vague in their formulation to be used as a guide. This could impede the support and guidance the actors take from the FES-related policies.

The FES of most importance to the largest number of actors are clean air and water and ecocycles, followed by biodiversity and genetic resources, and carbon storage and sequestration. This is regardless of the respondents’ type of business. The justification is that without them, their business would not exist. All the FES of most importance are defined as supporting and regulating.

There is a clear pattern in the importance of FES. In general, the ranking correlates with the business of the actor—i.e. the majority of the actors rank the importance in correlation with what type of business they are engaged in. For example, actors with industries value technology as important, tourism actors put a high value on recreation and tourist activities, etc., with the justification that without them there have no business. However, wood for timber and pulp differ from this pattern. Both actors with and those without business closely connected to the provision of timber and pulp stated that these were of high importance to them; that is to say, regardless of the type of business, the provision of pulp and timber is important. One reason for this could be the largescale forest management for production of timber and pulp in Sweden, affecting different types of actors.

The overall assessment of the national FES-related regulations according to the actors shows that they are unclear, complex and difficult to interpret. Given the importance of national regulations previously stated, this overall assessment of

them indicates a problem. Without understanding the regulations, help from them and implementation of them are obstructed.

5. Key factors affecting the policy response

The following section describes the results that emerged from the interviews with the actors. To answer the research question of which factors affect the policy response and land use strategies according to the actors, several questions were asked, both structured and open. The actors identified factors that influence forest use and forest management and ranked them according to how important they are to FES-related choices and strategies.

Several questions were of a ranking or clustering nature, followed by open questions to capture a deeper understanding of the actors' thoughts and opinions. The results are divided question wise, all with reference to where the results came from. The interview survey is to be found in Appendix 1 in the original Swedish. Quotations are translated from Swedish.

5.1. Factors of high importance to the actors

The actors were asked to rank the factors as highly, less or least important for their decision-making. All factors were rated as highly important by six or more actors (see Figure 4). All respondents but two saw competence as a factor of high importance for decision management in their organization and how they chose to use the forest, and the remaining two respondents as less important. None of the actors ranked competence as of least importance. Although the majority of the actors rated competence as highly important, the view on it differed between the actors. Depending on the type of business, different types of competence are needed, and the question of competence is closely related to labour supply. The Sami actors in particular rely on the next generation to be able to continue their culture and traditions, or for their own survival (interviewee 16). The second factor most rated as being of high importance was national regulations—i.e. laws and guidelines—according to 16 of the 19 actors. After competence and national regulations come climate and knowledge, new scientific evidence and ideas, both rated of high importance by 13 respondents.

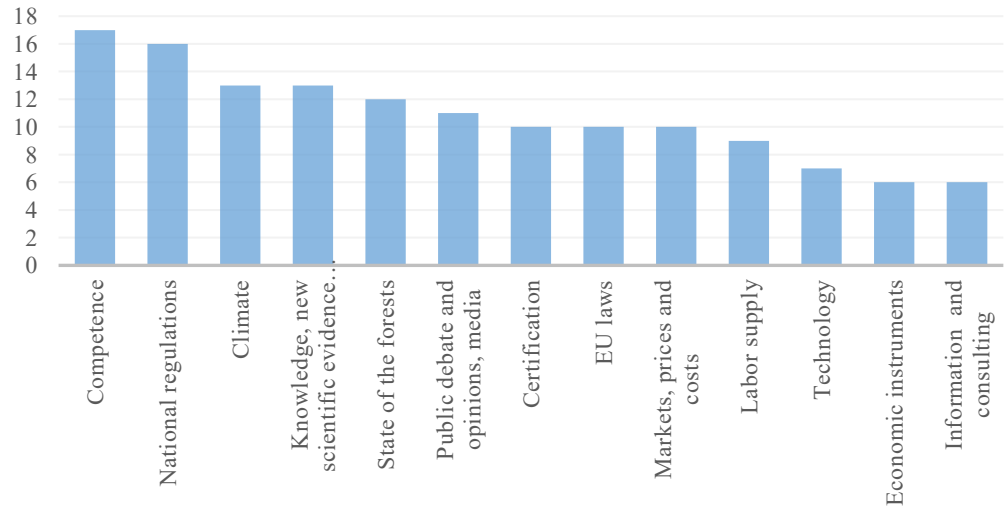

Figure 4. Factors affecting the decision making within the organization. Number of responses per factor, ranked of high importance.

The state of the forest was of high importance to actors in direct contact with forests, such as authorities, forest-owning companies and recreation organizations (12 of 19). Public debate and opinions and media were considered highly important by 11 of the actors. One actor argued that the historical importance of the forest industries in the municipality, and the influence they have had on its development, creates an understanding today among the inhabitants, and less explanation and defence of why and how the forests are used is needed (interviewee 11).

The importance of certifications divided the actors. Of the 19 actors, ten rated certifications as being of high importance. Forest certification is referred to by one actor as "a possibility to affect the forest sector" (interviewee 16) in terms of forest management. However, another viewed it as "an air-bag for the forest companies, not something the customers really care about" (interviewee 7). One actor argued that there should be greater responsibility for certifications to regulate the forests and management for different FES. A lot of time and money is spent on conflict management and consideration, without good solutions as an outcome in many cases, according to the actor (interviewee 18).

When it comes to technology, seven of the respondents see it as being of high importance, all but one with their own business. Information and consulting and economic instruments (i.e. taxes and subsidies) are both of high importance for only six of the respondents. Other factors mentioned as being of high importance in addition to the predetermined were predator populations and hunters' associations (interviewees 4, 19). Two actors argued that the organization's own policy document is primary what controls decision-making processes (interviewees 13, 7).

5.2. Factors of least importance to the actors

The factors most often rated as being of least importance are economic instruments and labour supply (five respondents; see Figure 5). The importance of labour supply differs between the actors, all agreeing on the importance of it. The Sami actors in particular rely on coming generations to be able to continue (interviewee 16), while the forest and industrial companies are in need of educated, competent staff and a demand for jobs. Despite this, four of the actors rated it as being of least importance. Exclusively non-industrial actors rated technology as least important (interviewees 3, 5, 10, 18). None of the actors rated climate, competence, national regulation, and public debate and opinions, media as factors of least importance to their decision-making.

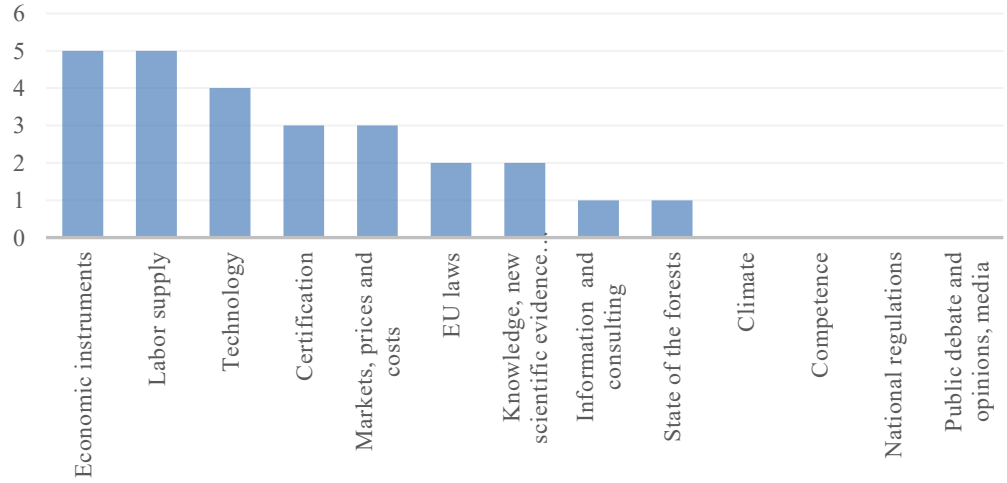

Figure 5. Number of actors per factor, ranked of least importance.

5.3. The perception of factors importance among other actors

The question regarding which factors are perceived as being of importance in general in the municipality differs from the actors' ranking of importance in their own organizations, according to Figure 6. This question provides an understanding of how the actors see themselves in comparison to other forest actors. The factors' importance is both over- and underestimated in terms of their general importance to the actors.

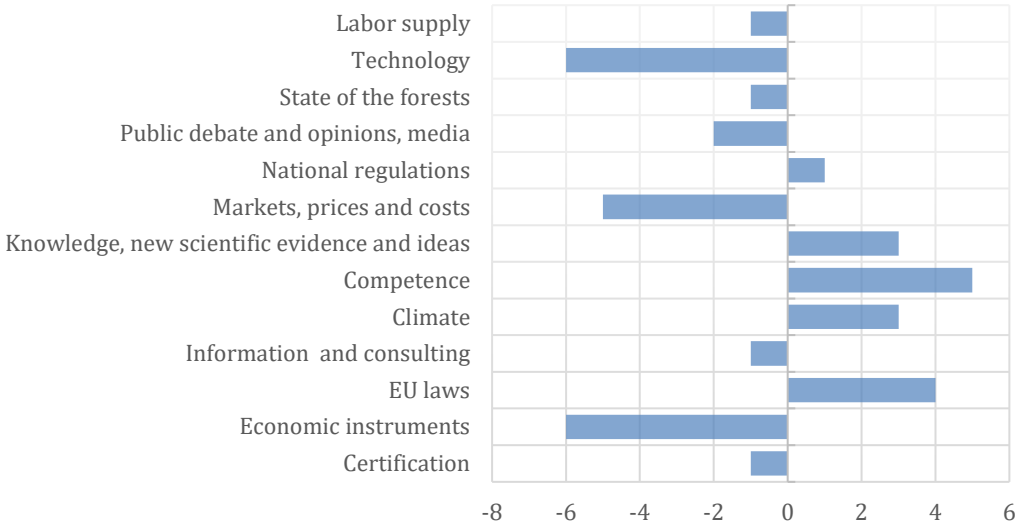

Figure 6. The difference between factors' importance according the actors, and the perception of how other actors value the factors.
Note: Negative values equal an overestimated view on the factors' importance, and a positive value equals an underestimated view on the factors' importance.

Economic instruments are rated as being of high importance for decision-making in the actors' own organization by six of the actors, but by double this number—12 actors—in terms of the general perception. Hence, the importance of economic instruments is overestimated. The result for technology is similar, with six actors overestimating its importance. Markets, prices and costs are the third most overestimated factors, with 10 actors rating this as of high importance for their own organization, but 15 seeing it as of general importance to others.

Competence is rated highly important for decision-making in the actors' own organization by 17 actors, but by 12 in the general question. Hence, the importance of competence is underestimated by the actors. EU laws are underestimated, with a difference of four.

Perceptions of the importance of certifications, information and consultation, national regulations, state of the forest and labour supply are all in line with the actors' own opinions, as is public debate and opinions and media. There is a difference of just one between the actors' own opinions and the perception of how important they are to other actors.

5.4. Strong connections between factors

To obtain a more thorough understanding, and to elaborate the answers as to which factors are important, the actors were asked to rank the connection between the five most important factors of their choice. This was part of the impact analysis, to investigate the key factors identified and how they are related to each other. During the interview, the respondents were asked to state the connection—that is, whether change in one factor affects the other—between the most important factors for the organizations' decision management, using a grade from 1 to 3, where 1 indicates no connection, 2 less connection, and 3 a strong connection.[2]

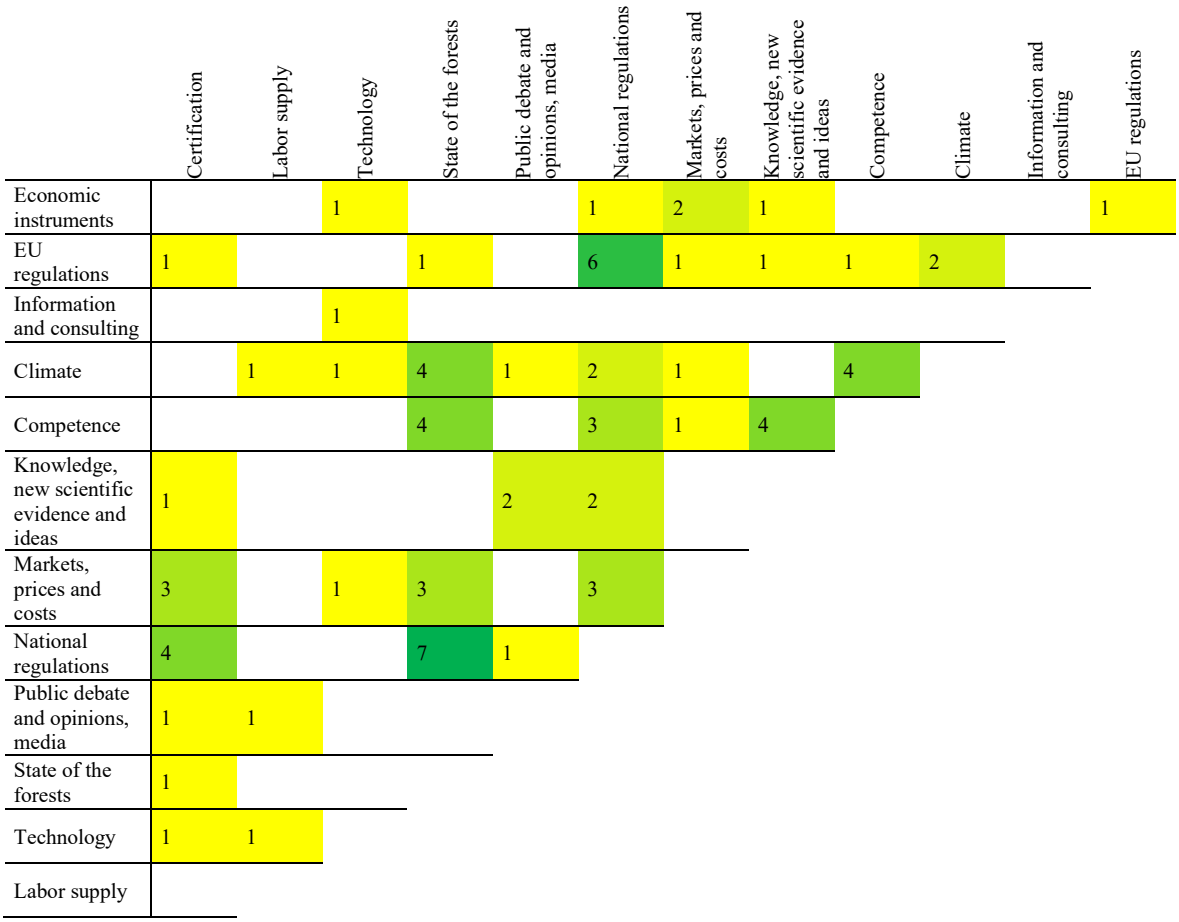

Figure 7. Number of actors ranking factors of high importance, with strong connection to other factors of high importance.

[2] Question C1c. "Select the five most prioritized factors (cards) and place them in the vertical and horizontal columns and rows below. Grade them on a scale of one to three, where 1 = very much linked, 2 = some linkage, and 3 = not linked at all."

Note: Blank cells indicate no actor found a connection between these factors, the number indicate how many identified the connection.

Analysing the results, several recurrent strong connections are found, displayed in Figure 7. In terms of number of strong connections per factor, national regulations are the most mentioned factor, with 29 statements of strong connection to other factors. EU regulations were seen to have a strong connection to national regulations by six of the actors, while national regulations were considered to have a strong connection to state of the forest by seven of the 19 actors, being the most frequently perceived strong connection between two factors. State of the forest is the second most mentioned factor regarding strong connections to other factors, with 20 answers. In addition to national regulations, competence and climate are seen to be strongly connected to state of the forest.

There are 17 stated strong connections to competence: climate, knowledge, new scientific evidence and ideas, and state of the forest are all strongly connected to competence, according to four actors each. However, labour supply, technology and certifications are examples of factors without a strong connection to competence, according to the actors' answers.

The results for climate also show a strong connection to other factors. Competence and state of the forest are stated as having a strong connection to climate. However, certification, information and consulting, and knowledge, new scientific evidence and ideas are all without strong connection to climate, according to the actors.

Certification, national regulations and state of the forest are all strongly connected to markets, prices and costs, according to four actors. However, none of the actors stated a strong connection to information and consulting, knowledge, new scientific evidence and ideas, public debate and opinions and media, or labour supply. Furthermore, certifications and EU regulations have strong connection to state of the forest according to only one of the actors, and to knowledge according to two actors. Economic instruments, information and consulting, and technology, according to all actors, were not strongly connected to the state of the forest. Information and consulting were seen having only one strong connection, with technology, by one of the actors. The rest of the actors found information and consulting less connected or not connected to the other factors.

5.5. Factors with no connection

There were also among the answers a number of factors that were seen to have no linkage at all,[3] as shown in Figure 8. The factor most repeatedly stated as being without connection to other factors was national regulations, with 12 statements. However, the two factors stated by the highest number of actors as having no connection were EU regulations and state of the forest, with four statements of no connection. EU-regulations were also stated with no connection with knowledge, new scientific evidence and ideas by three actors. In total, no connection between EU regulations and other factors was seen in ten statements. Other factors repeatedly stated as being without connection to the other factors are competence, certifications and state of the forest.

	Certification	Labor supply	Technology	State of the forests	Public debate and opinions, media	National regulations	Markets, prices and costs	Knowledge, new scientific	Competence	Climate	Information and consulting	EU regulations
Economic instruments		1								1		
EU regulations		1		4		1		3	1			
Information and consulting		1										
Climate	1	1				2	1					
Competence	2			1		2	2					
Knowledge, new scientific evidence and ideas				1		1						
Markets, prices and costs					2	1						
National regulations	1		2	2								
Public debate and opinions, media			1									
State of the forests	2											
Technology	1											
Labor supply	1											

Figure 8. Factors of high importance with no connection to other factors of high importance. Note: Blank cells means no actor states that there is no connection between the factors, 1 equal one actor finding no connection between factors, 2 equals two actors, etc.

[3] Question C1c. "Select the five most prioritized factors (cards) and place them in the vertical and horizontal columns and rows below. Grade them on a scale of one to three, where 1 = very much linked, 2 = some linkage, and 3 = not linked at all."

5.6. Summarizing discussion on key factors

All factors are rated as highly important by six or more actors. The factor most frequently rated as highly important for decision-making within their own business is competence, which is chosen by all but two actors, closely follow by national regulations, chosen by all but three. Climate, knowledge, state of the forest and public debate and media are all rated as highly important by just over half of the actors. There is a clear pattern between what type of business the actors are involved with and how the factors are rated. For example, actors with their own factories largely rate technology as highly important, in comparison to actors with a business without any need for technology. This seems to be a natural outcome.

Several of the actors have strong opinions on the importance of certifications, in general divided into two different groups of about the same size. On the one hand, certifications—FSC and PEFC—are perceived as a way to affect how decisions are to be made; on the other hand, certifications are described as "an airbag for the forest companies", not really affecting how forest management is performed. Certifications are one of few regulations on a national level implemented to a large extent both by private forest owners and among forest companies. The different opinions on the certifications, according to the results, are therefore of high interest, and the actors' opinions on and implementation of certifications could be investigated further.

Similar to the results for factors of high importance, the results show factors with least importance according to the actors are factors far from the actors' business. Economic instruments and labour supply are rated least important by five actors each. Since there are few economic instruments for the provision of FES, it is natural that these are of little importance.

The results for factors' perceived importance in relation to other actors differ. Factors' importance is both under- and overestimated by the actors. It is natural that the actors have different opinions on which factors are important since the actors conduct different types of business that are structured in different ways. However, the discrepancy between the actual importance of factors and the perception of importance emerging here may create difficulties in understanding other actors. Knowledge and understanding of other actors are important to facilitate conflict management.

National regulations are the second most rated factor of high importance: therefore the strong connection to other factors is of high interest. The most recurrent strong connections between factors—i.e. change in one factor creating a change in other factors—are between national regulations and EU regulations, and between

national regulations and state of the forest. The connection with EU regulations implies that national regulations are highly influenced by regulations on the EU level. This also applies to the connection with state of the forest. However, four actors saw no connection between EU regulations and state of the forest, these being the two factors with the greatest number of statements of no connection. Since national regulations had a strong connection to both EU regulations and state of the forest, it could be assumed that EU regulations and state of the forest should have a strong connection as well, which is not the case. One reason for this could be the lack of regulations de facto articulated by the EU. Swedish legislation and strategies are often created with the underlying EU directive, but are nevertheless national legislations. The understanding of the connection in theory seems to be present to some extent, but in practice the assessment of the connection between EU legislation and the state of the forest is not clear to the actors.

6. Assessment of synergies and trade-offs for the provision of FES

To answer the research question regarding the assessment of trade-offs and synergies for the usage of FES, several questions are asked. Question B2b[4] is a direct question regarding the actors' assessment of trade-off and synergies. The actors are asked to indicate how the provision of one FES affects the provision of another, the relationship being stated as synergetic, conflictual, neutral or do not know. Trade-offs depart from conflictual relationships for provision of different FES.

6.1. Synergies and trade-offs in provision of FES'

Almost all actors find both synergies and trade-offs regarding the provision of different FES'. The majority of the actors agree that several different interests, strong opinions and voices regarding land use create conflicts—i.e. trade-offs. Some of the actors say that their work tasks are too far from operative management and are thus not in contact with conflict management.

Wood for timber and wood for pulp are categorized separately in the interview survey. However, the results show similar perceptions of their relationship to the provision of other FES'. Almost all actors give the same answer for both wood for timber and wood for pulp regarding their relationship to other FES. The two FES' are, according to the actors, the primary source of trade-offs in relation to the provision of other FES', although some synergies are found.

One of the most recurrent trade-offs is in relation to the provision of tourist activities, recreation and provision of timber and pulp. Industrial forest actors, forest management actors, recreational and government actors—i.e. actors with different businesses and perspectives—all found them conflicting. One actor, finding synergies with tourist activities and recreation, argued that forest management using primarily clear cutting as a final felling method creates forests

[4] Question B2b. "Characterize how the provision of forest functions/FES affect each other: neutral (0), synergetic (+), conflicting (-) or do not know (/)."

with recreational value, with aesthetics appealing to visitors (interviewee 3). Another synergy mentioned is forest roads built due to the forest management by forest companies or private forest owners which also facilitate tourist activities, recreation and hunting (interviewee 4).

Reindeer husbandry is seen to be in conflict with the provision of wood for timber and pulp, according to the majority of the actors. One of the actors argued that the forest management dominating today—i.e. clear cutting—creates a trade-off with reindeer herding, since the management method complicates the conditions for reindeer husbandry (interviewee 19). Lack of coherent pasture lands as a consequence of clear cuts reduces the possibilities for pastures. The actor argued that more economic compensation is needed in many cases as a result of the forest management.

According to the majority of the actors, landscape aesthetics and cultural heritage are also in conflict with the production of timber and pulp. Several of the actors explain the trade-off with the damage that forest management, with clear cutting methods, can have on cultural heritage sites. One actor states that multi-use of forests is good in theory but is not rational due to the difficulties applying it in practice (interviewee 10).

Household picking of mushrooms and berries was in general neutral or synergetic with the provision of the other FES. However, commercialized picking created conflicts to a larger extent, according to the actors. The argument is commercialization—that is, organized picking can disturb the reindeer husbandry and be in conflict with hunting.

Pastures for reindeer are another area of conflict. One actor argued that the incorporation of reindeer husbandry and tourist activities should be investigated as a possibility for cooperation between the two interests (interviewee 3). Other actors argued that tourist and recreation activities and hunting are in conflict with reindeer husbandry since the activities can disturb the reindeer and impair husbandry. Another factor mentioned was windmills. The construction of windmill parks affects reindeer herding, as the windmills disturb the reindeer. Another indirect effect mentioned is that windmill parks can regulate the forest management, and therefore put higher pressure on other forest land, which affect the reindeer husbandry. This, despite the fact that the windmill park itself in some cases might not be affecting the reindeer herding but relocate the intensity in land use.

The opinions on hunting grounds, tourist activities and recreation are all similar. The majority of the actors find them synergetic with the provision of other FES'.

The production of wood for sawn products, pulp, liquid and solid fuels, on the other hand, is found to be in conflict with recreation and tourist activities. Recreation and tourist activities are in conflict with the provision of wood products/biomass products, according to the majority of the actors. The reasons given are that the dominant clear-cutting methods are not appealing to visitors and create a fragmented landscape which is sometimes hard to get around. One actor argues that industrial forest use and management contributes with forest road, which increases the availability for both hunters and other visitors for recreation and tourist activities. One actor pursuing hunting found the lack of understanding and acceptance of hunting and hunters to be a problem which may result in conflicts not always being handled objectively (interviewee 4).

Yet another area of conflict is carbon storage and sequestration. The actors generally agree on the synergies between carbon storage and sequestration and the provision of other FES'. However, some argue the opposite. Tourist activities and reindeer pastures are two FES' described as being in conflict with one another, explained by the more intense forest production affecting them. Several of the actors mention sustainability when discussing carbon storage and sequestration. The definition of sustainability was discussed, and one actor argued that the definition differs depending on who you ask. Geographical aspects affect the possibility of striving for a sustainable business, such as long distances to the work area (interviewee 19). Several of the actors argue that there are a number of synergies for sustainable forest management, such as creating products of both economic and social value, while the forests work as carbon storage (interviewee 17).

In general, the actors find biodiversity and genetic resources synergetic with the provision of other FES. Ecocycles, pastures for reindeer and clean air and water are all synergetic with the other FES, with the exception of a few where the relations are felt to be neutral.

However, conflict with the production of bio-products was mentioned by several actors with different types of business activity (interviewees 5, 7, 8, 18, 19, similar in 9, 10). Homogeneous forests and clear cutting are reasons mentioned for the conflict. One actor argued that the pervasive discussions on climate change are in conflict with the conservation of biodiversity (interviewee 5), due to the claim that the use of forests will replace fossil resources, and increased production and usage of forests is needed in terms of biomass for timber, pulp and liquid and solid fuels. According to the actor, climate transition should not be done at the expense of biodiversity and preservation.

Consideration for biodiversity could be in conflict with consideration for reindeer husbandry, according to one actor, in terms of how the forests are managed. When prioritizations need to be made, biodiversity is sometimes prioritized over, for example, consideration for reindeer husbandry. When possible, consideration for the two FES can coincide in the same location. If not, consideration for biodiversity is occasionally prioritized, as it is found to be more strictly regulated in strategies and laws (interviewee 18).

Almost all actors find knowledge to be synergetic with the other FES. A few argue that it has a neutral relationship with the other FES. One actor stated that more knowledge can cause increased industrial use of forest products, which is in conflict with nature conservation and biodiversity, arguing that "nature should not be sacrificed for the cause of mitigating climate change" (interviewee 5).

6.2. Challenges and opportunities for the provision of FES'

To further investigate the actors' perception of trade-offs and synergies regarding the provision of FES, they were asked to give their view on the most important challenges and opportunities for them and their business.

Almost all actors gave examples of challenges for the provision of the FES needed in their business. The most recurring challenge is between the production of forest products and other FES'. Nature conservation and production of forest products were mentioned by a majority of the respondents. The balance between the two, and where to do what in practice are discussed. Some of the actors argued that there is not enough forest land to increase, or even maintain, forest production and at the same time maintain or increase nature conservation. Pasture lands for reindeer herding were also mentioned as creating a trade-off with the production of forest products by several different actors. Political governance was described as a challenge.

There is a need for more regulations and political guidance to facilitate conflict management and trade-offs, according to the actors. The difficulties in handling conflicts should not be for the actors to solve, but up to the politicians, according to the actors. Too complicated and vague regulations create conflicts to be solved by different actors, without the possibility of getting help from government organizations and the justice system (interviewees 6, 13, 18, similar in 19). The political governance needs to be substantiated by research, and the political views need to be scientifically supported. Knowledge and competence are also mentioned

as a challenge for the provision of FES. Research on climate change and the challenges to come in terms of resilience in forests and forest management, but also for reindeer herding and pasture lands, need to be investigated further.

When it comes to opportunities, tourism and recreational values are mentioned by the actors. The Swedish forests offer great possibilities to experience nature differently from many other countries, but are also unlike urban residences in Sweden. Climate change and the debate regarding new pathways to sustainability and the protection of biodiversity are mentioned as possibilities. The development of new products and methods of forest management can create an innovative environment, where new collaborations across sectors can be reinforced. Examples of possible enhanced collaborations were between the forest sector and technology and energy sectors.

6.3. Summarizing discussion on synergies and trade-offs for the provision of FES

The results show that the main trade-offs for the provision of FES are between the production of different forest products—i.e. wood for both timber and pulp, and to some extent biofuels. The similar results for the different FES could be due to the similar management methods regardless of the final product. The opinions on climate divide the actors. The main trade-off stated is between forest production and nature conservation. Several actors argued that the provision of forest products is synergetic with climate adaptation. However, two of the actors argued that climate adaptation, in terms of replacing fossil products with renewable—i.e. forest—products should not be through increased forest production.

Common to the majority of the actors is the experience of their needs being neglected in terms of conflicts and trade-offs. Several actors with different types of businesses feel that the importance of the provision of the ecosystem services that they need is in conflict with others. The exception is the government actors. At the same time, there is a certain understanding of problems and conflicts others experience, which could indicate that conflict management can be facilitated, and synergies promoted.

As several of the actors mentioned, the improvement needed to facilitate trade-offs and conflicts between the provision of FES is more support in the regulations. Handling conflicts is both time and money consuming, but often without conflicts being resolved. This includes both more clarity in already existing regulations and added regulations for bioenergy, for example. While regulations are sometimes

tested in legal processes, cases are often closed without an outcome or solution. Clearer regulations and laws could facilitate conflict management with concrete legal outcomes. Despite the demand for clearer regulations and laws, political governance is mentioned as a challenge. On the one hand, more regulations and political guidance to facilitate conflict management, substantiated by research, is requested, and political views need to be scientifically supported. On the other hand, political governance with a lack of understanding of the reality from the different actors' perspectives is described as an issue for the actors. Lack of knowledge and competence is also mentioned as a challenge in terms of political governance. However, despite scientific evidence, politics are also based on opinions. Since the actors are demanding regulation in their favour, there will always be some dissatisfaction.

Opportunities regarding tourism and recreational values are mentioned by several actors. The Swedish forests offer great possibilities to experience nature differently from many other countries, but also unlike urban residences in Sweden. There are great opportunities for the forest sector due to the debate on climate change, according to several actors. Increased forest production, development of new products and new collaborations are all mentioned.

7. Concluding Discussion

The aim of this study was to investigate the factors that affect local actors' policy responses and land use strategies, and how local actors assess trade-offs and synergies regarding the usage of FES, using a semi-structured interview survey. The theoretical approach, departing from a previously identified policy framework, sought to examine the factors affecting land use strategies—i.e. policy response—in combination with the assessment of trade-offs and synergies regarding the provision of FES. The investigation of policy response and assessment of synergies and trade-offs in combination aimed to create an understanding of possible actions taken by actors.

The actors interviewed were all located in a municipality in northern Sweden. There was a slight overrepresentation of landowners and actors closely related to forest management activities. This may have affected the results. At the same time, landowners put the forest-related policies into practice, which is why this was not adjusted for in the selection of respondents. Other actors of interest could be researchers or representatives from the windmill sector, for example.

As mentioned in the methodology section, there was an over-representation of male respondents, which may have affected the results. Additionally, the majority of the interviews took longer to conduct than anticipated. The last part of the interview guide was given less focus as the respondents ran out of time. This may have affected the results, as not all respondents were given the opportunity to end the discussion in a satisfactory manner. Two of the interviews were completed afterwards via e-mail. Although the interview survey was tested in advance, more time per interview or a shortened survey was needed. The results for the last part of the interview are analyzed with caution.

The results show that the FES of high importance to the greatest number of actors were all defined as regulating and supporting FES: ecocycles, biodiversity, clean air and water, and carbon storage and sequestration. This is interesting since all actors have businesses of other kinds, primarily in need of provisioning and cultural FES'. Overall, production of all wooden products for timber, pulp, solid and liquid fuel had the same relationship to provision of the other FES, generally creating

trade-offs. This could be due to the similar forest management methods, independent of the type of final product concerned. However, different types of product can require different types of forest management—e.g. biomass for sawn products of high quality, or biomass for bioenergy.

Furthermore, the results indicate that competence, national regulations, climate and knowledge are key factors affecting actors' policy response and how they choose to operationalize land use strategies. As the question regarding the actors' knowledge of FES-related policy indicated, while several of the national regulations were not known to the actors, the general perception was that the regulations are too difficult to interpret to incorporate on all levels of the business, operational and strategic, and too vague in their formulation to be imperative. Certifications were one of few regulations implemented on a large scale, and the different opinions on them could therefore be interesting to investigate further. In general, the complexity of the regulations could impede the support and guidance the actors can draw from FES-related policy.

Reindeer husbandry actors argued that the national regulations regarding reindeer husbandry are weak in terms of obligations when it comes to consideration of conflicts between forest management and conservation of biodiversity. The national regulations for reindeer husbandry are not imperative for land use conflicts, but rather are formulated as guidelines. Actors argued that this results in lower priority for reindeer husbandry in relation to the provision of other FES'.

Lack of knowledge and lack of clarity in the regulations, with their soft legal character, could make it complicated for the actors to conduct their business in a correct and efficient way. Also, goal achievement on a national level is made more difficult in terms of forest, climate, energy and conservation objectives if the regulations do not facilitate the businesses. A large number of objectives, including provision of FES, are in need of clearer and well-defined regulations for the actors to be able to fulfil them. Otherwise, there is a risk of less goal achievement.

Actors operate within the framework of institutions such as workplaces and industries, but also social structures and norms, influencing both historical and current opinions and actions. This cannot be ignored when working with decision theories and needs further investigation. Further research is needed on whether a combination of scientific and stakeholder knowledge could facilitate research into actions taken by forest actors in terms of forest management.

The majority of the actors felt their needs to be neglected in terms of how conflicts and trade-off are handled. Several actors, with different types of businesses, felt

that the importance of provision of the ecosystem services they are in need of was in conflict with others. The exception was government actors. At the same time, there was a certain understanding of problems and conflicts experienced by others, which indicates that conflict management can be facilitated and synergies can be promoted. The actors indicated dissatisfaction with how the regulations are formulated and their complexity. In combination with their perceived importance, this could create a great problem for their implementation and support from them.

In conclusion, key factors and FES according to the actors were strongly connected to their own business. Supporting and regulating FES were stated as being highly important to all actors regardless of their business. Competence and national regulations were stated as being most important to the majority of the actors' policy responses and land use strategies. Lack of knowledge and the complexity of national regulations creates a problem for policy responses and for the actors' assessments of trade-offs and synergies. The combination of key factors identified and the actors' assessment of synergies and trade-offs could be used in further research to investigate actual actions taken by the actors. Straightforward and supportive regulations, in combination with communication, are needed to ensure that national FES-related objectives are fulfilled.

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Personal contact/Test interviewees:

Grafström, E. 5 February 2019

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Appendix 1

Interview survey

Del A: Generell information om aktören och dess organisation

1. Vad är din roll i organisationen?
2. Vilken typ av organisation är ni? (Privat företag/bolag, förening...)
3. Vad är er huvudsakliga verksamhet? (Virkesproduktion, naturbevarande...)

Del B: Förståelse för skogen, nuvarande användning och strategier kring skogliga ekosystemtjänster

1. Vilka ekosystemtjänster står i centrum för din organisations verksamhet? Alltså det ni håller på med…. Lägg korten med ekosystemtjänster i tre grupper, de som har störst betydelse, de som har lite mindre betydelse och de som har minst betydelse. (Om du inte vet lägg den åt sidan).

Störst betydelse	**Mindre betydelse**	**Minst betydelse**

   a) Kan du säga något mer om hur er verksamhet relaterar till/varför de var viktigast de ES som står i vänstra kolumnen?

   b) Utifrån dina erfarenheter och verksamheten i din organisation; upplever du att det finns situationer där olika ekosystemtjänster hamnar i konflikt med varandra, alltså där ert nyttjande av en ekosystemtjänst hamnar i konflikt med en annan och ni måste göra avvägningar eller anpassa er?
2. Kommande frågor handlar om hur du, och din organisation mer allmänt värderar olika skogliga ekosystemtjänster eller funktioner, alltså inte

kopplat till er verksamhet.

a) Gruppera korten med ekosystemtjänster i tre grupper, de som är mest viktiga, de som är lite mindre viktiga och de som är minst viktiga. (Om du inte vet lägg den åt sidan).

Mest viktig	**Mindre viktig**	**Minst viktig**

b) Hur ser du/ni på förhållandet mellan de här olika ekosystemtjänsterna? Baserat på din erfarenhet och kunskap, hur skulle du/ni säga att nyttjande av en tjänst påverkar möjligheterna att tillhandahålla andra tjänster, tex…? Visa hur du/ni tycker att olika ekosystemtjänster relaterar till varandra: Neutralt (lämna blankt), synergi/gynnar varandra (+) eller konkurrerar/missgynnar varandra (-). Om du inte kan eller vill svara, markera med ett diagonalt streck.

c) Någon ekosystemtjänst som vi missat/du vill tillägga?

Neutralt = Blankt Synergi/gynnar varandra= + Konkurrens/missgynnar varandra= -
Vet ej= /

Relation mellan ekosystemtjänster och funktioner	Produktion av timmer	Produktion av massaved	Produktion av biomassa för fasta bränslen	Produktion av biomassa för flytande bränslen	Bär- och svampplock ning, kommersiell	Osv…
Produktion av timmer						
Produktion av massaved						
Produktion av biomassa för fasta bränslen						
Produktion av biomassa för flytande bränslen						
Osv…						

3. Vilka utmaningar och möjligheter ser du/din organisation när det gäller skogens användning och möjligheter att tillhandahålla de här ekosystemtjänsterna nu och i framtiden.
    a) Vilka är de största utmaningarna och möjligheterna (max 5/var)?

Utmaning	Möjligheter

    b) Ranka nu dessa genom att sätta 1–5 bredvid resp. utmaning/möjlighet, där 1 är den största/viktigaste utmaningen/möjligheten.

Del C: Frågor för att fånga aktörens förståelse för nyckelfaktorer som påverkar FES-relaterat beslutsfattande gällande markanvändning/skötsel/planering, på lokal nivå.

1. Nu kommer vi att ställa ett antal frågor som handlar om vad det är som påverkar skogens användning i Piteå kommun, de val som ni gör i er organisation, och de val som andra aktörer gör.

    - Offentlig debatt, opinionsbildning, media
    - Kunskap, nya vetenskapliga rön och idéer
    - EU-regler (ex. Habitatdirektivet/Natura2000)
    - Nationella regelverk (lagstiftning)
    - Ekonomiska styrmedel, exv. skatter/subventioner
    - Certifiering
    - Information och rådgivning
    - Marknader, priser och kostnader
    - Teknologi
    - Tillgänglig arbetskraft
    - Kompetens
    - Skogens tillstånd (e.g. åldersklasser eller skog av särskild sort eller kvalitet)
    - Klimat
    - Annat

    a) Gruppera korten med faktorer efter vilka som har störst betydelse för hur du och din organisation väljer att använda skogen, störst betydelse till minst betydelse.

Störst betydelse	Mindre betydelse	Minst betydelse

    b) Hur ser du/ni mer allmänt ser på vilka faktorer som påverkar skogens användning och skötsel i Piteå kommun? Är de lika som i a) eller ser det annorlunda ut? Om annorlunda; flytta korten så att de avspeglar din uppfattning.

Störst betydelse	Mindre betydelse	Minst betydelse

c) Utifrån din erfarenhet och kunskap, hur förhåller sig de faktorer som du tycker är mest betydelsefulla till varandra? Ibland kan en faktor som påverkar hur skogen används ”dra med sig” andra, de kan alltså vara mer eller mindre kopplade till varandra

Av de du valde som mest betydelsefulla, välj ut de fem viktigaste faktorerna och fyll i de vertikala och horisontella kolumnerna och raderna nedan. Finns en stark koppling, ge en trea, ingen koppling, en etta. (Korten placeras i faktor-tabellen.)

Faktor	…	…	…	…	…
…					
…					
…					
…					
…					

Del D: Frågor för att fånga organisationens/respondentens förståelse för policy

Nu kommer vi att ställa några frågor om hur du och din organisation ser på det regelverk som styr skogens användning i Sverige – och Piteå kommun.

Styrmedel nettolista	**Mål**
Klimatlagen	Nationellt miljökvalitetsmål: Minskad klimatpåverkan
Klimat- och energistrategi för Norrbottens län: med sikte på 2050 (Länsstyrelsen i Norrbotten 2016)	Minskade utsläpp av växthusgaser: Inga nettoutsläpp 2025 (Klimatpolitiskt ramverk för Sverige)
Miljöbalken	2030 ska Sverige ha en fossilfri fordonsflotta (Klimatpolitiskt ramverk för Sverige)
Elcertifikat och lag om elcertifikat	100% förnybar elproduktion 2040 (Energipolitikens inriktning)
Sektorsstrategier för energieffektivisering: Produktion i världsklass, Flexibelt och robust energisystem, fossilfria transporter, Framtidens handel och konsumtion, Resurseffektiv bebyggelse. (Energimyndigheten)	50 % av energianvändningen ska komma från förnybar energi (inklusive bioenergi) 2020 (Budgetproposition 2017)
Lokal och regional kapacitetsutveckling för energiomställning och minskad klimatpåverkan (stödprogram från Energimyndigheten)	Nationellt miljökvalitetsmål: Ett rikt växt- och djurliv
Stöd och bidrag till energiomställning: affärsutveckling, omställning i industrin, etc. (Stödprogram från Energimyndigheten)	Förbättra människors möjligheter till utomhusaktiviteter och att besöka naturen. (En svensk strategi för biologisk mångfald och ekosystemtjänster)
En svensk strategi för biologisk mångfald och ekosystemtjänster (proposition 2013/14:141)	Fornlämningar och värdefulla kulturmiljöer i skogslandskapet ska skyddas (Kulturminneslagen och Skogsvårdslagen)
Artskyddsförordningen	Skogen, det gröna guldet, ska bidra till jobb och hållbar tillväxt i hela landet samt till utvecklingen av en växande bioekonomi. (Nationella skogsprogrammet)
Nationell strategi for formellt skydd av skog (Naturvårdsverket och Skogsstyrelsen, 2017)	Ett hållbart skogsbruk med ökad klimatnytta. (Nationella skogsprogrammet)

Skogsvårdslagen	Mångbruk av skog för fler jobb och hållbar tillväxt i hela landet. (Nationella skogsprogrammet)
Nationella Skogsprogrammet	Innovationer och förädlad skogsråvara i världsklass. (Nationella skogsprogrammet)
Regeringens samverkansprogram för cirkulär och biobaserad ekonomi (Regeringen och Vinnova)	Miljömålet i Skogsvårdslagen
Ett klimatpolitiskt ramverk för Sverige (2016/17:146)	Produktionsmålet i Skogsvårdslagen
En sammanhållen politik för Sveriges landsbygder (proposition 2017/18:179)	Nationellt miljökvalitetsmål: Levande skogar
Naturvårdsavtal	Nationellt miljökvalitetsmål: Levande sjöar och vattendrag
Naturreservat	Nationellt miljökvalitetsmål: Myllrande våtmarker
Skogscertifiering (FSC eller PEFC)	Samer (samebymedlem) har rätt att använda mark och vatten till underhåll för sig och sina renar (Rennäringslagen)
Mina Sidor: För dig som vill ha mer kunskap om din skog (Skogsstyrelsen)	
Finansiering av innovation och företagande inom förnybar energi (Vinnova och Energimyndigheten)	
Rennäringslagen	
Energi- och koldioxidskatter	
Utsläppshandel med koldioxid	

1. Placera styrmedlen i grupper som visar vilka du känner till/vilka du inte känner till – och vilka som påverkar eller har direkt betydelse för din organisation och dess verksamhet/vilka som inte har det.

Har viss kunskap om	**Har hört talas om**	**Känner inte till**

   a. Vill du lägga till något styrmedel som inte finns i vår lista?

   b. Berätta på vilket sätt eller i vilka situationer du och din organisation kommit i kontakt/använder/påverkats av de här styrmedlen.

2. Gör nu likadant med målen, placera dem i grupper beroende på hur väl du känner till dem.

Har viss kunskap om	Har hört talas om	Känner inte till

   a. Vill du lägga till något mål som inte finns i vår lista?
   b. Berätta på vilket sätt eller i vilka situationer du och din organisation kommit i kontakt/använder/påverkats av de här målen.

3. Ranka de styrmedel du har viss kunskap om, beroende på vilken betydelse du tycker att de har för din organisation och dess verksamhet

Störst betydelse	Viss betydelse	Ingen betydelse

4. Gör nu samma sak med de mål du har kunskap om, gruppera dem beroende på vilken betydelse de har för din organisation och dess verksamhet.

Störst betydelse	Viss betydelse	Ingen betydelse

5. Hur skulle du beskriva de mål och regelverk som styr skogens användning och nyttor (ekosystemtjänster) i Sverige idag?

	Stämmer	Stämmer inte
Tydliga		
Samstämmiga		
Lättillgängliga		
Balanserade och rättvisa		
Annat		

6. Hur upplever du/din organisation förhållandet mellan de olika mål som finns? Neutral, synergi, konflikt? Behöver avvägningar göras?

a. Gör en bedömning, baserad på din erfarenhet och kunskap, över vad som karaktäriserar förhållandet mellan de mål som du tyckte var mest betydelsefulla, se nedan. Neutralt (), synergi (+), konflikt (-) eller vet ej (/).

Neutralt = Blankt Synergi/gynnar varandra= + Konkurrens/missgynnar varandra= - Vet ej= /

Relation mellan mål	⋮	⋮	⋮			
….						
….						
….						
….						

b. I er egen verksamhet, hamnar ni i situationer när ni måste göra avvägningar mellan de här målen? Ge exempel? Hur gör ni då?

c. Hur är det med synergier, ser ni några sådana utifrån er egen verksamhet? Ge exempel?

d. Upplever ni att de styrmedel som finns, ger er det stöd ni behöver för att hantera konflikter, och göra avvägningar? Hitta och utveckla synergier? Om inte, vad borde utvecklas eller förändras?

7. Vilka myndigheter/organisationer känner du till, och hur viktiga är de för er organisations verksamhet? Välj ut dessa.
   - Skogsstyrelsen
   - Länsstyrelsen
   - Kommunen
   - Naturvårdsverket
   - Energimyndigheten
   - Region Norrbotten
   - Sametinget
   - Sverige Geologiska Undersökning/Bergsstaten
   - Universitet

- Annat

Mest viktig	Lite viktig	Minst viktig

a. Specificera på vilket sätt/i vilka situationer har du kommit i kontakt med dem?

b. Finns det andra aktörer, exempelvis intresseorganisationer eller andra företag, som är viktiga för er verksamhet och era skogsrelaterade strategier.

Tack för alla dina värdefulla svar. Är det något som du vill lägga till? Har du några övriga frågor till oss? Får vi kontakta dig igen om vi behöver mer information?
Vi undrar också om ni har några dokument som kan vara relevant för oss? T.ex. strategimaterial, organisationspolicy eller liknande.
Stort tack för din medverkan. Vi kommer att skicka den svenska sammanfattningen av resultaten när den är färdig.

Examensarbeten / Master Thesis
Inst. för skogsekonomi / Department of Forest Economics

1. Lindström, H. 2019. Local Food Markets - consumer perspectives and values

2. Wessmark, N. 2019. Bortsättning av skotningsavstånd på ett svenskt skogsbolag - en granskning av hur väl metodstandarden för bortsättningsarbetet följts

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9. Berg Rustas, C. & Nagy, E. 2019. Forest-based bioeconomy - to be or not to be? - a socio-technical transition. *Skogsbaserad bioekonomi - att vara eller inte vara? - En socio-teknisk övergång*

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11. Bernö, H. 2019. Educating for a sustainable future? - Perceptions of bioeconomy among forestry students in Sweden. *Utbildning för en hållbar framtid? - Svenska skogsstudenters uppfattningar av bioekonomi*

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15. Gyllengahm, K. 2020. Omsättningslager för förädlade träprodukter - en avvägning mellan lagerföring - och orderkostnad. *Levels of cycle inventory for processed wood products - a trade-off between inventory - and order cost*

16. Olovsson, K. 2020.Ledtider i sågverksindustrin – en analys av flöden och processer. *Lead times in the sawmill industry – an analysis of flows and processes*

17. Holfve, V. 2020. Hållbart byggande – Kommuners arbete för flerbostadshus i trä. *Building in a sustainable way –Municipalities' work for wooden multistory constructions*

18. Essebro, L. 2020. Ensuring legitimacy trough CSR communications in the biobased sector. *Att säkerställa legitimitet genom CSR kommunikation i den biobaserade sektorn*

19. Gyllengahm, K. 2020. Making material management more efficient – reduction of non-value-adding activities at a wood products company. *Effektivisering av materialflödet – reducering av icke värde-adderande aktiviteter på ett trävaruföretag*

20. Berg, E. 2020. Customer perceptions of equipment rental – Services for a circular economy. *Kunders uppfattning av maskinuthyrning – Serviceutbud och cirkulär ekonomi*

21. Emerson, O. 2020. Impacts of environmental regulations on firm performance – the development of a new perspective. *Påverkan av miljökrav på företags prestanda – utvecklingen av ett nytt perspektiv*

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