The Swedish policy framework for Forest Ecosystem Services

– A study of integration of objectives, policy instruments and local actor's knowledge about policies and policy objectives

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Degree project/Independent project • 60 hp
Swedish University of Agricultural Sciences, SLU
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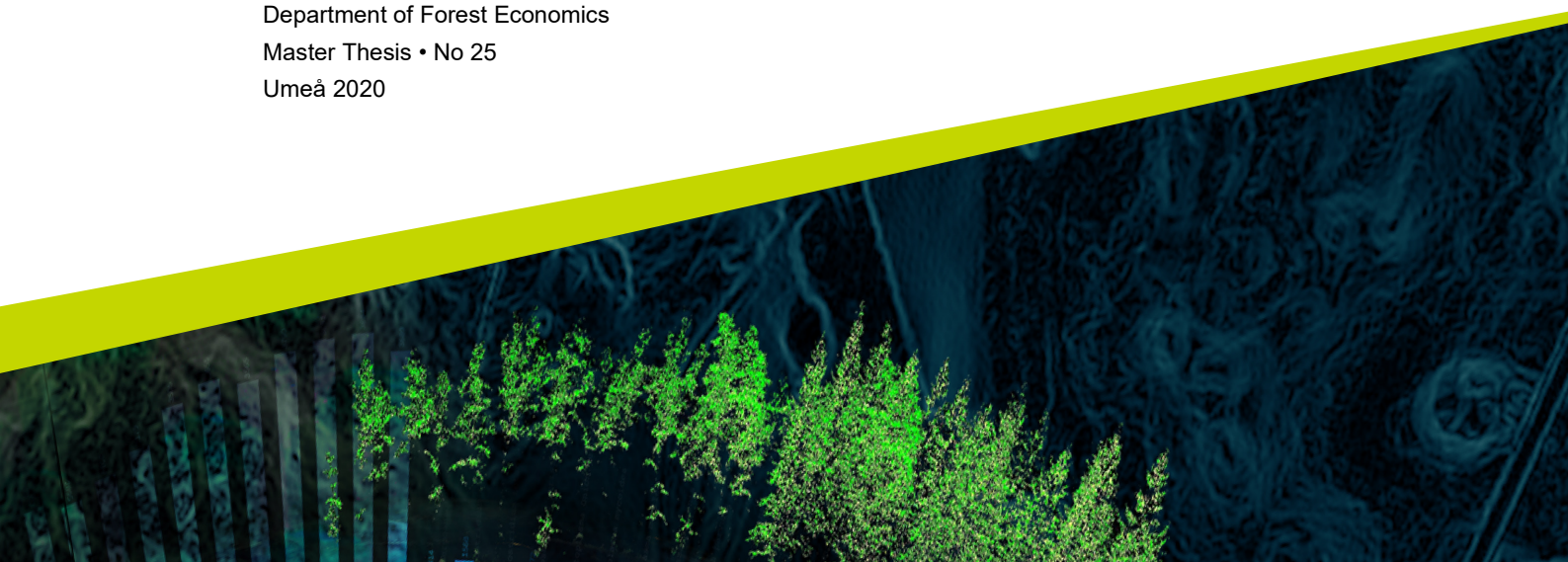
Master Thesis • No 25
Umeå 2020



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– A study of integration of objectives, policy instruments and local actor's knowledge about policies and policy objectives

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Credits:	60 hp
Level:	A2E
Course title:	Master thesis in Forest science
Course code:	EX0924
Programme/education:	Forest Science
Course coordinating dept:	Department of Forest Economics
Place of publication:	Umeå
Year of publication:	2020
Title of series:	Master Thesis
Part number:	25
Keywords/Nyckelord:	energy, climate, forest, nature conservation, policy analysis, policy implementation, policy perception, stakeholders beslutsfattande, policyimplementering, policyintegrering, skogliga ekosystemtjänster, Sverige

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This master thesis of 60 hp is based on the following papers:

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

Paper 2. Tanse, K. Implementation of policy for forest ecosystem services in Sweden – A study on implementation practises and how policies are perceived by local actors

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 theses, within two master theses of 60 hp. The authors have each one additional thesis.

Table of contents

List of tables

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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Acknowledgements

A great thank you to supervisor Camilla Widmark and assistant supervisor Karin Beland Lindahl, for introducing us to this project and subject.

This study is carried out within the framework of the research programme POLYFORES. This paper has been reviewed by Proofreadingservices.com.

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:				
				Goal 1:				

Policy document 8: Title in English				Goal 2:				
				Goal 3:				

Paper 2

Implementation of policy for forest ecosystem services in Sweden – A study on implementation practises and how policies are perceived by local actors

Tanse, K.

Abstract

Sweden has a long tradition of using and managing forests for forest ecosystem services (FES). Consequently, the development of policy for FES has continuously been revised to meet demands of ecological consideration in forest use and management. For a policy to be successful it must be implemented on a local level. This study tries to contribute to knowledge of Swedish policy implementation and how the Swedish policy framework works in practice by a qualitative thematic analysis of Swedish FES-related policy documents supplemented by an interview study with key actors. The aim of this study is to (1) identify the implementation practices of FES-related policies in the four policy areas *climate*, *energy*, *nature conservation* and *forest*, and (2) analyse how FES-related policies are perceived by key actors on a local level.

Results show that the implementation practices for the four policy areas are similar in terms of strategies but differ in specific instruments. Climate and energy policies use more economic instruments and nature conservation and forest policy uses more voluntary instruments. The actors interviewed show a broad knowledge of policies and objectives for FES, although most knowledge lies within their area of interest. The policies and objectives with a sanction are ranked as more important than more voluntary. Thus, the results can help to understand how priorities between objectives can be made in policymaking and which policy instrument can be useful in different situations to reach a desired outcome.

Keywords: policy implementation, policy perception, policy analysis, climate, energy, nature conservation, forest, stakeholders

Sammanfattning

Sverige har en lång tradition av att nyttja och sköta den svenska skogen för dess ekosystemtjänster. På grund av detta har utvecklingen av politiken för skogliga ekosystemtjänster reviderats kontinuerligt för att möta kraven på naturhänsyn i skogsbruket. För att en policy ska få önskad effekt måste den implementeras på lokal nivå. Denna studie försöker bidra till kunskapen om svensk policyimplementering och hur den svenska policyramverket fungerar i praktiken genom en kvalitativ tematisk analys av svenska policydokument som relaterar till skogliga ekosystemtjänster, kompletterad med en intervjustudie med lokala aktörer. Syftet med denna studie är att (1) identifiera metoder för implementering hos policys för skogliga ekosystemtjänster inom de fyra politikområdena klimat, energi, naturvård och skog, och (2) analysera hur policy för skogliga ekosystemtjänster uppfattas av nyckelaktörer på en lokal nivå.

Resultaten visar att implementeringsmetoderna för de fyra policyområdena är likartade när det gäller strategier men skiljer sig åt vad gäller specifika instrument. Klimat- och energipolitiken använder mer ekonomiska instrument medan naturvård och skogspolitik använder mer frivilliga instrument. De intervjuade aktörerna visar en bred kännedom om olika policys och mål, även om den största kännedomen ligger inom deras intresseområde. Policys och mål som är kopplade till sanktioner av något slag rankas som mer viktiga än policys och mål som är frivilliga. Resultaten kan hjälpa till att förstå hur prioriteringar mellan mål kan göras vid beslutsfattande och vilket styrmedel som kan vara användbart i olika situationer för att nå önskat resultat.

Preface

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

> The project results will contribute to policymakers learning 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).

Table of contents

List of tables

List of figures

Abbreviations

EPI	Environmental Policy Integration
FES	Forest Ecosystem Services
NGO	Non-Governmental Organisation

1. Introduction

Sweden has a long tradition of using forests for wood production and has included ecological aspects in policy since the beginning of the 20th century. In the history of Swedish forest policy, two main years are stated as "turning points". The first is 1903, when the first Forestry Act was established, with the aim of a sustainable use of the forest and with the requirement of regeneration after harvest. Though the regeneration requirement was implemented, finding a balance between wood production and environmental issues continued to be a challenge. This led to different changes in the 1903 Forestry Act during the 20th century and the second "turning point" in 1993, when the Forestry Act of today was accepted by the Swedish government. This act had two main goals, stating that the production goal and the environmental goal were to be treated as equal and putting more light on the environmental issues (Appelstrand 2012; Ekelund and Hamilton 2001).

The history of Swedish forest policy can be described as a journey "from government to governance", and it has alternated between hard law with command-and-control instruments and soft law with advising and voluntary instruments (Appelstrand 2012). Today, environmental policy is more integrated in different policy areas than treated separately, as sustainable development has become an important aspect in many sectors (Nilsson and Eckerberg 2007). Four policy areas that can be connected to forests are climate, energy, nature conservation and forest (Winkel et al. 2013).

Sustainable development is a prioritized topic among the countries of the world, leaders and different organisations. To meet challenges like climate change, poverty and increased population, both the need and the demand for sustainable resources have increased. In Sweden, the forests have been raised as a resource that can be a part of the solution for many of our challenges today and in the future. On the one hand, increased wood production is argued to mitigate climate change, and wood-based products can replace fossil-based products. On the other hand, protection of forests is argued to save biodiversity and to serve as a means of carbon storage. The different opinions on how forests should be used and managed create conflicts

between the different interests. If and how several interests can be present and/or can increase at the same time are part of an ongoing discussion among forest actors, policymakers and scientists (Beland Lindahl et al. 2017; Beland Lindahl and Westholm 2010).

Swedish forests offer a broad range of forest ecosystem services (FES) that have been and still are used by many different actors (Hansen and Malmaeus 2016). With many interests and actors connected to the Swedish forests, challenges in balancing the use of different FES arise (Hansen and Malmaeus 2016; Nordén et al. 2017; Sandström et al. 2016). The Swedish forestry model is usually described as "freedom with responsibility", which puts a lot of responsibility on the forest owners since the legal framework works as a minimum. To meet the national objectives on biodiversity and forest land protection, for example, forest owners need to do more for issues like biodiversity than is stated in the law (Beland Lindahl et al. 2017). Dialogue and consensus are expressed as an important part of policymaking (Sundström 2005), and Sweden has a tradition of including different actors in forest policymaking (Appelstrand 2007). Though the thought of dialogue and consensus is good in theory, it can be challenging in policymaking. The direction of the final policy and the amount of influence different actors have in policymaking often depend on their financial ground and how well-established they are (Johansson 2016; Widmark et al. 2013). Some actors also use a more offensive approach to make sure that their will and interests are met. This can create an unbalanced amount of influence in policies since all actors do not have the same ability to make their voice heard (Bjärstig 2013). This makes the governing of the forests important to maintain the multifunctionality of the Swedish forests (Beland Lindahl et al. 2017; Sandström et al. 2011). One important factor to succeed with the governing of the forests is the implementation of policies. There is still a lack of knowledge on what influences policy implementation and how the Swedish policy framework works in practice (Beland Lindahl et al. 2017; Wallin 2017).

There are many approaches to analyse the implementation and vertical integration of policy objectives. Söderberg (2011) argues that there is a need for multi-sector environmental policy integration (EPI) studies focusing on "exploring the coherence between policies on a certain issue in different relevant sectors" (p. 20). This is especially important since EPI in practice often boils down to a question of weighing environmental and sectoral objectives (Söderberg 2011). Policy coherence can be described as the interaction between policies within and across levels and, as a way to achieve common non-conflicting objectives, to reduce conflicts and promote synergies within and across different policies and implementation levels (den Hertog and Stross 2013; Makkonen et al. 2015;

Mickwitz et al. 2009; Nilsson et al. 2012). The factors building the concept of policy coherence set by Nilsson et al. (2012) are in this study used to analyse which implementation practices are used in the policy areas of climate, energy, nature conservation and forest.

1.1. Aim & research questions

This study intends to contribute to the knowledge of Swedish policy implementation and how the Swedish policy framework works in practice. A qualitative thematic analysis of Swedish FES-related policy documents supplemented by an interview study with key actors will be performed. The aim of this study is to analyse the implementation practices of FES-related policies in the four policy areas of climate, energy, nature conservation and forest. This will be done by (1) identifying implementation practices in FES-related policy documents and (2) a local case study of how the policies are perceived by key actors. The questions to be answered are these:

1. What are the implementation practices of FES-related policies?
2. How are the FES-related policies perceived by key actors on a local level?

1.2. Outline

The outline of the paper is first a chapter describing the theoretical framework (Chapter 2), then a chapter about materials and methods (Chapter 3). The results, analysis and a summarizing discussion are then presented in Chapter 4. This is followed by a concluding discussion in Chapter 5.

2. Theoretical framework

2.1. Policy implementation

To identify the implementation practices in policies for climate, energy, nature conservation and forest, this study departs from the theory of policy coherence (den Hertog and Stross 2013; Makkonen et al. 2015; Mickwitz et al. 2009; Nilsson et al. 2012). There is no clear definition of policy coherence (den Hertog and Stross 2013). However, common to all definitions is that there is a high level of coherence in promoting synergies and reducing conflict (den Hertog and Stross 2013; Makkonen et al. 2015; Mickwitz et al. 2009; Nilsson et al. 2012). Nilsson et al. (2012) describe policy coherence as

> an attribute of policy that systematically reduces conflicts and promote synergies between and within different policy areas to achieve the outcomes associated with jointly agreed policy objectives. (p. 396)

Nilsson et al. (2012) suggest a three-step process for analysing policy coherence. These three steps are to identify:

1. policy objectives (objectives set by the policies);
2. policy instruments
    a. general policy implementation preferences (e.g. broader ideas, approaches and/or strategies)
    b. specific policy instruments (e.g. the specific policy tools used to achieve the objectives); and
3. policy implementation (the arrangements of authorities and other actors that are identified as responsible and/or involved in the implementation of a specific objective).

These three steps, with emphasis on step two, are used to identify policy implementation practices in this study (Table 1). In step one, objectives are to be identified, as Gebre-Medhin and Tanse (2020) did in their analysis of policy integration and environmental policy integration. Accordingly, the objectives identified in their study are used in this study since they analysed the same documents. In step two, policy instruments are separated into two parts (2.a and 2.b). Policy implementation preferences (2.a) refer to what the policy documents say about the general policy implementation preferences that are portrayed as the preferred means to achieve the objectives. The specific policy instruments (2.b) refer to the instruments that are defined in the analysed documents.

Further, according to Nilsson et al. (2012), policy implementation comprises the arrangements by authorities and other actors for putting policy instruments into action. Thus, in step three, key authorities and actors that are involved in the implementation of identified policy objectives are identified.

Table 1. Framework for analysis of policy coherence, used to identify implementation practices.

1. Objectives and sub-objectives
objectives and sub-objectives identified
2. Instruments to achieve objectives
a) implementation ideas/strategies identified
b) specific policy instruments identified
3. Key authorities and actors
arrangements of authorities and other key actors identified

2.2. Actors' policy perception

The second step of this study is to analyse how actors perceive the policies for forest ecosystem services to understand the implementation of policy on a local level. For a policy to achieve its objectives, it is important to include the actors affected by the policy in both the policymaking process and the implementation process (Appelstrand 2012b; Bäckstrand 2006; Bryson 2007). Further, Marshall (2007) argues that the outcome of policy objectives highly depends on how policies are perceived by the actors using the resource regulated by the policy. Capello and Perucca (2019) describe that actors' perceptions of policy depend on how the policies meet their needs. In their study they analyse the EU identity by arguing that it is built by the citizens' policy perception. They analyse two factors that are argued

to be important for policy perception: citizens awareness of policy and their satisfaction with policy. In this study, both policies and policy objectives connected to climate, energy, nature conservation and forest are studied. In the framework for analysing actors' policy perception, awareness is assessed as the actors' knowledge of policies/objectives, and satisfaction is assessed as actors' opinions of the importance of policies/objectives (Figure 1). It is important to keep in mind that actors' satisfaction with policies and objectives can be affected by the adverse effect the policy can have on the actor (Paraskevopoulos 2002). By interviewing local actors affected by the policies, conclusions can be drawn on how the actors perceive the FES-related policies and if the identified implementation practices work.

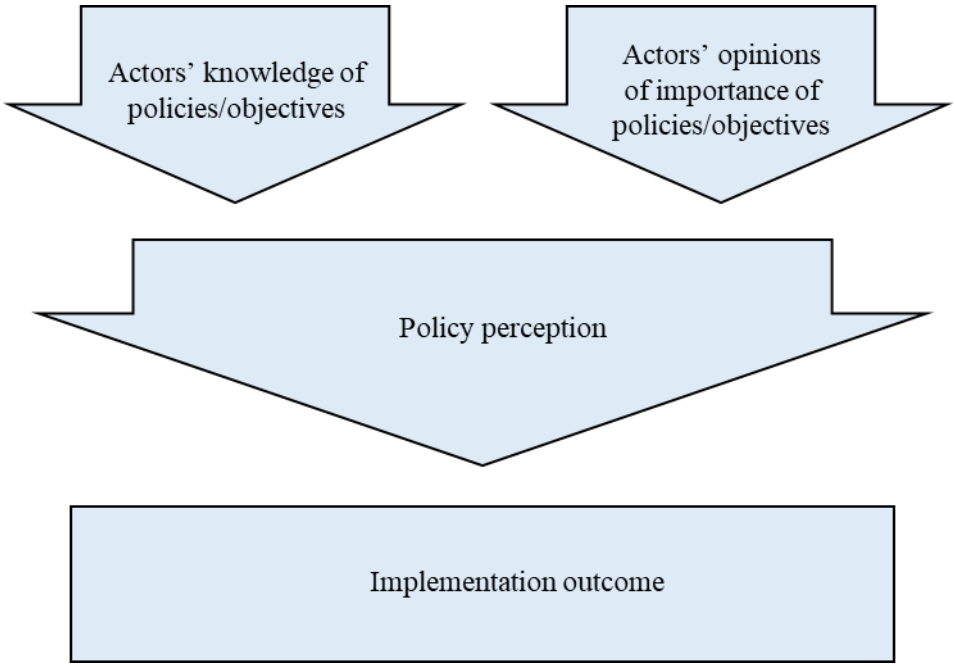

Figure 1. The framework for the analysis of actors' perception. The implementation outcome depends on actors' policy perception, which is assessed through actors' knowledge of policies/objectives and the actors' opinions of the importance of policies/objectives (Capello and Perucca 2019).

3. Materials & Methods

3.1. Policy analysis

3.1.1. Document selection

Four policy areas were in focus for this study: climate, nature conservation, energy and forest. They all influence the provision of FES due to their interests (Hansen and Malmaeus 2016) and because they are clearly defined as separate policy areas they have been selected for this study. The policy texts in focus for the analysis address FES-related issues. For a document to be selected it must meet either of two criteria: (1) a national law, bill or other authoritative document, and (2) authored by or on behalf of the Swedish government. Additionally, the document needs to be the most recent of its kind. A total of nine documents were selected with a variation in types of documents (see Table 2).

Table 2. Selected documents for analysis.

Document	Content	Relevance to paper
Climate Act (SFS 2017:720)	Law that describes the Swedish government's climate policy work, aims and how it should be conducted.	Regulates the Swedish climate work.
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.
Direction of Energy Policy (Bill 2017/18:228)	Political aims to reach fossil-free-energy production.	Indicates broad political agreement on future energy politics.
Budget Bill for 2017, category 21 Energy (Bill 2016/17:1)	Budget for energy policy.	Shows implementation of energy politics.
Swedish strategy for biodiversity and ecosystem services strategy (Bill 2013/14:141)	Describes the aims for biodiversity and ecosystem services and their importance in the Swedish community.	Shows 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 have been reached toward biodiversity partial goals and ecosystem services.	Shows the work done for the protection and increase of biodiversity and ecosystem services.

Environmental act (SFS 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 forests and forest ecosystem services.	Shows the broad use of the Swedish forests and subsequent synergies and conflicts.
Swedish forest policy (collection of regulations and guidelines: Swedish forestry act SFS 1979:429 (law) Forestry regulation SFS 1993:1096 (policy plan) General advice SKSF 2011:7 (policy plan))	Regulates forestry in Sweden.	Describes the legal framework for forestry and its interpretation.

3.1.2. Method of analysis

A total review of the documents was first performed. The documents were read one by one, and three questions were answered based on the theoretical framework:

1. What do the documents say about how the identified FES-related policy objectives/frameworks (including or related to climate, energy, nature conservation, forest) are to be implemented? What ideas/strategies guide the implementation?
2. What authorities at different levels (federal/national, regional/local) are responsible/involved in the implementation?
3. What legislation and regulatory frameworks guide the implementation?

The answers were collected as quotes, and they were later summarized following the policy analysis steps presented in the theoretical framework. All documents analysed were written in Swedish, and quotes in the results section were translated, with the original in footnotes.

3.2. Actor analysis

To understand how policies are perceived after implementation, a qualitative interview study was chosen as a method to capture the actors' thoughts and opinions on policies for FES. The interviews were standardized to limit the risk of impact from the interviewers on the answers, and to limit the amount of information collected (Trost 2005). The basis for the interviews was the policy analysis presented above and the policy analysis made by Gebre-Medhin and Tanse (2020). The identified objectives, policies (both the analysed policies and policies referred to in the documents) and authorities were included in the questions asked during the interviews.

3.2.1. Selection of study location

The study location selected was Piteå Municipality in Norrbotten County. The municipality has signed the Covenant of Mayors for Climate and Energy introduced by the EU and by that is taking the lead in sustainable development. Piteå Municipality also offers a broad range of actors, e.g. forest industries, different types of forest owners, indigenous people, NGOs and hunters. In addition, the

municipality holds large areas of forests and different types of forests, which makes it a study location representing the complexity of Swedish forests and forest actors.

3.2.2. Identification of actors

In this study, an "actor" refers to organised actors, i.e. organisations that can be expected to influence land use and forest management in Piteå Municipality. To be selected as an actor, at least one of five criteria must be met. They must be:

1. Land owners/tenure holders/authorities who are involved in forestry/forest management activities on the ground;
2. A forest owner association (for private forest owners);
3. Industries/businesses of different kinds that use/buy/rely on biomass (timber, pulp, bioenergy feed stock, other wood-based materials) or other FES (tourism enterprises, reindeer husbandry, etc.);
4. Local/regional authorities who implement FES-related policies, oversee land use/forest management or are involved in FES-related strategy development; or
5. NGOs capable of influencing current and/or future use of FES and forest land in the case study location.

The informants for each actor must have the authority to speak for the organisation and have positions where they are involved in the decision making of land use or forest management. Identification of actors was made through the documents analysed and by actors identified by synergies or conflicts in Gebre-Medhin and Tanse (2020); a Google search with keywords (actor group name, see Table 3) was made on organisations in Piteå Municipality and with local knowledge of organisations in Piteå Municipality. Informants were selected through information on each actor's webpage. After identification, a request for participation in the study was sent to the informants by mail and email with a follow-up reminder and/or phone call. Attached to the request was summarized information about the POLYFORES project. A total of 19 informants from 17 actors, with different FES-related interests, agreed to participate. Some organisations covered the whole of Norrbotten County but handled issues within the area of Piteå Municipality. The actors have been divided into six actor groups. Each group consists of actors with similar interests in FES (Table 3).

Table 3. Types of actors interviewed.

Type of actor	Actor number	Interests in FES
Authorities	1	Responsible for
	2	supervision of laws and
	3	other policies.
Energy & innovation	4	Forest products as energy
	5	source, new products and
	6	solutions from forests.
Forest owners	7	Companies and forest
	8.1	owner associations that
	8.2	own forest to use for their
	9	own interests.
Industries	10	Use forest products to
	11	refine new products.
	12	
Native & tourism actors	13.1	Cultural and economic
	13.2	interests.
	14	
NGOs	15	Cultural, ecological and
	16	social interests.
	17	

3.2.3. Interview survey guide

For the standardized interviews, a general guide (Appendix 1) was used to help focus and streamline the interview situations and give all actors the same interview conditions. The guide included four parts, A–D (Table 4).

Table 4. Structure of interview guide used during interviews.

Part	
A.	General information about the actor and informant: Type of organisation, forest activities, informant's position and tasks.
B.	Actor's understanding of FES, current forest use and forest use strategies: Importance of FES, relations between FES, current and future challenges and opportunities
C.	Factors affecting/influencing current forest use in the area of Piteå Municipality: Importance and relationships between factors
D.	Actor's understanding of current FES-related policies and objectives: Knowledge and importance of and relationship between policies and objectives. Policy characteristics, importance of authorities and other organisations

The policies and objectives asked about during the interview are presented in Table 5 (Swedish translation is found in Appendix 1).

Table 5. Policies and objectives asked about during the interviews.

Policy	Objective
A climate policy framework for Sweden	100% renewable energy production by 2040
A Swedish strategy for biodiversity and ecosystem services	50 % of the energy use will come from renewable energy 2020
Capacity development for energy conversion and reduced climate impact	Environmental goal in the Forestry Act
Climate Act	Forests will contribute to jobs, sustainable growth and development of a growing bioeconomy.
Coherent policy for rural Sweden	Fossil-free vehicle fleet by 2030
Cooperation programe for circular and biobased economics	Improve people's opportunities for outdoor activities and to visit nature.
Electricity certificate scheme	Multiple use of forest
Emission trading schemes	NEQO: Living forests
Energy and carbon dioxide taxes	NEQO: Living lakes and streams
Energy transition subsidy schemes	NEQO: Living wetlands
Environmental Act	NEQO: Reduced climat impact
Financing of innovation and entrepeneurship in renewable energy	NEQO:A rich plant- and wildlife
Forest Certification Schemes (FSC or PEFC)	No net emissions of GHG by 2025
Forestry Act	Production goal in the Forestry Act
My pages	Protection of ancient monuments and valuable cultural environments in the forest
National Forest Program	Sustainable forestry with increased climate benefit.
National strategy for formal protection of forests	The right of Native people to use land and water
Nature Conservation Agreements	World-class innovations and forest products
Nature Reserves	
Regional climate- and energy strategy	
Reindeer Husbandry Act	
Sectoral strategies for energy efficiency	
Species Protection Ordinance	

3.2.4. Interview circumstances

The interviews were performed with two interviewers, one asking the questions and one taking notes, and the location was chosen by the informant. Before starting the interviews, a short introduction of the interviewers, POLYFORES and GDPR was made. The interviews lasted 1–2 hours, depending on the length of the informants' elaborations. The answers were collected through notes and forms. Additionally, photos were taken to document the categorizing and ranking of the cards naming policies and objectives. These cards were sorted in alphabetical order before starting each interview. The interviews were recorded as a back-up, and photos and recordings were taken with permission of the informant. The answers were later summarized using the structure of the interview survey guide to perform the analysis for each actor. Most of the questions were multiple-option questions or ranking of cards with different FES, policies, objectives, factors and authorities. A few questions were open-answer questions to give the informants an opportunity to elaborate their answers and opinions.

3.2.5. Analytic method

The interviews generated a large data set that could be analysed in different ways (Bryman 2011). In this study, mainly questions from part D of the interview survey guide were used. The answers were analysed through frequency tables for each actor group (Bryman 2011) to identify the range of knowledge and opinions of Swedish FES-related policies.

This study intended to capture a broad picture by analysing several policy areas and interviewing different types of actors. There is variation among policies, objectives and actors in the connection to the use of FES. Some have a more direct connection, and some have a secondary connection (e.g. use products derived from forests but are not involved in the direct use of forests). The interview was standardized to affect the interviewees as little as possible. However, the time used for each interview varied due to the length of the interviewees' answers. The results from the last part (D) of the interview survey guide can therefore have been more stressed than the others, which could affect the results. Due to this, the parts of the questions where the interviewees were given an opportunity to explain their answers has not been analysed due to the different opportunities for the interviewees. The results of this study reflect the opinions of local actors in one municipality in northern Sweden; thus the results could differ if the same study were to be conducted somewhere else.

4. Results & discussion

The results are divided into three parts: (1) a summarizing description of the policy objectives identified by Gebre-Medhin and Tanse (2020); (2) results from the policy analysis of implementation practices for the policy areas of climate, nature conservation, energy and forest; and (3) results from the local case study of actors' policy perceptions in Piteå Municipality.

4.1. Policy objectives

This study uses the policy analysis made by Gebre-Medhin and Tanse (2020) for identification of policy objectives. In this policy analysis, objectives and sub-objectives were identified. Several of the objectives in each policy area are similar and are therefore summarized in this study.

Climate policy objectives are about limiting the human impact on the climate and highlight the importance of decreasing the emissions of greenhouse gases. To do this, increased use of renewable energy and protection of ecosystems are mentioned as key factors to succeed (Bill 2016/17:146; SFS 2017:720). Further, energy policy objectives are strongly connected to the objectives in climate policies. The main objectives in energy policies are to increase efficiency in energy production and to use and increase the usage of renewable energy, to limit the climate impact. The energy policies also state that the Swedish energy sector shall be competitive and take a global lead in renewable energy (Bill 2016/17:1; Bill 2017/18:228).

Objectives in nature conservation policies are about protecting the forest to maintain and increase biodiversity. Another objective is to create diversified forests. Diversified forests are argued to be more resilient and able to better handle future climate change-induced challenges like storms and fires. The last main objective is to improve forest management to protect the cultural legacy and to create forests for human recreation (SFS1998:808; Bill 2013/14:141; Ds 2017:32).

Forest policy objectives aim to balance the two objectives of forest production and forest protection for environmental issues (Swedish Forest Agency 2019). Further objectives are to maintain current wood production, maintain biodiversity and forests for social values and objectives about using forests to support a growing bioeconomy and to replace fossil products. Companies in the forest sector are important employers in the rural areas of Sweden, which is why objectives to increase employment in those areas are set (Government Office of Sweden 2018).

4.2. Policy implementation practices

The first research question for this study is *What are the implementation practices of FES-related policies?* To answer the question, policy documents for climate, nature conservation, energy and forest have been analysed as described in the methods section to identify what implementation ideas, instruments and authorities/actors are used. Results are presented for each policy area separately and in Table 6.

4.2.1. Implementation practices

Climate policy

The objectives for climate policy are set to fulfil Swedish agreements on an international level, e.g. with regard to the UN and the EU, to prevent climate change and the damaging effects of emissions on ecosystems and health (Bill 2016/17:146; SFS 2017:720). To reach this, the objectives are organised through the system of National Environmental Quality Objectives, milestone targets and governmental feedback reports to the Parliament (Bill 2016/17:146). The Parliament also has enacted a Climate Act that states how the Swedish government shall work with climate issues (SFS 2017:720). In addition, a Climate Policy Council has been created to evaluate the policies and advise the Swedish government in the political realm (Bill 2016/17:146). In summary, the implementation strategies for climate policies are regulation, policy coordination, strategy development, targets, monitoring and economic instruments. Specific instruments connected to this are the Climate Act, Climate Policy Council, regional climate and energy strategies (guided by appropriation directions and authorisations from the government), taxes and emission trading. Authorities responsible for this are the Swedish

Environmental Protection Agency, county administration boards and municipalities, all representing different policy levels (Bill 2016/17:146).

Energy policy

A transition to more sustainable energy production and use are the focus of energy policies. To make the transition to renewable energy sources, reduced emissions and competitiveness are highlighted as important factors to fulfil the objectives of energy policies (Bill 2017/18:1; Bill 2017/18:228). Climate change issues are of high importance for the energy sector and are the justification for greater sustainability (Gebre-Medhin and Tanse 2020). The bill for the direction of energy policy (Bill 2017/18:228) states the strong connection between energy and climate issues:

> Climate policy and energy policy is closely connected, and the climate policy goals are also the point of departure for the development of the energy system.[1] (p. 15)

The close connection between the climate and energy sectors provides strong integration (Gebre-Medhin and Tanse 2020), and climate and energy policy have a strong impact on each other. To reach the objectives, several actions are needed to be made by the energy sector. The implementation strategies are a combination of market-driven change, where the Swedish government creates conditions that make it beneficial for the energy sector to become more sustainable, and more hands-on command-and-control instruments. The implementation strategies for energy policies are regulation, coordination with climate objectives, strategy development for climate and energy, targets and economic instruments. Specific instruments for implementing the energy policies include the Electricity Certificate Act (SFS 2011:1200), the Energy Agreement (2016), budget bill area 21 (Bill 2017/18:1), regional energy and climate strategies, the Environmental Act, the Plan and Building Act and research funding. Responsibility for implementing the energy policies lies with the agencies for energy, transport and transport administration. They are to advise and support county administration boards and municipalities in strategy development and other issues regarding transition to a more sustainable energy sector. Apart from creating conditions for the transition of the energy sector, the government is also responsible for the funding of research and innovation and for planning the necessary infrastructure (Bill 2017/18:1; Bill 2017/18:228).

[1] "Klimatpolitiken och energipolitiken är tätt sammankopplade, och de klimatpolitiska målen är även en utgångspunkt för utvecklingen av energisystemet." (Bill 2017/18:228).

Nature conservation policy

As in climate policy, several of the objectives found in nature conservation policy lead back to international commitments Sweden has accepted, for example the Convention on Biological Diversity taken in Nagoya (2010), UN Agenda 2030 and the EU Strategy for Biological Diversity. The aim is to take action for a sustainable future and to secure a healthy and good environment (SFS 1998:808). A cornerstone in the Swedish work on preserving nature and biodiversity is the Swedish Strategy for Biological Diversity and Ecosystem Services (Bill 2013/14:141). Connected to this strategy is the government decision on 10 milestone targets for biological diversity and ecosystem services (Ds. 2017:32). Together these two are contributing to the National Environmental Quality Objectives, including flourishing lakes and streams, sustainable forests and a rich diversity of plant and animal life (Bill 2013/14:141). The strategies to implement conservation policies take place through regulation, voluntary instruments, targets, monitoring, counselling and dialogues. Specific instruments used are the Environmental Act, Forestry Act, Climate Act, certifications and agreements. Responsible authorities are the Swedish Environmental Protection Agency, county administration boards, the Swedish Forest Agency and municipalities.

Forest policy

Forest policy rests on the principle of "Freedom with responsibility" (Swedish Forest Agency 2017), meaning that several of the implementation strategies rely on dialogue, information and counselling. Regulation is another strategy and is mainly handled through the Forestry Act (Swedish forest policy; SFS 1979:429, SFS 1993:1096 and SKSF 2011:7), but also through parts of the Environmental Act (SFS 1998:808). The Forestry Act represents the minimum of what must be considered in terms of nature conservation. In addition to this there are several objectives that the forest owners must consider in their forest management. This is where the implementation strategies above take place. Forest owners need to do more if the objectives are to be reached. Specific policy instruments to do this include voluntary instruments (several with an economic incentive) as certifications (FSC/PEFC), dialogue, agreements, funding and regulation. The Swedish Forest Agency and in some cases county administration boards are responsible for coordination information/counselling activities and to measure how environmental objectives are considered in forestry. Apart from authorities, forest owners have a big responsibility for the implementation of objectives other than economic ones, such as environmental objectives.

Table 6. Implementation practices, instruments and authorities.

	Climate	**Energy**	**Nature Conservation**	**Forest**
Instruments to achieve objectives - implementation ideas and/or strategies identified	- Regulation - Policy coordination (energy) - Strategy development - Targets & monitoring - Economic instruments	- Regulation - Coordination (climate) - Strategy development - Targets & monitoring - Economic instruments	- Regulation and voluntary (market) instruments - Targets & monitoring - Counselling - Dialogue	- Freedom under responsibility - Voluntary (market) instruments - Counselling and dialogue
Instruments to achieve objectives - specific policy instruments identified	- Climate Act - Climate Policy Council - Regional climate & energy strategies - Taxes & emission trading	- Electricity certificate act (2011:1200) - Energy Agreement - Information - Counselling and strategy support - Taxes & economic incentives	- Environmental Act - Forestry Act - Climate Act - Certification - Agreements	- Certification - Dialogue - Agreements - Funding - Regulation
Key authorities and actors - arrangements of authorities and other key actors identified	- Swedish Environmental Protection Agency - County admin. boards - Municipalities	- Swedish Energy Agency - County administration boards - Municipalities - Swedish Transport Agency - Swedish Transport Administration	- Swedish Environmental Protection Agency - Swedish Forest Agency - County administration boards - Municipalities - Forest owners	- Swedish Forest Agency - County administration boards - Forest owners

Summarizing discussion

Results show that the implementation strategies are similar among the four policy areas. However, the specific instrument to achieve implementation differs. The climate and energy sectors both have a clear distribution of responsibility among agencies and other actors, and there are also more economic benefits of implementing the policies. Nature conservation and forest sectors must to a greater extent rely on voluntary actions by actors (mainly forest owners), which can be done in a variety of ways depending on the interests of the forest owner to involve issues other than economic ones in forest management.

4.3. Actors' perception of policies

The second question for this study is *How are the FES-related policies perceived by key actors on a local level?* A standardised qualitative interview study was performed with local actors in Piteå Municipality. The results are first shown as a total and then presented per actor group. Policies and objectives are presented only as totals. Since there was little distinction made by the interviewees between the categories less important and least important, they are presented in the same staples in the figures.

4.3.1. Actors' knowledge of policies

As shown in Figure 2, there were three policies that all interviewees had heard about or are familiar with*:* the Environmental Act, nature reserves and forest certification schemes. Other policies that several actors were familiar with or had heard about (and consequently have some knowledge about) included energy and carbon dioxide taxes, the Forestry Act, the Reindeer Husbandry Act and the species protection ordinance.

Interviewees from each actor group were familiar with almost all policies (see Figure 3). Authorities and forest owners were the actor groups with the broadest knowledge of policies. At least two interviewees were familiar with 12 respectively 13 of the policies. For the other actors, the policies within their "area of interest" were the familiar/known policies, and they had only heard about most of the other policies. Energy and innovation as well as industry actors were both familiar with mostly energy policies, whereas native and tourism as well as NGO actors were

more familiar with policies connected to nature conservation. Even though several of the policies were not familiar to the actors, they had heard about them.

The interviewees also had the opportunity to add policies if they wanted. For example, international authorities and EU policies such as the UN convention on biological diversity, the EU habitat directive and the Planning and Building Act (SFS 2010:900) were mentioned. Energy and innovation actors mentioned regulation and policies for biofuels, and native actors mentioned the Mineral Act (SFS 1991:45). Two forest owner interviewees also mentioned their internal company-specific policies. One also ranked the Forestry Act as less important, arguing that their internal policies set higher requirements on environmental considerations.

Relatively unknown policies (ranked as such by at least nine interviewees) were the climate framework for Sweden, the Climate Act, the Coherent policy for rural Sweden, the Cooperation programme for circular and biobased economics, Regional climate and energy strategies and Sectoral strategies for energy efficiency(see Figure 4).

NGOs were the actor group that ranked the highest number of policies as unknown, spread over all four policy areas. Policies regarding forest and nature conservation were the policies which interviewees from energy and innovation ranked as unknown. Authorities and forest owner actors mostly ranked energy and climate policies as unknown (Figure 4).

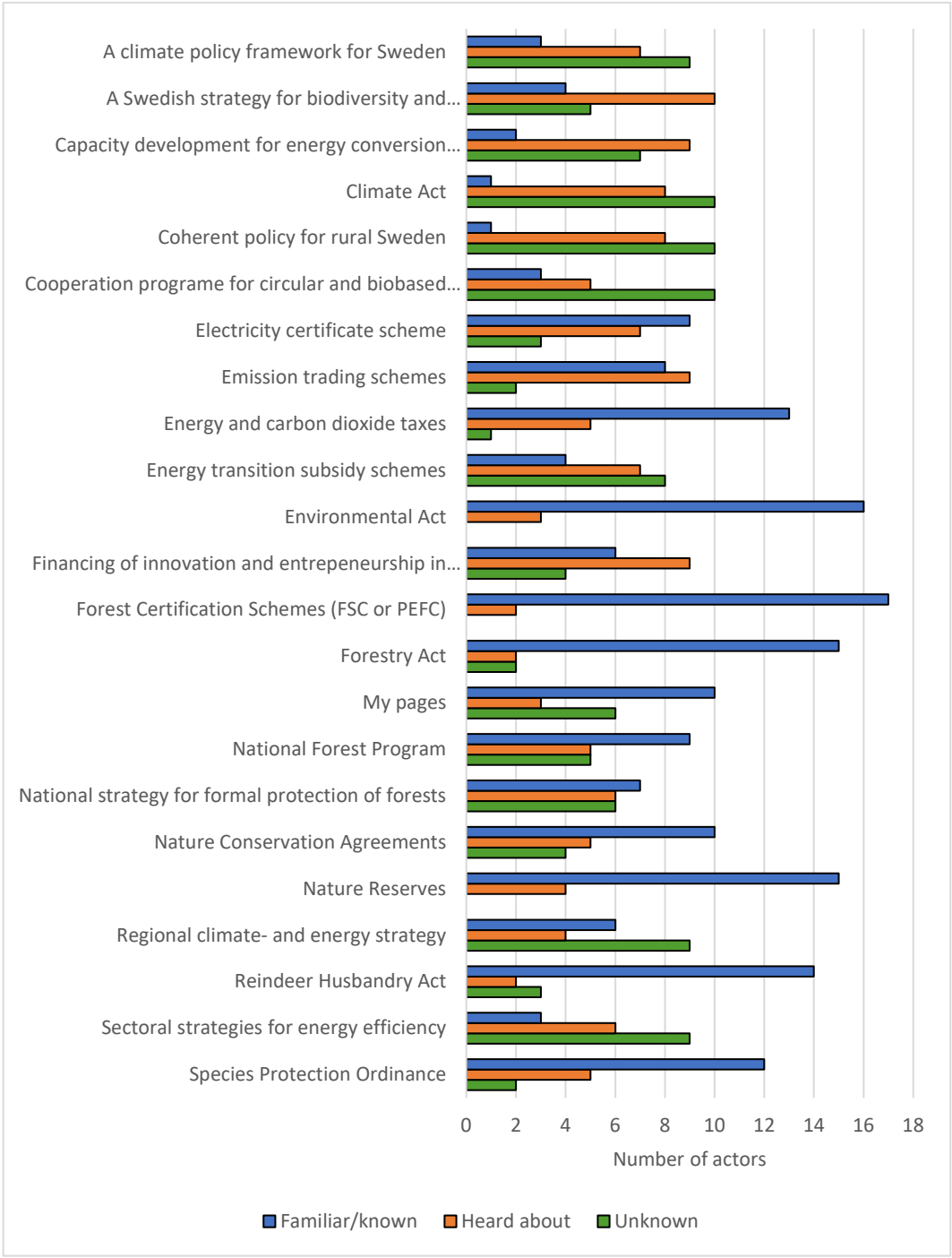

Figure 2. Knowledge of policies among local actors.

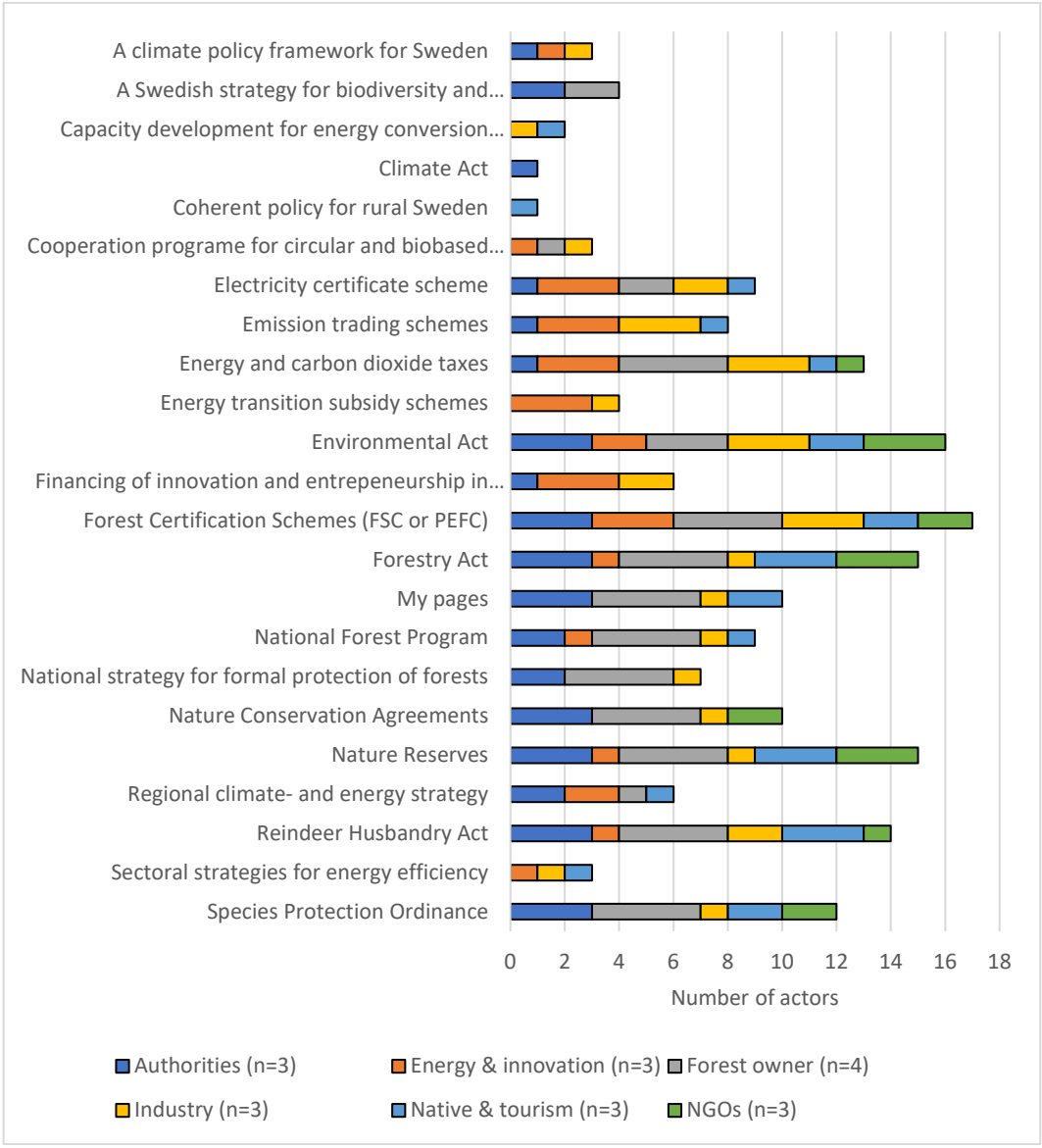

Figure 3. Policies local actors are familiar with.

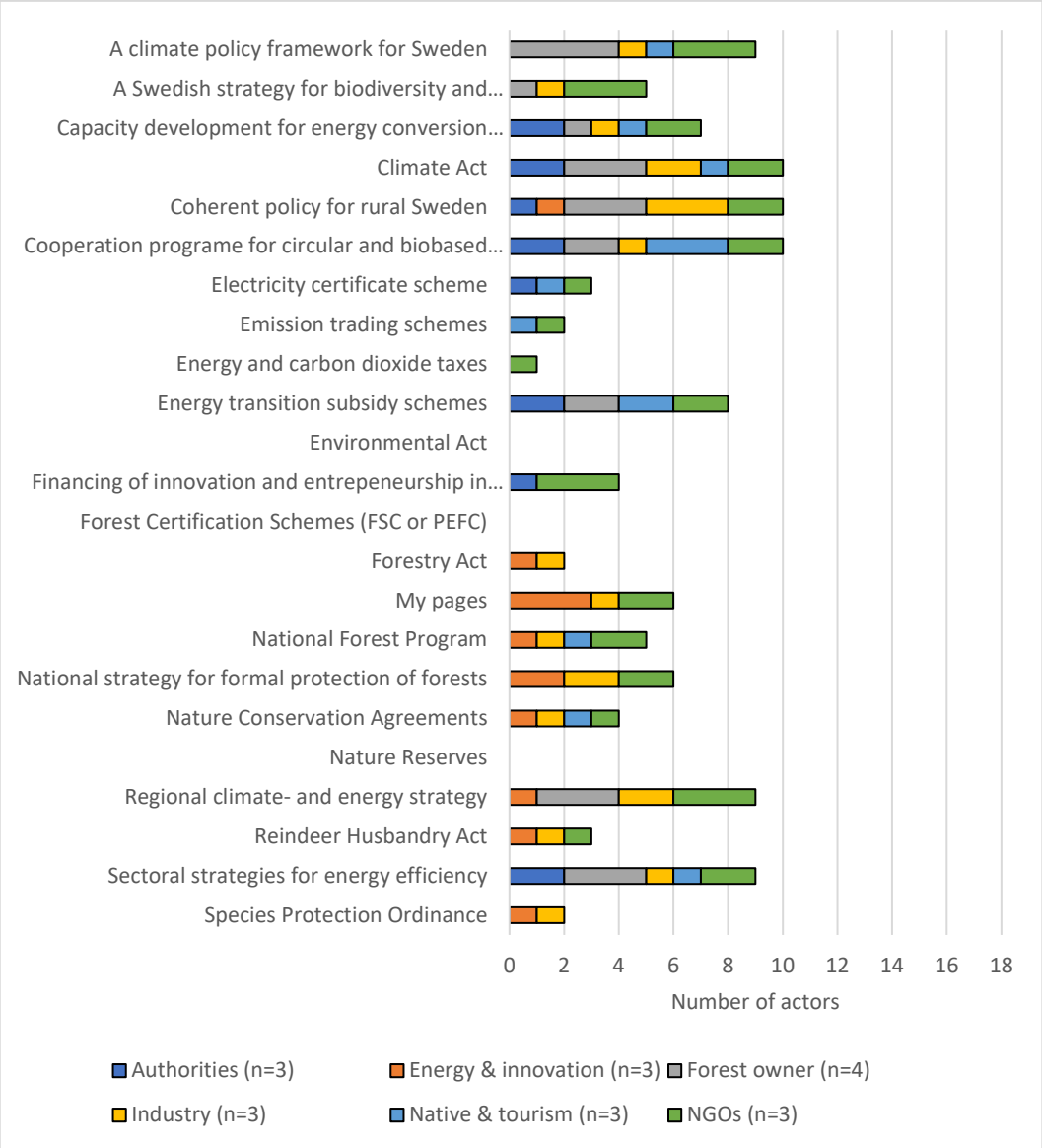

Figure 4. Unknown policies by local actors.

Discussion

Results show that there was a broad knowledge of FES-related policies. With a broad range of actors/actor groups interviewed, it can be expected that most of the policies would be known. However, policies connected to forest, environmental or nature conservation issues were the policies local actors were most familiar with, whereas policies for climate and energy were more often the unknown policies. The results also show that the actors were most familiar with policies within their area of interest and unfamiliar with the policies outside of it. Industry as well as native

and tourism were the actor groups with the most widespread knowledge of policies. Authorities and forest owners seem to be the actor groups with the broadest knowledge of policies for FES since they had the highest number of interviewees stating that they were familiar with the highest number of policies. The energy and innovation actor group was mostly familiar with policies connected to energy and climate but had heard about several of the other policies.

4.3.2. The importance of policies among local actors

Four policies were ranked as the most important: the Environmental Act, forest certification schemes, the Forestry Act and nature reserves (≥ 9 interviewees ranked them as most important). These policies are all connected to forest, environmental or nature conservation issues. “My pages” on the Swedish Forest Agency’s webpage and Nature conservation Agreements were ranked as the less/least important policies. Policies with regard to energy and carbon dioxide taxes, the Forestry Act and the Reindeer Husbandry Act had a relatively high number of interviewees ranking them as less important (Figure 5).

Actor groups representing authorities, energy and innovation and forest owners were the groups where at least two interviewees ranked the highest number of policies as most important (7, 8 and 8 policies, respectively). The authorities and forest owner actor groups mostly ranked policies connected to forest and nature conservation as most important, whereas energy and innovation actors mostly ranked energy policies as most important. The industry as well as native and tourism actor groups are spread in their opinion of which policies are most important, and NGOs mostly found policies for forest and nature conservation issues as most important (Figure 6).

Energy and innovation as well as NGOs were the actor groups that ranked the lowest numbers of policies as less/least important. The forest owner group was the actor group that had the most interviewees ranking policies as less/least important (Figure 7).

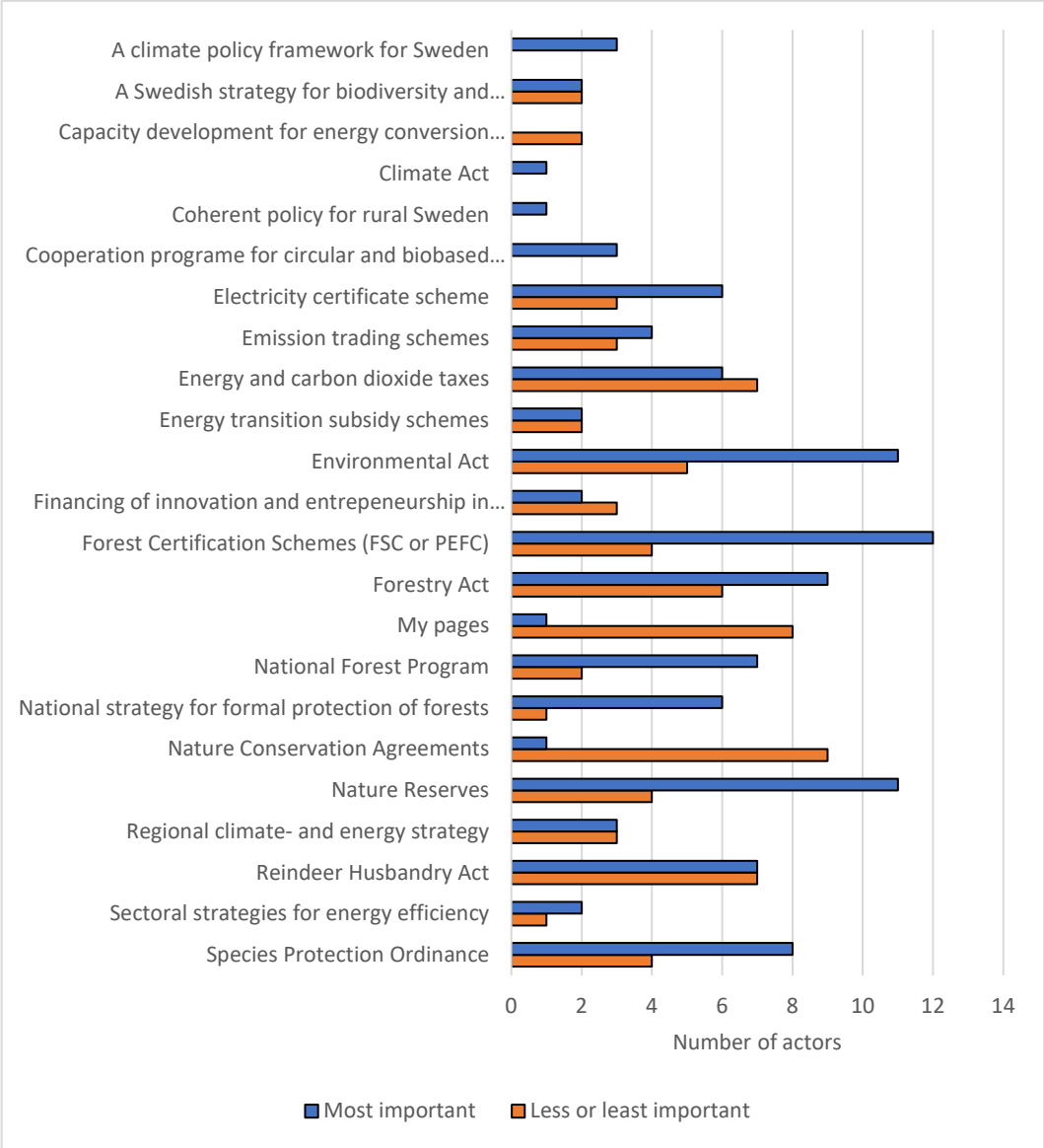

Figure 5. Importance of policies among local actors.

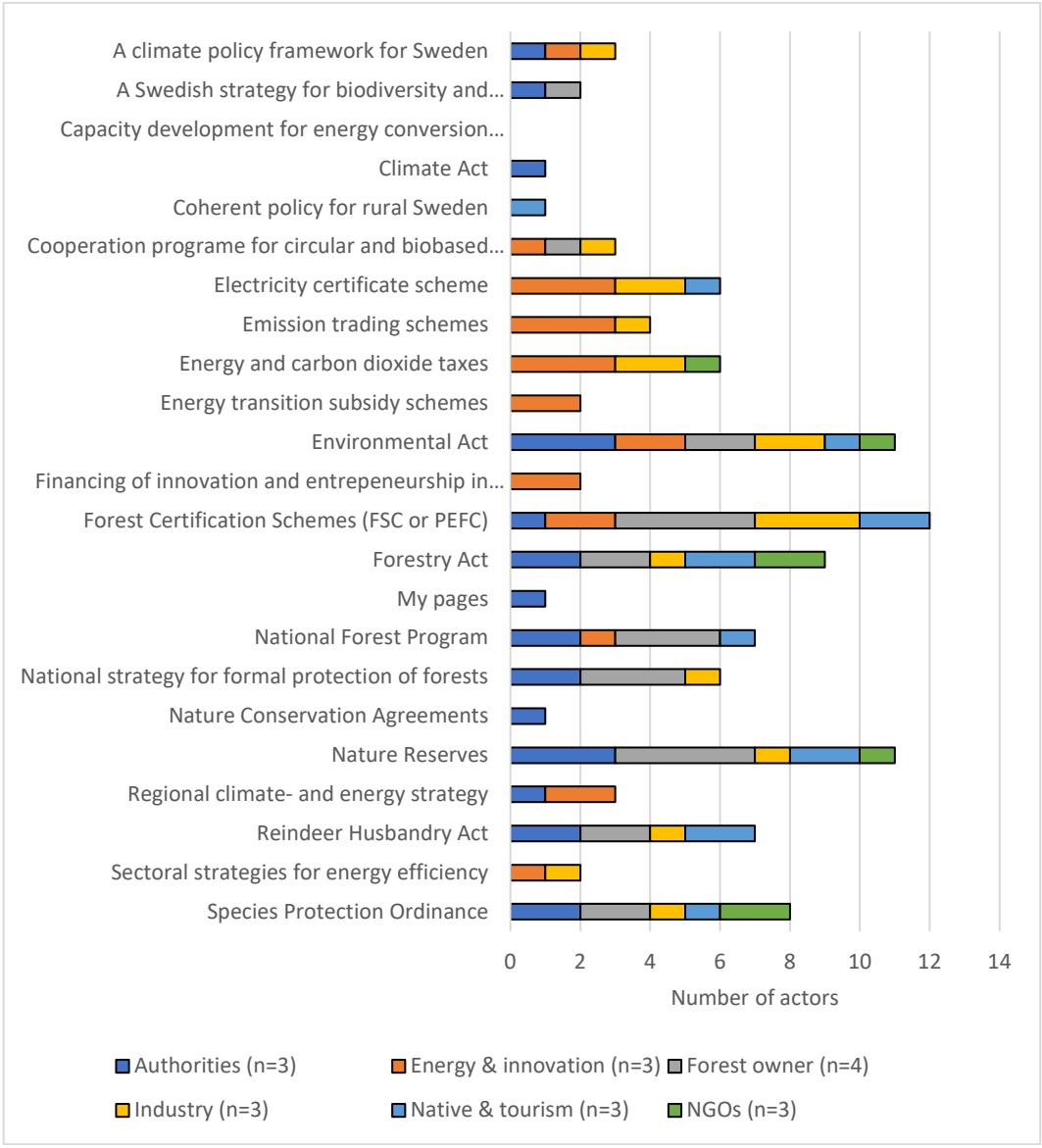

Figure 6. Most important policies for local actors.

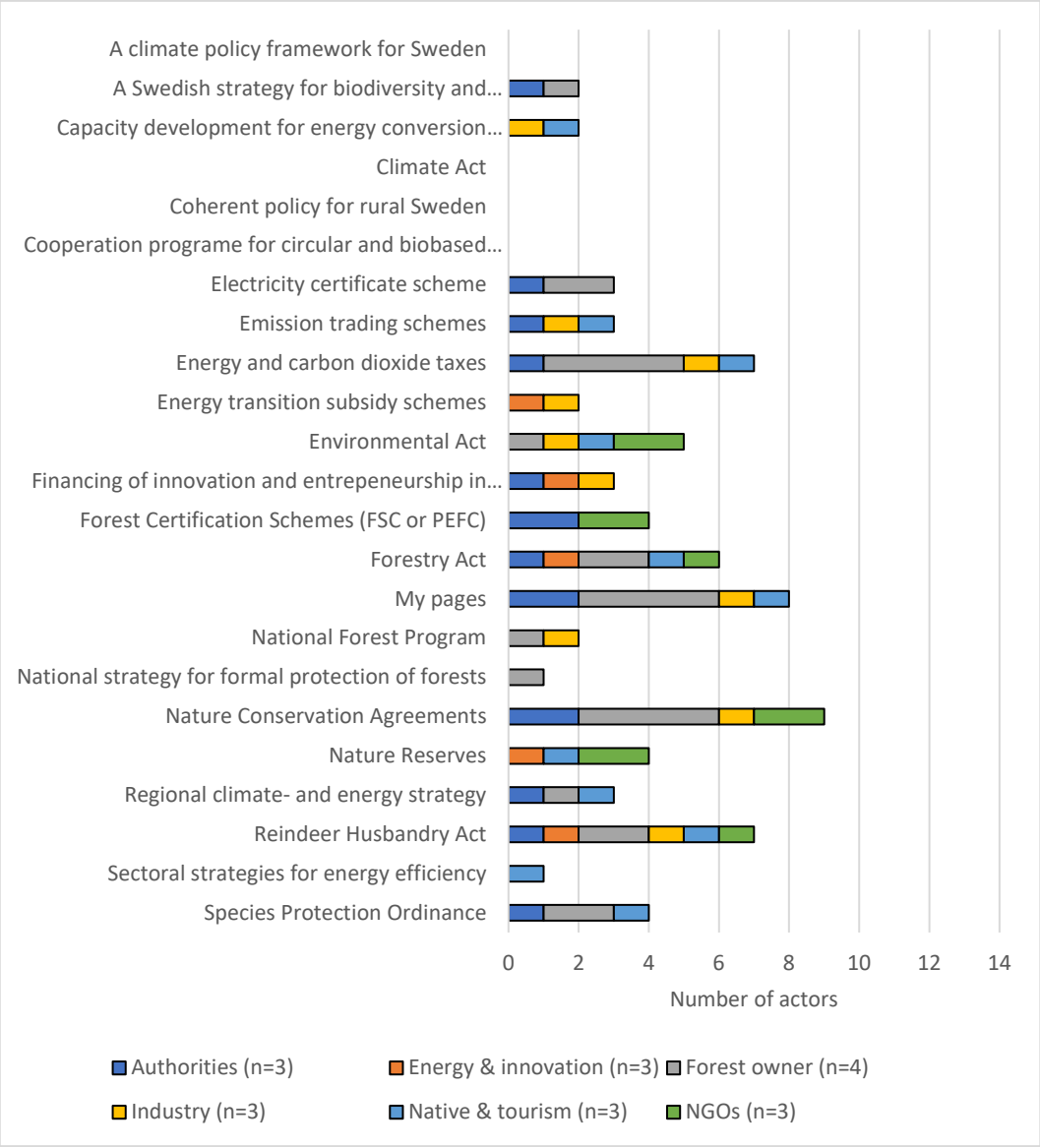

Figure 7. Policies less and least important to local actors.

Discussion

The results indicate that the policies which were ranked as the most familiar by the interviewees also seem to be the most important ones; thus the policies that were heard about and unknown can be expected to be the least important ones. In this study, policies which are less voluntary (e.g. laws and taxes) or voluntary with an economic benefit (e.g. forest certification schemes), in other words policies with a sanction, tended to be the policies of importance for the actors. The actor groups with similar organisations or similar use of the forest seem to have had similar

opinions on what policies were most important. Thus, policies that lay closest to the area of interest of the actors were the most familiar and important ones. Authorities and forest owner actors both ranked forest and nature conservation policies as most important. Energy and innovation as well as industry actors ranked energy and climate policies as most important, although industry actors were more diversified in their opinions. Native and tourism as well as NGO actors were also varied in their opinions on which policies were most important, but the results indicate that laws and other policies with sanctions were most important.

4.3.3. Knowledge of objectives among local actors

The knowledge of FES-related objectives was high among local actors in Piteå Municipality. There is one objective that was known or heard about by all interviewees: the right of native people to use land and water. Although only one objective was known or heard about, there was a broad knowledge of the objectives. Fifteen of the objectives were familiar/known to at least nine (47%) of the interviewees. Eleven of the interviewees (58%) were familiar with or had heard about all objectives (see Figure 8).

At least two of the interviewees in the authority actor group have categorized 12 objectives as familiar/known and in the forest owner actor group 14 objectives. Most of them are connected to forest and nature conservation. At least two interviewees from the energy and innovation and industry actor groups categorized nine objectives each as familiar/known. The energy and innovation group was most familiar with energy and climate objectives, but two of three interviewees also categorized the National Environmental Quality Objectives as familiar. Industry interviewees were most familiar with forest production, energy and climate objectives. The native and tourism actor group categorized 5 objectives as familiar/known and NGO actor group 6 objectives as familiar/known by at least two interviewees. Both actor groups differed in what type of objectives they were familiar with (Figure 9).

Since most of the objectives were familiar or had been heard about by the interviewees, there were few unknown objectives (Figure 10). The most unknown objectives were 100% renewable energy production by 2040; multiple use of forest; National Environmental Quality Objective: Living wetlands; and World-class innovations and forest products. The energy and innovation and industry actor groups had the highest number of interviewees categorizing objectives as unknown—13 objectives each where at least one stated it as unknown. Next, nine objective where marked as unknown by at least one interviewee in the native and

tourism actor group, and seven objectives in the forest owner actor group. The actor groups with the lowest number of unknown objectives were authorities and NGOs, with five and seven objectives, respectively, that were marked as unknown by at least one interviewee.

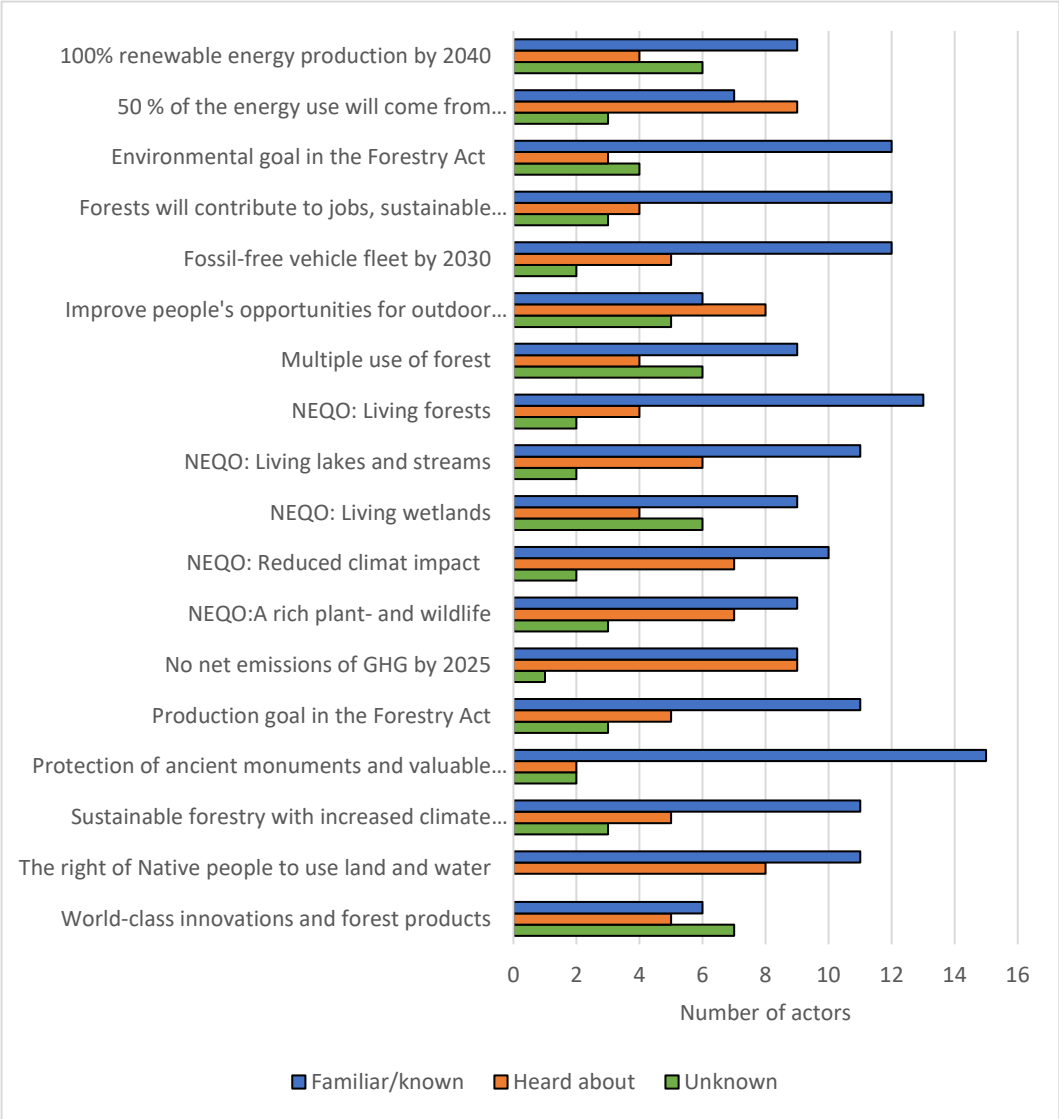

Figure 8. Knowledge of objectives among local actors.

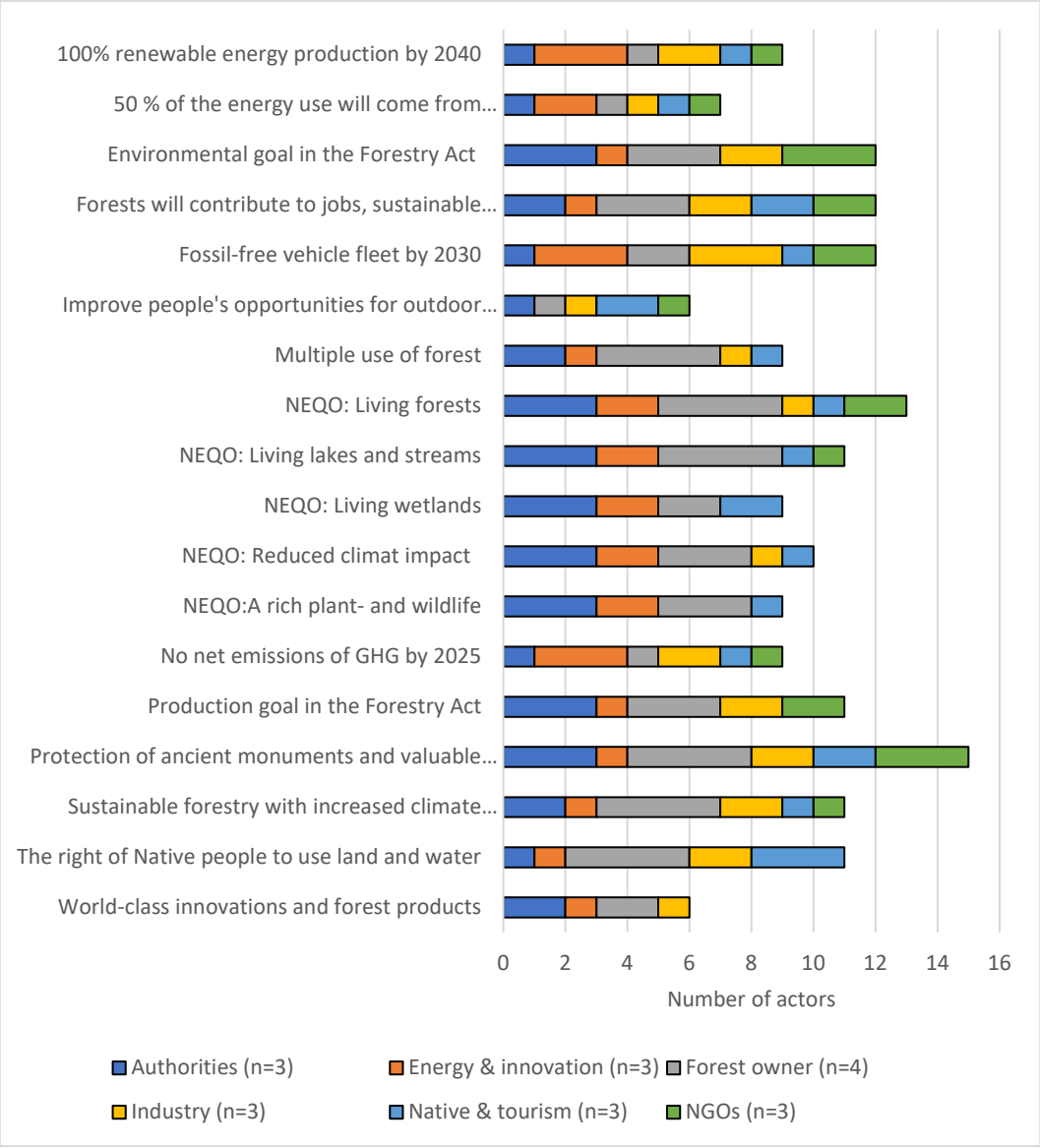

Figure 9. Objectives familiar to local actors.

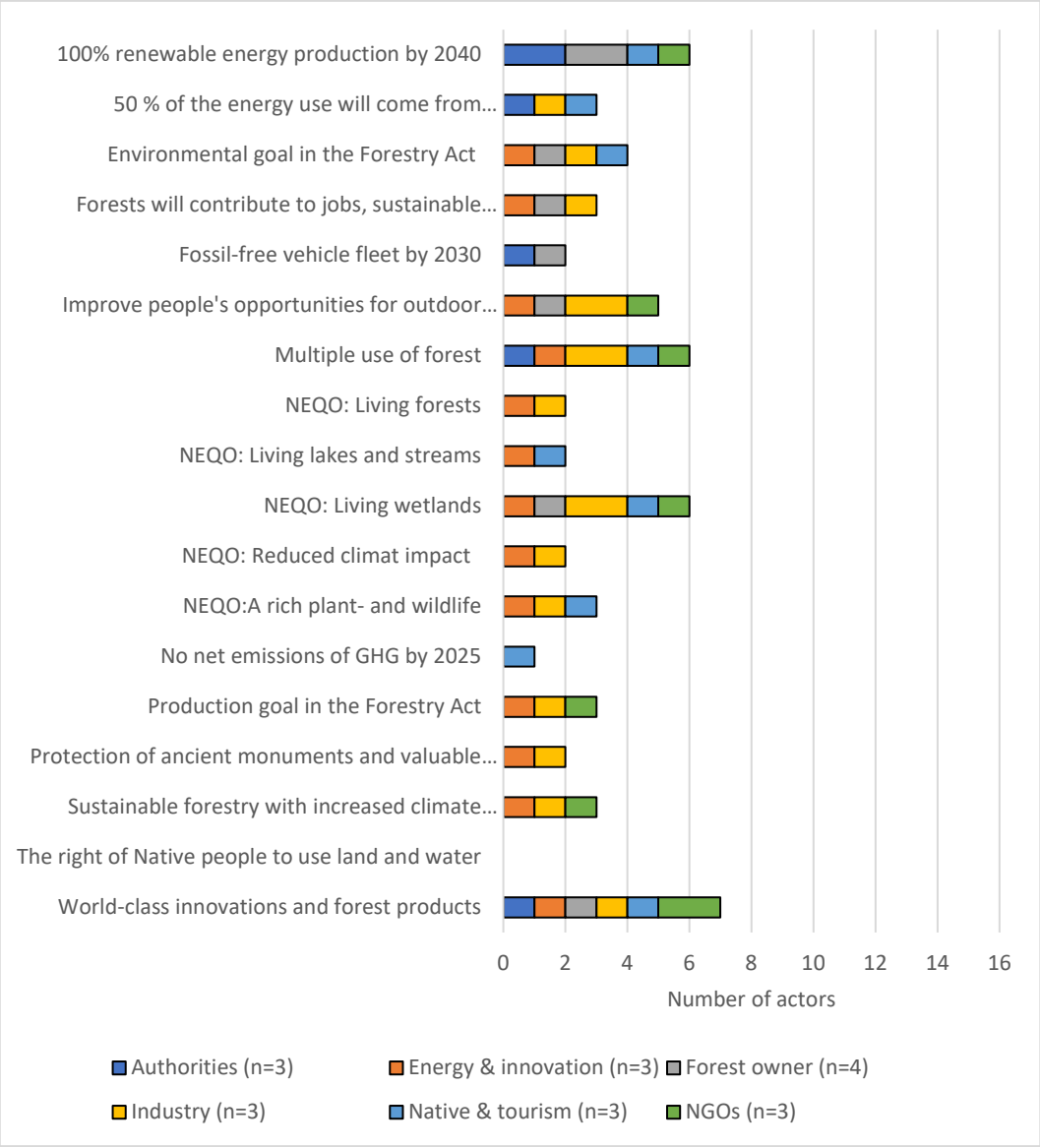

Figure 10. Unknown objectives by local actors.

Discussion

Results show that there was a broad knowledge of FES-related objectives. Almost all interviewees were familiar with or had heard about the objectives asked about. Energy and innovation and industry interviewees stood out in the unknown category, with 13 objectives each marked as unknown. Most of those objectives were not connected to energy or climate issues.

As described about the knowledge of policies, the objectives connected to the actor groups' area of interest also seem to have been the most familiar objectives.

However, there was broader knowledge of objectives outside the actor groups area of interest, compared with policies where mostly policies connected to the actor groups area of interest were marked as most familiar. This can be an indication that actors/interviewees can be familiar with an objective but maybe not with the policy it belongs to.

4.3.4. Importance of objectives among local actors

The most important objectives for local actors were the environmental goal in the Forestry Act; Forest will contribute to jobs, sustainable growth and development of a growing bioeconomy; National Environmental Quality Objective: Living forests; and the right of native people to use land and water. Only one objective was seen as most important by all the interviewees who categorized it as familiar/known, and that was the objective that 50% of all energy use should come from renewable energy by 2020 (Figure 11).

In the forest owner actor group, at least two interviewees found 10 objectives as most important. Six objectives are more connected to nature conservation, and four objectives are connected to forest/wood production and climate issues. At least two interviewees in the authorities and energy and innovation actor groups found six objectives as most important. Authority interviewees mostly found nature conservation objectives as most important, but they are represented in almost all objectives. The energy and innovation group mostly found objectives connected to energy and climate as most important. The native and tourism, industry, and NGO actor groups had the fewest objectives ranked as most important, with four, three and two objectives, respectively. The objectives were mostly connected to their area of interest (Figure 12).

A few objectives were stated as less and least important compared to the ones stated as most important (Figure 13). The policies of less/least importance were the National Environmental Quality Objective: Living lakes and stream;, National Environmental Quality Objective: Living wetlands; and Protection of ancient monuments and cultural environments in the forest, where at least six interviewees stated them as less/least important.

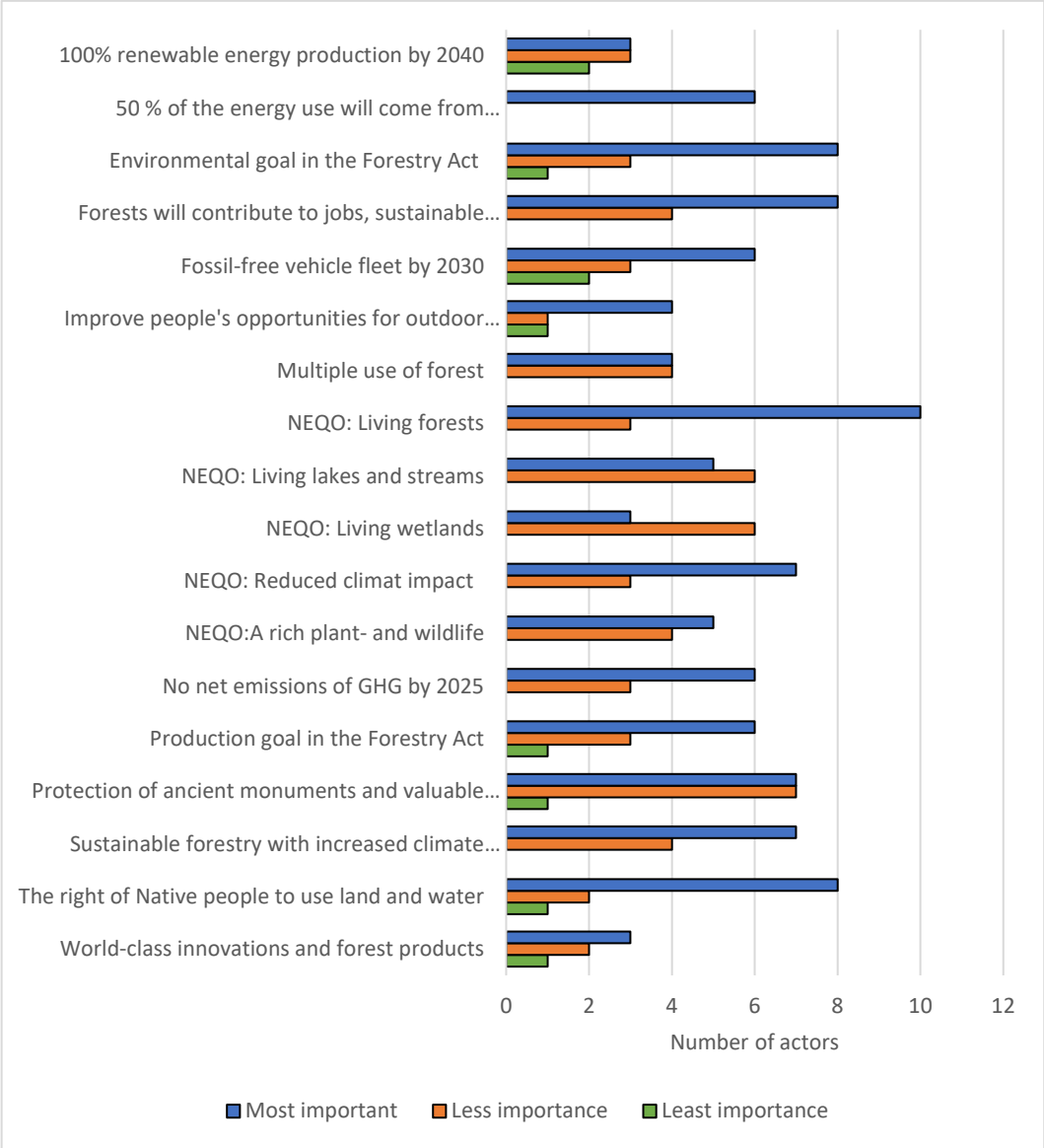

Figure 11. Importance of objectives among local actors.

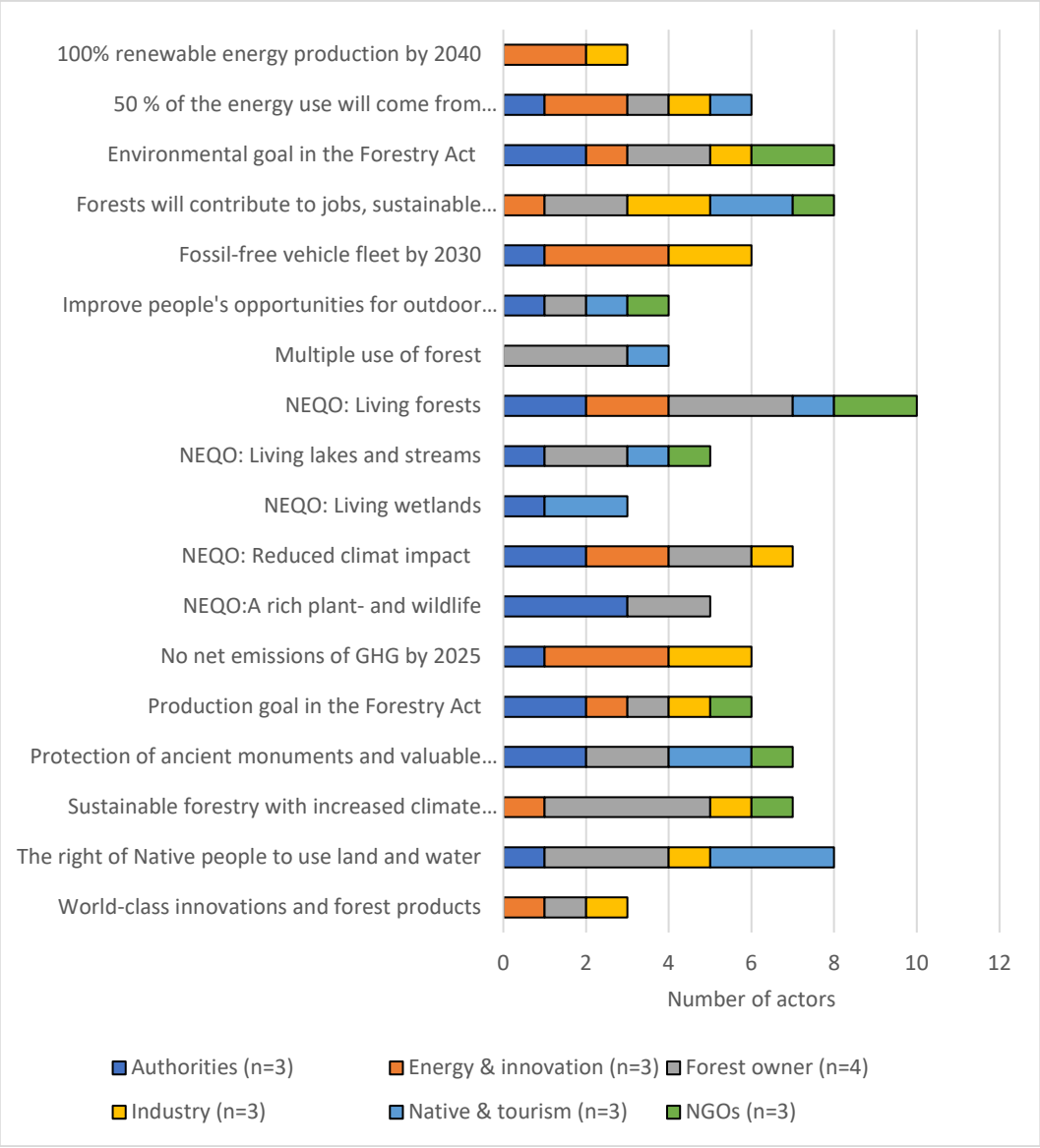

Figure 12. Objectives of most importance among local actors.

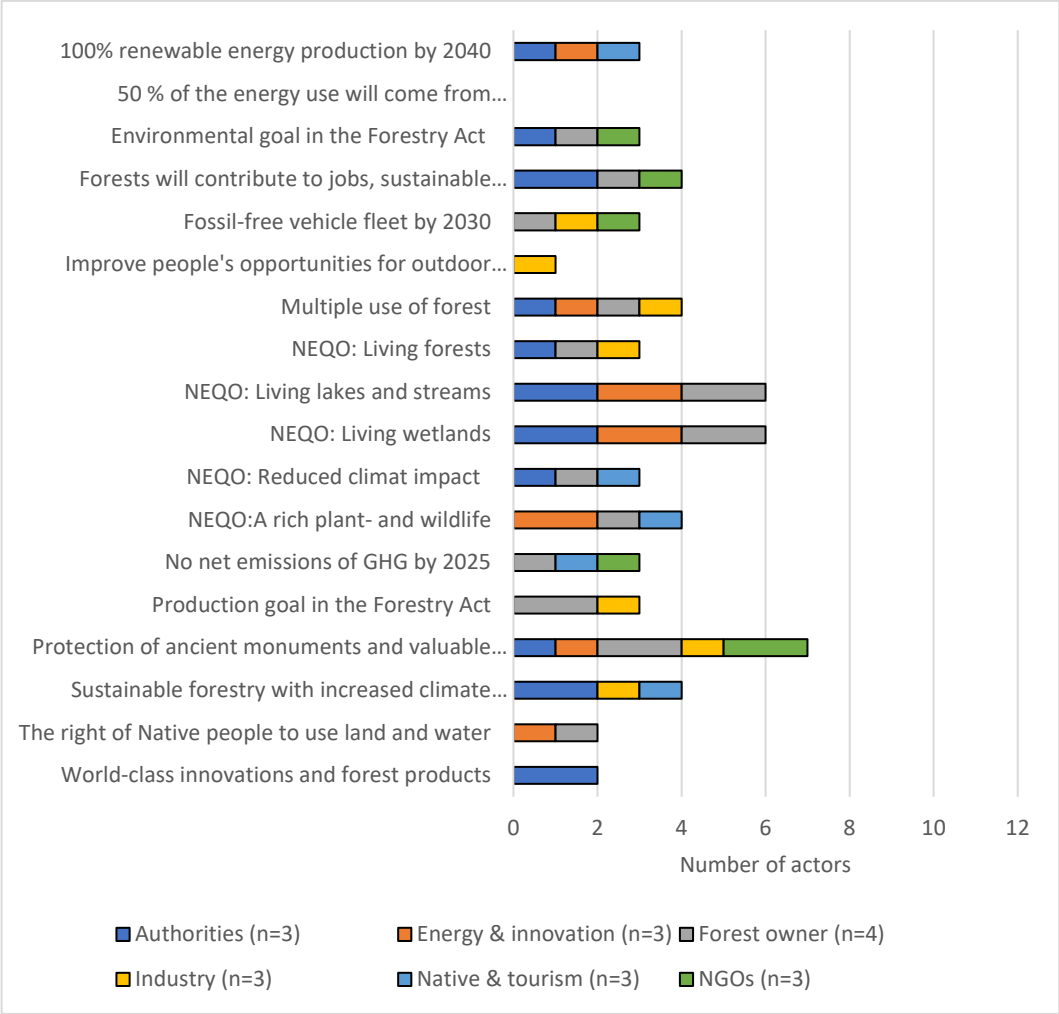

Figure 13. Less and least important objectives among local actors.

Discussion

As described earlier, the most familiar objectives (and policies) were those the actor groups found most important. Objectives connected to the actor's area of interest were those that were familiar/known and most important to the actors. Several of the objectives asked about are connected to nature conservation and/or forest. However, most of the objectives stated as most important are connected to energy, climate and/or forest/wood production. Several of the interviewees commented that even though they stated an objective as less or least important, they understood why they were decided on, but it was just not important for their organisation's management/decision making. This indicates that there can be a broader knowledge and understanding than the results in this study show.

5. Concluding discussion

The aim of this paper was to (1) identify implementation practices in FES-related policy documents and (2) perform a local case study of how the policies are perceived by key actors. The study was performed in two parts: (1) a policy document analysis identifying the policy practices in FES-related policies using parts of the concept of policy coherence; and (2) an interview survey with local actors to analyse how they perceived FES-related policies.

The results show that the implementation practices are similar in terms of strategies used, but the specific instruments differ. As described by Gebre-Medhin and Tanse (2020), the policies for climate and energy are well integrated with each other. This is also reflected in their implementation practices. Instruments with an economic effect (taxes, subsidies etc.) are to a greater extent used in climate and energy policies compared to nature conservation and forest. This can explain why these instruments are ranked as more important compared to more voluntary instruments as in nature conservation and forest policies. The results do not indicate if local actors in Piteå Municipality to a higher extent act on policy instruments that have a more economic effect. However, the results from the interviews show that economic (e.g. taxes and subsidies) and regulatory (e.g. laws) instruments are perceived as more important than more voluntary instruments.

As described by Beland Lindahl et al. (2017), FES-related actors must do more than stated in law to meet the demands on environmental and social issues. Capello and Perucca (2019) argue that for a policy to succeed it must meet the needs of actors using the resource. The results of this study indicate that the more voluntary FES-related policies and objectives in Sweden are lacking in terms of meeting the needs of the actors, and thus they are not as important for management and decision making. Instead the instruments with sanctions are ranked as most important and can be assumed to matter the most in management and decision making regarding the use of FES.

Apart from which instruments are the most important, the results show that the local actors in Piteå Municipality have a broad knowledge of different policies and

objectives for FES. However, the objectives are more familiar than are policies, which indicates that the actors can know about objectives but not the actual policy that states it, which must be the most valuable in terms of policy implementation since there are the objectives that are to be reached. The policies and objectives that govern issues closest to the actor's area of interest seem to be the most familiar and perceived as the most important ones. However, the broad knowledge among the actors must be assumed to indicate a successful implementation of the policies in terms of creating knowledge among the actors. Implementation in terms of outcome on the ground was not analysed in this study, but the results indicate that it can be harder to achieve objectives with voluntary instruments than with instruments that include economic or legal sanctions.

This study can help to understand how priorities among objectives can be made in policymaking through the knowledge of what instruments local actors rank as most important. Dialogue between actors and cooperation to achieve objectives have been a successful path in Swedish FES-related policymaking (Appelstrand 2007, 2012; Sundström 2005). Actors also express that local influence on the management of forests is important (Sténs et al. 2016). If policymakers also lack understanding of actors' needs, it could be better if actors solve these needs themselves. If policymakers instead want objectives to be reached in a short time, instruments with an economic or legal sanction seems to be the way forward.

Looking at the different actor groups, authorities and forest owners seem to have the broadest knowledge of policies. Energy and innovation and industry actors are mostly familiar with policies within their area of interest, and native and tourism actors and NGOs are more diversified in their knowledge. This can be expected, since authorities and forest owners are the actors with activities that have a direct connection to forest and the use of FES, whereas energy and innovation and industry actors mostly use products derived from the forest. Native and tourism actors and NGOs also have activities directly connected to the forest or use of FES but do not derive products from the forest to the same extent. Instead, the forest works more as an arena for their activities, but where several FES are important for them. These activities do not have to be regulated to the same extent compared to when products are derived from the forest and ecosystems can be harmed or destroyed.

The results show that climate and energy policies and objectives are relatively unknown compared to policies connected to forest and nature conservation. The climate and energy policies analysed in this study are relatively new compared to the policies for nature conservation and forest. This can help to explain the results.

To further understand the implementation of Swedish FES-related policies, interview studies could be done elsewhere in Sweden to find differences and similarities between different locations and actors. Additionally, studies of policymakers' understanding of actors' needs and of policy outcomes on the ground would be interesting. This could bring knowledge about how the chain of implementation, from policymakers to actors and outcome work, could be improved.

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Acknowledgements

A great thank you to supervisor Camilla Widmark and assistant supervisor Karin Beland Lindahl, for introducing us to this project and subject.

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

Appendix 1

Interview survey guide

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 som 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) Upplever du att det finns situationer där olika ekosystemtjänster hamnar i konflikt med varandra, (baserat på din kunskap och verksamhet) 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.

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	Produktion av biomassa för flytande	Bär- och svampplockning,	Osv…
Produktion av timmer						
Produktion av massaved						
Produktion av biomassa för fasta bränslen						
Produktion av biomassa för flytande bränslen						
Osv…						

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

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)?

Utmaningar	**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

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

3. Wictorin, P. 2019. Skogsvårdsstöd - växande eller igenväxande skogar?

4. Sjölund, J. 2019. Leveransservice från sågverk till bygghandel

5. Grafström, E. 2019. CSR för delade värderingar - En fallstudie av kundperspektiv hos skogs- och lantbrukskunder inom banksektorn

6. Skärberg, E. 2019. Outsourcing spare part inventory management in the paper industry - A case study on Edet paper mill

7. Bwimba, E. 2019. Multi-stakeholder collaboration in wind power planning. *Intressentsamråd vid vindkraftsetablering*

8. Andersson, S. 2019. Kalkylmodell för produkter inom korslimmat trä - Fallstudie inom ett träindustriellt företag. *Calculation model for products within cross-laminated timber - A case study within a wood industrial company*

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*

10. Eimannsberger, M. 2019. Transition to a circular economy - the intersection of business and user enablement. Producenters och konsumenters samverkan för cirkulär ekonomi

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*

12. Aronsson, A. & Kjellander, P. 2019. Futureshandel av rundvirke - Möjligheter och hinder för en futureshandel av rundvirke. *A futures contract on roundwood - Opportunities and barriers for a futures trade on roundwood*

13. Winter, S. 2019. Customers' perceptions of self-service quality - A qualitative case study in the Swedish banking sector. *Kundernas uppfattning om självbetjäningskvalitet*

14. Magnusson, K. 2020. Riskanalys av hybridlärk (*Larix X marschlinsii*) - Möjligheter och problem. *Risk analysis of hybrid larch (Larix X marchlinsii) - Opportunities and problems*

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*

22. Essebro, L. 2020. Communicating a climate friendly business model. *Att kommunicera en klimatvänlig företagsmodell*

23. Halldén, A. 2020. Skogens roll i klimatfrågan – En medieanalys av Dagens Nyheter 2010–2019. *The role of forests in the climate discourse – a media analysis of Dagens Nyheter 2010-2019*

24. Gebre-Medhin, A. 2020. Swedish FES-related policy: Integration of national objectives and factors affecting local actors' policy respons

25. Tanse, K. 2020. The Swedish policy framework for Forest Ecosystem Service. A study of integration of objectives, policy instruments and local actor's knowledge about policies and policy objectives