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# **Bioeconomy and ecosystem services – synergy or conflict?**

**Horizontal and vertical policy analysis, modelling  
and orchestration in practice**

Final Conference Proceedings of the FPS COST Action FP1207

Tuula Packalen and Markus Lier (eds.)

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COST (European Cooperation in Science and Technology) is a pan-European intergovernmental framework. Its mission is to enable break-through scientific and technological developments leading to new concepts and products and thereby contribute to strengthening Europe's research and innovation capacities. [www.cost.eu](http://www.cost.eu).

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## Foreword

The Final Conference of the COST Action FP1207 “Orchestrating forest-related policy analysis in Europe” (ORCHESTRA) was held in Louvain-la-Neuve, Belgium on September 5-6, 2016.

ORCHESTRA ([http://www.cost.eu/COST\\_Actions/fps/FP1207](http://www.cost.eu/COST_Actions/fps/FP1207)) has aimed at supporting the coherence of forest-related policy targets and efficiency of policy measures. The Final Conference covered three different aspects in policy support, aligned with the ORCHESTRA Working Groups (WG): policy analysis (WG1), modelling (WG2) and orchestration (WG3). Two common denominators were identified: (1) horizontal and vertical policy support in practice and (2) discussion on whether bioeconomy and ecosystem services are in synergy or conflict.

After the setting-the-scene session by the Action Chair and two keynotes, the presentations and posters of the final conference addressed European, national and regional studies as well as international perspectives. Some new means for orchestration were also introduced. During the conference response was collected from stakeholders and audience. At the end of the conference, the Action leaders summarized their experiences and findings.

On behalf of organizing Committee, we would like to thank all authors and the sponsoring organisations for their contribution to the success of this Final Workshop and Markus LIER (Finland) for editing the conference proceedings.

FP1207 Action Chair Tuula PACKALEN (Finland)  
FP1207 Action Vice-Chair Jean-Luc PEYRON (France)  
FP1207 WG1 Leader Norbert WEBER (Germany)  
FP1207 WG2 Leader Jordi GARCIA-GONZALO (Spain)  
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### Organisers



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# The FPS COST Action FP1207 “Orchestrating forest-related policy analysis in Europe” (ORCHESTRA)

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## **Keywords**

Policy analysis, policy modelling, policy support, policy orchestration

## ***Setting the scene for the ORCHESTRA Final Conference***

There is to date no common forest policy such as Common Agricultural Policy (CAP) existing in the European Union (EU). On one hand, Member States (MS) have competency in forest-focused policy within their national framework of established ownership rights, laws, regulations, practices and interrelated sectoral policies. On the other hand, the EU has competency in many forest-related policies, e.g. energy, climate, rural, environment, industry and trade policies, affecting forests and forestry. Furthermore, decisions on forest management on the ground are driven by market demand for different forest products and services. In some MS there has been a governance shift from “command and control” to more market-based mechanisms. Unintended impacts may result if the response by and in MS is not foreseen at EU level when designing policy targets and measures. However, complex interrelationships between sectors and levels make it challenging to foresee economic, social and environmental impacts of different, often overlapping or even contradicting, forest-related policy decisions.

The COST Action ORCHESTRA is based on the continuous collaboration of many scientific groups, e.g. quantitative modellers, economists, sociologists and policy scientists. Among those, understanding of governance issues, quantitative forestry and forest sector modelling as well as collaborative processes has increased in recent years. For example, quantitative economic models are useful for the analysis of trade-offs between different policy targets and cost-efficiency of alternative policy measures whereas qualitative methods common in sociology and policy science are applicable for policy analysis and support. Consequently, that modelling of policy impacts requires integration of both quantitative and qualitative approaches.

In this context, the FPS COST Action FP1207 “Orchestrating forest-related policy analysis in Europe” (ORCHESTRA, [http://www.cost.eu/COST\\_Actions/fps/FP1207](http://www.cost.eu/COST_Actions/fps/FP1207)), 2013–2017 was established to support the coherence of forest-related policy targets and the efficiency of policy measures. The objectives of ORCHESTRA included

- analysis of how different forest-related policy targets have been and could be implemented at supranational, national and sub-national level (Working Group 1);
- enhancement of the use of models for integrated policy analysis (Working Group 2); and
- co-design of new methodologies and related guidelines for the orchestration of policy modelling and analyses (Working Group 3).

This final conference will focus on the generated new knowledge and means that can be used by policy and decision makers to coordinate and streamline forest-related policies. Specifically, the coherence of policies related to bioeconomy and ecosystem services will be addressed.



### **Activities of the COST Action ORCHESTRA**

The activities in ORCHESTRA were designed as a series of annual events, each consisting of a thematic workshop, all Working Group (WG) meetings and a Management Committee (MC) meeting, organized by a different WG each year and aiming to a WG specific Special Issue in a peer-reviewed journal.

[WG 1](#) organized the first annual event (Joensuu, 2013) and a smaller workshop (Prague, 2013) on forest policy targets and measures. A synthesis report of WG1 country reports was published as an IUFRO Occasional Paper and a Journal of Forest Policy and Economics Special Issue “Implementation of forest policies: success stories, deficits and failures in European multi-level systems” is being compiled. [WG2](#) organized the second annual event (Cascais, early 2015) for an overview of existing policy modelling and analysis tools. A Journal of Forest Policy and Economics Special Issue “Models and tools for integrated forest policy analysis” is being compiled. [WG3](#) organized interviews on policy orchestration in various countries and designed a conference (late 2015, Bordeaux) on the involvement of scientists and stakeholders in political processes, supported by a conceptual paper and several case studies. A Journal of Forest Policy and Economics Special Issue “Involvement of scientists and stakeholders in political processes” is being compiled.

A total of 28 COST countries, two COST Near Neighbour countries and four Specific Organisations, namely the European Forest Institute (EFI), the Joint Research Centre (JRC), the European Environment Agency (EEA) and the Forestry and Timber Section of the UNECE/FAO, Geneva have been involved in ORCHESTRA. The COST inclusiveness countries (a total of 13 in ORCHESTRA) are represented in the core group (WG2 leader) and they have been active in participating and hosting Short-term scientific missions (STSMs) as well as organizing events (e.g. workshops in Prague and Cascais). A half of Core Group members and roughly one third of active participants are female. Early stage researchers (ESRs) are well represented in WGs and the Core Group (4 out of 10), and they have been active in carrying out STSMs and participating in the events (roughly a half of participants). A total of over 20 STSMs have been carried supporting the development of concepts or compiling material for different WPs. As other outputs from networking within FP1207 and also with some other COST Actions, specifically FP0804 “Forest Management Decision Support Systems (FORSYS)” and FP1001 “Improving data and information on the potential supply of wood resources - an European approach from multisource national forest inventories (USEWOOD)”, two EU Horizon 2020 projects DIABOLO – “Distributed, integrated and harmonised forest information for bioeconomy outlooks” (duration 2015–2016) and ALTERFOR – “Alternative models and robust decision-making for future forest management” (duration 2016–2020), have been launched. Stakeholders have been kept informed through the [ORCHESTRA web-site](https://sites.google.com/site/costactionfp1207/) (<https://sites.google.com/site/costactionfp1207/>), an executive summary and newsletter articles.

### **Lessons learned from the COST Action ORCHESTRA**

The main findings of the *COST Action ORCHESTRA* are related the big variation of local governance and policy reflections within EU due to differences in ecological and socio-economic conditions; the impact of forest-related policies on the business conditions when actors “are thinking globally but acting locally”; the role of policy analysis in making policy games more transparent; the potential of integrating social science (e.g. network analysis) and quantitative modelling in anticipating economic, social and environmental impacts of policy measures, and, consequently supporting policy negotiations towards win-win solutions.

The new knowledge generated in the COST Action ORCHESTRA can be used by European policy and decision makers to adjust forest-related policies and their implementation at supranational, national and sub-national level to the requirements of multilevel and multi-stakeholder governance.

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# Preliminary programme

**MONDAY - September 5, 2016**

**09:00 - 09:30 WELCOME AND INTRODUCTION**

Welcome and opening, *Claude BRAGARD* and *Christine FARCY* (Local Organizer)

Setting-the-scene *Tuula PACKALEN* (Chair of the Action)

**09:30 - 10:30 KEYNOTES**

Science-Policy-practice interaction *Risto PÄIVINEN*

Are environmental services and bio-economy antagonist? *Eduardo ROJAS-BRIALES*

10:30 - 11:00 COFFEE BREAK

**11:00 - 12:40 EUROPEAN STUDIES**

Harmonization of Forest Available for Wood Supply (FAWS) in Europe *Christoph FISCHER*

Identification of current sustainable forest management (SFM) policy targets formulated in national forest-focused policies and strategies in Europe *Markus LIER*

Projection systems for future wood availability in Europe *Susana BARREIRO*

Linking forest policy issues and decision support tools to promote the development of integrated policy analysis in Europe *Edgaras LINKEVICIUS*

**12:40 - 13:00 STAKEHOLDER RESPONSE**

European Commission, Joint Research Centre, Forest Resources and Climate Unit *JOSE I. BARREDO*

European Commission, DG ENV, Unit D *Zoltan RAKONCZAY*

13:00 - 14:30 LUNCH

**14:30 - 16:30 NATIONAL AND REGIONAL CASE STUDIES**

Declining influence of economic interests in the public consultation process for the revision of forest legislation? *Tobias SCHULZ*

Assessment of timber supply under alternative futures *Marius KAVALIAUSKAS*

Trade-offs between bioenergy and other ecosystem services in local forest policy: a case study in Italy *Isabella DE MEO*

Forest owner's motivations for adopting programs of biodiversity protection *Philippe POLOME*

Assessing the feasibility of forest policy implementation under climate change: a case study on Scotland's National Forest Estate *Duncan RAY*

Effectiveness of forest conservation on private land *Jussi UUSIVUORI*

**16:30 - 17:00 COFFEE BREAK AND POSTER SESSION FOR STSMs**

Poster: Stakeholders' involvement: the participation in the development of National Forest Programmes *Jessica BALEST*

Poster: Addressing forest policy and planning by combining participatory workshops and forest management decision support tools *Eva-Maria NORDSTRÖM*

Poster: Integration of forest policy goals at European, national and sub-national levels. The case of fire prevention and biomass production *Francesca FERRANTI*

Poster: Q-25 years later the Rio de Janeiro conference: what has been the contribution of global forest policy at non-forest processes *Francesco CARBONE*

Poster: Framework for building integrated policies regarding forest risk management: Insights from Wallonia (Belgium) *Simon RIGUELLE*

**17:00 - 18:00 INTERNATIONAL PERSPECTIVES**

Europe's impacts on tropical forest changes through international trade and supply chains interventions *Patrick MEYFROIDT*

An Economic Impact Assessment of Community-Based Conservation Associations (CBCAs) in the Nzoia River Basin, Kenya: Taking stock of ecosystem services and welfare trends under Climate Change *Kosmas LAMBINI*

International forestry regime fragmentation: causes, consequences and responses *Pauline PIRLOT*

How to use NFPs to orchestrate SDG goals? FAO, t.b.c

**TUESDAY - September 6, 2016**

**09:00 - 11:00 NEW MEANS FOR ORCHESTRATION**

Striving towards sustainability: integrating environmental concerns into the political bioeconomy discourse? *Alexandru GIURCA*

Role of social innovation in linking multifunctional forestry goals with sustainable development objectives in Scotland's uplands *Albert NIJNIK*

Evaluation of forest management scenarios using a web-tool for expert participation in a multi-criteria decision analysis framework *Jeannette EGGERS*

Action expiration chart integrating impact models with forest objectives to evaluate climate change adaptation options in New Forest, England *Michal PETR*

11:00 - 11:30 COFFEE BREAK

**11:30 - 13:00 LESSONS LEARNED ABOUT**

Forest policies in Europe: Issues, actors and research activities, WG1 Representative *Norbert WEBER*

Forestry modelling for integrated policy analysis, WG2 Representative *Jordi GARCIA-GONZALO*

Orchestrating forest policy-making: involvement of scientists & stakeholders in political processes in Europe, WG3 Representative *Laura SECCO*

Policy and action orchestration, orchestrated audience response *Tuula PACKALEN and Markus LIER*

Ending words *Christine FARCY*

**13:13 - 14:00** Lunch

## Abstracts

# Science-policy-practice interaction

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## **Keywords**

Science-policy-practice interaction, impact of research, scientific communication

## **Abstract**

In national and international forest-related policy processes, it has been widely recognized that decisions must be based on the best available scientific knowledge. In order to generate added value for people and society, science must be utilized in the design and implementation of decisions by policy-makers and forest practitioners at all levels. The manner in which research results have been used to support the selection of policy targets for bioeconomy and ecosystem services varies from country to country.

The international and national mechanisms established to this point in time have increased dialogue between researchers, policy-makers and practitioners. They aim at boosting the effectiveness of research investments by accelerating the process between research and implementation of the results. The levers include analyzing the often scattered research results and synthesizing them with a set of policy options and recommendations. Further, the analysis of available information also reveals the need for further research. The communication tools include brief documents with clear recommendations, panels, including fora, and conferences of various types and sizes.

Some examples on that how the new knowledge provided by research can be used by European policy-makers and practitioners are described and discussed.

## **Introduction**

The main international forest policy process in Europe, the Ministerial Conference on the Protection of Forests in Europe (MCPFE), has, since its first resolutions in 1990, underlined the importance of research. The Warsaw declaration in 2007 also highlighted the importance of the communication between policy-makers and researchers by suggesting “effective measures to improve understanding between policy-makers, practitioners and the scientific community in order to better use scientific knowledge and research results relevant to forests and the forest sector as a sound basis for decision making.” (Forest Europe, 2015). The EU forest strategy in 2013 and, at a national level, both the Bioeconomy Strategy in 2013 and the National Forest Strategy for Finland 2015 address the same issues.

Science-policy interaction includes many ways in which scientists, policy-makers and stakeholders link up to communicate, exchange ideas and jointly develop knowledge for enriching policy, decision-making processes and research. Often the policy questions are broad and complex, and cannot be solved by using the knowledge gained within a single research project or program. The scientific output is often not what practitioners or policy-makers need or its timing and format is not suitable for their use. There may also be communication problems between the producers and users of the research results. Stakeholders may consider that their legitimate concerns are not addressed in the research (Vogel et. al., 2007).

### Examples

A well known initiative on the science-policy interface is the International Panel on Climate Change (IPCC), which was established in 1988 under the auspices of the United Nations. It aims at synthesizing scientific information on climate change and presenting it to decision-makers in a digestible format. Other examples include The Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES, since 2012) and at the European level, The European Platform for Biodiversity Research Strategy (EPBRS) and The Science for EU Environment Policy Interface (SEPI), since 2010.

The Global Forest Expert Panels (GFEP) initiative of the Collaborative Partnership on Forests, organised by IUFRO, was launched in April 2007 to provide objective and independent scientific assessments of key issues to support more informed decision-making at the global level. The new GFEP “Rapid Response” on Illegal Timber Trade aims at producing a synthesis report on the topic by December 2016, thus providing a scientific contribution to ongoing discussions on illegal timber trade in international policy fora.

ThinkForest, hosted by the European Forest Institute, has provided a forum for science-policy discussions since 2012. The Forest Based Technology Platform, an industry driven EU initiative, has taken on the role of identifying the most relevant research topics that contribute to the EU political goals towards a sustainable and competitive forest sector in Europe.

In Finnish science policy, the question of the use of research as a basis for strategic national decisions in various fields has recently been introduced into the discussion. Tapio Ltd. has launched a project, with financial support from the Metsämiesten säätiö foundation, to develop a pilot version of a science-policy-practice interface for the forest sector in Finland, based on the concept of topic-wise, ad-hoc panels as meeting fora for science, practice and policy experts on the topic in question (Päivinen and Toivonen, 2016). The first pilot concentrated on the availability of timber from private forests in Finland (Päivinen et al. 2016).

### Conclusions

In order to be successful, science-policy-practice interaction should fulfil some basic conditions. The most important attributes cited in the literature are as follows (Cash et. al. 2003):

1. Relevance, reflecting the ability to link the issues on which decision-makers focus.
2. Credibility, reflecting the believability of knowledge of scientific results and facts, models, scenarios and options behind them to a user.
3. Legitimacy, referring to political acceptability, transparency and trust in the process of the science-policy interface.

Naturally, implementation of these principles depend on the structure and history of relevant actors in the three fields interacting in the countries.

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## Are environmental services and bio-economy antagonist?

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### **Abstract**

Environmental services were at the core of the birth of forest science as the linkage to water and watershed shows even in the name of the Faculties and profession, especially in the Alpine and Mediterranean countries. The wake-theory (Dietrich 1953) recognized the relevance of environmental services but understood them automatically covered by a sustained yield conventional forestry. During the late 70s and following 3 decades, environmental services from forests, especially biodiversity and climate change, gain attention and it was evident that the low cost option of the wake theory eroded due to the fact that society wished a higher level of environmental services and increasingly extended areas of forests lost any profitability based on wood use.

Global climate change discussions and very specially REDD+ showed during the past decade that environmental services, if taken seriously, needed to be compensated to the forest dependent communities that sustained the forests. Costa Rica established the first country wide PES in the mid-90s and since then many countries have included into their national legislation and/or NFPs. Despite high consensus on PES, they account to 2 Bio \$/year while wood sales account to 100 Bio/a and NWFP 20 Bio/a.

The legal bases for conventional tenure is quite consolidated at global level since the release of the Voluntary Guidelines on Tenure (CFS, 2012) but no such consensus exists on environmental services. There is a need of a concerted action from legal, environmental economics and forestry/agronomy in order propose a similar corpus doctrinalis that later might be discussed at the correspondent multilateral bodies.

Another open question is to which extend PES might catalyse or impede SFM. Interestingly, European forest based industries have been rather reluctant to PES whereas cork based industries have been strong supporters.

Bioeconomy is driven by climate change and exhaustion of fossil fuels but as well other ethical, economic, social and environmental considerations, exacerbated in Europe and Japan due to the high dependence on imports of raw materials and energy. Forestry is the most advanced sector in bioeconomy as it provides today the most important, versatile and affordable renewable raw material: wood. 3 Bio m<sup>3</sup>/a are obtained annually from the World forests and much more could be obtained sustainably if correspondent policies would be implemented. The GPFLR has identified an area of 1 Bio ha suitable to afforestation without affecting food security what would increase the global forest area 25%.

If adequately managed, an increase demand of wood, especially low value wood, is positive as it will allow to implement thinning operations presently very costly. An improvement in the profitability of forestry will reduce the abandonment and support the investment in forests and will increase the political and social interests for forests striving forest expansion. For sure, there are some risks in case of poor governance like overuse or excessive intensification.

Control mechanisms like forest management plans and inventories will need to be more intensively used in order to monitor and avoid unsustainable practices. Participatory bodies will be crucial to

fine-tune the policies and to strive compromises that strengthen the potential win-wins of PES and bioeconomy. Nevertheless, PES will be presumable concentrated in the less productive areas (mountains, coasts, Mediterranean) where as bioeconomy might be more decisive in the higher productive forests.

# Harmonization of Forest Available for Wood Supply (FAWS) in Europe

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## Keywords

Wood resources, National Forest Inventory, wood supply, forest area, restriction

## Abstract

National forest inventories (NFI) are among the most important data providers for national and international forest reporting. Forest available for wood supply (FAWS) is an indicator for the sustainability of timber production. The application of the current FAWS definition is not without uncertainty due to different possible interpretations. A clearly defined and applicable reference definition (RD) for FAWS was proposed and tested using NFI data from five European countries. The RD was established based on questionnaires and country reports including most European countries. The case studies showed that the RD is applicable using NFI data, even though some additional clarifications are still needed for a harmonized reporting on FAWS.

## Introduction

NFIs are among the most important data providers for national forest resources relying on well-defined terms. NFI's are mostly based on statistical sampling providing high quality data. In the global context, data are needed by the FAO (Food and Agriculture Organization of the United Nations) for the "Global Forest Resource Assessment". Within the frame of European reporting, data are provided for the "State of Europe's Forests" (SoEF) report compiled by UNECE (Forest Europe, United Nations Economic Commission for Europe), and FAO. In international forest reporting, forest area and growing stock are often subdivided into different categories. One of the basic indicators is FAWS (forest available for wood supply) and forest not available for wood supply (FNAWS). FAWS is used as an important indicator for the sustainability of timber production and the potential for future availability of timber. Usually, reporting is based on the assumption that variables or indicators to report on are well-defined and unambiguous. Unfortunately this is not always the case. Thus, harmonization efforts are needed to improve existing definitions using reference definitions (Vidal et al., 2008) and to improve comparability of national definitions with reference definitions (Ståhl et al., 2012).

## Objectives

- 1) Establishment of a RD for FAWS.
- 2) Implement the RD using case studies based on NFI data.

## Methods and material

Before establishing a RD for FAWS a baseline of the general understanding of its concept has to be determined. The baseline was established using 1) a questionnaire and country status reports compiled by NFI experts under the framework of COST Action FP1001 (Improving data and information on the potential supply of wood resources: a European approach from multisource national forest inventories). 2) A questionnaire completed by the UNECE/FAO Team of Specialists on Monitoring Sustainable Forest Management.

To assess the possible harmonization of FAWS at European level, the proposed RD was applied using NFI data from five European countries (Italy, Ireland, Spain, Sweden, Switzerland).

### **Results**

The analysis of the COST Action FP1001 questionnaire showed that 66% of the countries have a national definition for FAWS and 24% of the countries apply the SoEF definition (Alberdi et al, 2016). The national definitions of FAWS differ fundamentally and the most important restriction (legal, environmental, economic) varies for each country (Alberdi et al, 2016). Only few (10%) countries do not use a FAWS definition for national purposes, even if they apply the SoEF definition for international reporting obligations (Alberdi et al, 2016).

Using the information gained from the questionnaires a reference definition for FAWS including details on restriction classes as well as a number of recommendations for their assessment was proposed (Alberdi et al, 2016).

The case study applying the RD for FAWS showed that the most common restriction is related to protected areas (e.g. national parks or forest reserves). In relation to the total forest area, Italy and Sweden have the largest protected forest area with 35% and 12%, respectively (Fischer et al., 2016). Social restrictions were not applied within any country of the case study (Fischer et al., 2016). The Economic restrictions were analysed using NFI expert- defined reference thresholds. Even though economic restrictions should be applied, not all countries are able to report on them due to missing data (Fischer et al., 2016).

### **Conclusions and discussion**

Currently, estimates of FAWS are not easily comparable between countries even if international processes and instruments require robust and harmonized data. A reference definition for FAWS has been proposed under the framework of the COST Action FP1001. The proposed reference definition defines reporting principles and determines different restrictions limiting wood supply.

For international reporting, well-defined restrictions, like the IUCN (International Union for Conservation of Nature) classes for protected areas should be used. The Economic restrictions of the RD is the most difficult one to assess and our analysis did not provide a clear threshold to apply for the economic restriction. There may be a possibility to establish an international threshold for slope or site productivity to apply to the economic restriction. Without clearly defined restrictions the proposed RD will pose similar challenges in its application as the current definition of FAWS.

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# Identification of current sustainable forest management (SFM) policy targets formulated in national forest-focused policies and strategies in Europe

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## **Keywords**

National SFM policy targets, national forest-focused policies and strategies

## **Abstract**

The demands on forests for wood and energy production are foreseen to increase in the future. This has triggered in new forest-related policies and strategies at different political levels and across different sectors (e.g. reviewed EU Bioeconomy strategy in 2017). This study analyses on how sustainable forest management (SFM) targets have been formulated and set in national forest-focused policies and strategies for 19 European countries. Results show that SFM policy targets formulated in national forest-focused policies and strategies represent the ecological and socio-economic framework of each country. The results show also that SFM forest-focused policy targets may contradict, e.g. increasing use of wood versus increasing the area of protected forests, which may result in an increase of forest area not available for wood supply, unless the area of forest is not increased as well.

## **Introduction**

The increased demands on forests for wood and energy production calls for shifts in forest policies and strategies (e.g. reviewed EU Bioeconomy strategy 2017) in relation to carbon sequestration, biodiversity conservation, water protection, landscape management, soil and nutrient regulation, and tourism and recreation (Standing Forestry Committee 2012). Therefore there is a need to analyse how sustainable forest management (SFM) targets have been defined in national forest-focused policies and strategies.

## **Objectives**

The study will analyse on how SFM targets have been formulated and set in national forest-related policies and strategies for 19 European countries. A selected set of ecological and socio-economic targets are compared to the current situation to check if national identified future forest-focused policy targets are compatible to the current state-of-the-art in a country.

## **Methods and material**

The data for this study was obtained from the Joint UNCECE reporting cycle 2013 on pan-European indicators for Sustainable Forest Management collected through the UNECE/FAO Forestry and Timber Section, Geneva 2013 (UNECE 2013). The focus of this study was on SFM targets as formulated in forest-focused policies and strategies in 19 European countries for following SFM indicators: forest area, growing stock and production and use of wood, protected forest areas. In this study an ordinal classification was created to describe the degree of future implementation targets. Furthermore future implementation targets were compared to the current situation in order to demonstrate if national identified future targets do not contradict to the current situation in the studied countries.

## **Results**

The different ecological and socio-economic conditions of the studied countries are well reflected in the formulation of future targets in SFM forest-focused national forest policies and strategies. Existing general SFM forest-focused policies and strategies on forest area aim in the majority of the studied countries at increasing existing forest area (e.g. afforestation of agricultural land unsuitable for agricultural use). This is interesting especially in the light of increasing competition for land use (e.g. between traditional agriculture and forestry) in many of the studied countries. Countries with a relative low forest cover do often report on clearly defined targets for increasing their forest area. Visa versa countries with an existing relative high forest cover and low population density do often not see the need to expand the existing forest cover.

Almost all studied countries aim at increasing both the growing stock and the use of wood within the SFM frame that fellings should not exceed increment over a longer period. Currently general SFM policy objectives in national forest-focused policies and strategies range from increasing the volume of fellings, to encouraging of forest management, to mobilisation and use of domestic wood resources, and to the optimisation of current forest cover. By comparison the future targets and current level (data FOREST EUROPE 2015) on annual fellings as percent of net annual increment it may be concluded that future targets do not contradict to the current situation.

SFM policy objectives on increasing protected forest areas exist in almost all of the studied countries. However, a few countries do also set quantified targets. Comparing recent data (FOREST EUROPE 2015) increase in the area of forests protected for biodiversity and landscape can be observed over the last 15 years in many of the studied countries. An increase in protected forest areas and connected increase on forest area not available for wood supply might be in contradictory to the general policy objectives in national forest policies and national forest strategies on increase production and use of wood. An integrative forest management approach for maintaining natural characteristics of valuable habitats outside protected forest areas might help to overcome this shortage.

## **Conclusions and discussion**

SFM policy targets formulated in national forest-focused policies and strategies represent the ecological and socio-economic framework of each country. A very few countries set clearly defined targets for increasing forest area, growing stock and production and use of wood, and protected forest areas. Hereby, forest-focused policy targets may often contradict in the studied countries, e.g. increasing use of wood versus increasing the area of protected forests, which may result in an increase of forest area not available for wood supply, unless the area of forest is not increased as well. In addition, targets of forest-related policies might have a direct impact on the forest sector and might result in the future in competition for land use e.g. between traditional agriculture and forestry.

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# Projection systems for future wood availability in Europe

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## **Keywords**

*wood supply, projection systems, future scenarios, national forest inventory, USEWOOD*

## **Abstract**

Information on sustainable wood supply potential in Europe is crucial for assisting forest industries and environmental policy makers. However, the variety of projection systems for forecasting wood availability makes the comparison of national results difficult. Under USEWOOD, a description of projection systems used in Europe has been compiled. The complexity of projection systems varies across Europe. Simple systems using forest management plans' data combined with yield tables can be found as well as more complex tools based on National Forest Inventory (NFI) data. The latter may use species-specific climate sensitive growth models and are capable of integrating the effects of climate, management and disturbances. All tools are under constant improvement, although there is still a long way to go concerning the validation of projection systems. Few countries carried out sensitivity analyses on their tools and/or provide uncertainty measures. Notwithstanding, projection results should always be interpreted as what-if scenarios rather than seen as a prognosis.

## **Introduction**

Information on sustainable wood supply in Europe is crucial for assisting forest industries and environmental policy makers. Many European countries have built projection systems for wood availability forecasting to assist in the development of national policies. However, when applied for larger region analysis such as the European Union, country level results are not often comparable because national projection systems differ in structure, underlying constraints and assumptions, possible scenarios, required inputs and outputs. Additionally, national-scale studies seldom cover all countries in a region and differ considerably in timing.

## **Objectives**

USEWOOD COST Action (FP1001) aimed at improving information on projection systems used in Europe. The variety of projection systems used by different countries raises difficulties when comparing projection results. Therefore, to better interpret results, it is essential to understand how these systems, used for scenario analysis, are structured, their input and output data as well as their limitations. Under USEWOOD, a description of projection approaches describing the input data, type of growth models and how the effects of external drivers (e.g. management) are integrated in projections was compiled.

## **Methods and material**

To reduce uncertainties and better evaluate future wood supply projection, USEWOOD participating countries were asked to describe the projection system most commonly used for assessing future wood availability at national level in their countries. A total of 21 projection systems were described allowing a fair characterization of the methodologies currently used across Europe. For further details see Barreiro et al. (2016).

## Results

Half the countries use projection systems based on National Forest Inventory (NFI) data, most of them driven by management. Traditionally, Eastern-European countries have developed systems based on Standwise Forest Inventory/forest management plans. Some countries still rely on yield tables for growth estimates, while other countries use tree level empirical growth models or matrix models to project growth. Despite the importance of climate change, few countries rely on climate sensitive growth models and hardly any country applies process-based models. Being mainly driven by management, thinning and final felling are the silvicultural operations most widely considered in projection systems; whereas other management activities, such as fertilization, are less common. Some projection systems have special modules for simulating biotic and abiotic disturbances, stand regeneration and land use changes.

Mediterranean countries report difficulties in developing nationwide projection systems due to the large variability in growth conditions, structure and composition of forests. In these countries, tools are commonly developed for specific country regions and/or for the most relevant tree species. Some countries apply a combination of methods depending on forest ownership, type or data availability. Additionally, a few countries use European level tools such as EFISCEN, either to complement national projections or to compare projection results with the ones obtained using their national systems.

## Conclusions and discussion

Projection systems can be used for assisting decision making processes. These tools are continuously being improved by the development and integration of new growth models and extra modules to take additional external drivers into account. It would be useful if countries could cooperate to benefit from experiences and to avoid efforts to reinventing what already exists. Available knowledge could be used by some Eastern-European countries were the development of NFI-based projection systems has already started or will soon start. The statistical design of NFI allows for the use of unbiased estimates of forest attributes and uncertainty measures that facilitate calculation of confidence intervals. However, other uncertainty sources are found in projection systems relating to the difficulty of modelling stochastic events (e.g. the development of old-growth forests, disturbance events, regeneration, and owner behaviour). Only a few countries reported having carried out sensitivity analyses to their tools. Nevertheless, projection systems should be validated for the whole span of their projection and simulation outputs. Finally, simulation results should be interpreted as what-if scenarios rather than seen as a prognosis.

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# Linking forest policy issues and decision support tools to promote the development of integrated policy analysis in Europe

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## **Keywords**

Forest policy area, forest decision support systems, expert interviews

## **Abstract**

This study aims to improve understanding and capacities in the use of forestry DS tools for integrated policy analysis. The methodological framework and the questionnaire of this study were developed within the frames of COST Action FP1207, “Orchestrating forest-related policy analysis in Europe (ORCHESTRA)”. The main conclusion is that there are DS tools suitable to support forest policy areas. Yet, the spread and usage of DS tools in forest policy is limited for several reasons.

## **Introduction**

Many decision support tools (DS tools), i.e., models and decision support systems, for forestry have been developed. However, the use of DS tools in forest policy processes remains limited in Europe. Within the ORCHESTRA COST Action, working group 2 focuses on the use of forestry DS tools for integrated policy analysis.

## **Objectives**

The main objective of this study was to improve understanding and capacities in the use of forestry DS tools for integrated policy analysis. Following tasks were set: (i) identify major forest policy areas (FPA, i.e., a specific issue that is high on the forest policy agenda in a country) in European countries and DS tools available to support forest policy processes; (ii) evaluate the compatibility of existing DS tools with the FPA; and (iii) identify DS tools that could address similar FPA in other countries, and factors limiting the use of DS tools in forest policy.

## **Methods and material**

The methodological framework and the questionnaire of this study were developed by ORCHESTRA working group 2. Interviews involving one policy expert and one expert of DS tools were carried out based on the questionnaires. In total, 30 experts (mostly COST Action members) representing 19 European countries were interviewed. The major FPAs in each country were identified by asking experts to list the five most relevant FPAs in recent forest policy processes. FPAs were grouped into Forest Policy Topics (FPT) to facilitate analysis. The most relevant DS tools used to support local FPAs in policy processes (formulation, implementation and evaluation) were also identified by the experts.

DS tools were classified as Decision Support Systems (DSS), Simulators (SM), Growth Models (GM) and tools used for National Forest Service (NFS). Further, the compatibility of existing DS tools to support FPAs was tested by checking what dimensions of FPAs are covered by DS tools (Borges et al. 2014). Identification of DS tools that could potentially be used to a larger extent was done by estimating the least number of Not Covered Dimensions (NCD), by DS tools that are covered by FPAs.

## **Results**

This study involved 30 experts (26 men and 4 women) and most of them (26) were directly or indirectly involved in forest policy processes. All of them had average (14) or expert (16) knowledge of FPAs in their country. From all countries (except Slovakia), a DS tools’ specialist with average or higher knowledge about DS tools participated.

The experts listed 95 different FPAs which were subsequently classified into 16 groups or FPTs that are presented in Table 1.

Table 1. List of classified Forest Policy Topics (FPTs)

	<b>FPT</b>		<b>FPT</b>
<b>1</b>	<i>Forest ownership</i>	<b>9</b>	<i>Restrictions on forest management</i>
<b>2</b>	<i>Sustainable forest management</i>	<b>10</b>	<i>Afforestation</i>
<b>3</b>	<i>Forest roads and infrastructure</i>	<b>11</b>	<i>National forest programs and strategies</i>
<b>4</b>	<i>Forest fires</i>	<b>12</b>	<i>Forest management planning</i>
<b>5</b>	<i>Natura 2000 constraints</i>	<b>13</b>	<i>Biodiversity issues</i>
<b>6</b>	<i>Climate change and CO<sub>2</sub> emissions</i>	<b>14</b>	<i>Rural areas and land use policy</i>
<b>7</b>	<i>Ecosystem services</i>	<b>15</b>	<i>Illegal cuttings</i>
<b>8</b>	<i>Bioenergy</i>	<b>16</b>	<i>Forest economics</i>

In total, 23 DSS, 17 SM, 6 local GM and 10 NFS were found to support FPTs in analysed countries. Preliminary results show that all FPTs had at least one DS tool to support forest policy. Also most of DS tools were used for policy formulation and for policy evaluation. However, DS tools were less used for policy implementation. Preliminary results presented in Figure 1 show that most of FPTs dimensions (blue bars) were covered by DS tools dimensions (red bars). Yet, DS tools did not completely cover all dimensions.

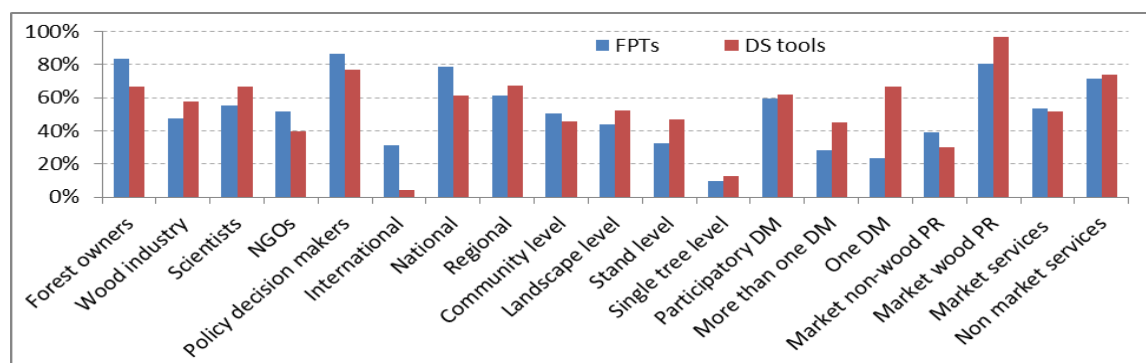


Figure 1. Comparison of FPTs required and DS tools covered dimensions.

Preliminary analysis of NCDS identified the best DS tools for each FTP that could be recommended for the usage in the other countries focusing the same FPTs. For example DSS “SADFLOR” developed in Portugal had the lowest number of NCDS for FTP “Forest economics”. Thus, this DS tool is recommended.

According to preliminary results, the main reasons that limit DS tools usage in forest policy are: “Users lacking confidence in how to use DS tools effectively”, and “DS tools are too complex and primarily designed by and for scientists and not for policy processes in general”.

**Conclusions and discussion**

The use of DS tools to support forest policy areas is not extended in all the European countries but the use of these tools would be beneficial. However, the sharing of DS tools between European countries is limited due to many different reasons. Main reason is lack of confidence in users how to use DS tools effectively.

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# Declining influence of economic interests in the public consultation process for the revision of forest legislation?

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## Keywords

Consultation, influence, interest-groups, forest legislation, political positions

## Abstract

An important phase for the orchestration of Swiss policies is the pre-parliamentary process, which ends with a public consultation process. The main intention is to improve the proposal and to prevent a public referendum against the final legislation.

By analyzing – using quantitative and qualitative methods of text-analysis – the original answers of the different stakeholders and interest-groups in the public consultation process, their positions relative to the draft legislation are derived. This gives an indication about the relative influence of these actors in the initial phase of policy-making process.

Looking at the three latest rounds of revision (2010: forest law, 2012: forest decree, 2014: forest law) the results unveil that the forest owners have often taken similar positions than the environmental NGOs and sometimes stood even in contrast to the other actors of the forest economy sector. The revision proposal itself seemed to be positioned rather evenly in between the most important actors of the forest sector. Hence, one possible explanation for the perceived ineffective lobbying of the forest economy is that it is lacking unity.

## Introduction

After a long phase of stability (1902-1993), the Swiss Forest Law has been subject to various revision proposals since the early 1990s. The second revision proposal was elaborated during the late 1990s and early 2000s in an extensive participatory process. This resulted in a National Forest Program that was meant to foster revisions of the forest law. These revision processes took place in 2005, 2010, 2012 and 2014 but they turned out to be rather difficult in the beginning.

Given that in Switzerland, forest law revisions are a relatively new phenomenon, it still is not clearly understood how much influence the different stakeholders have in the underlying policy process. Although the development of forest policy had been closely followed since decades (Zimmermann 1992; Zimmermann and Lieberherr 2015), interest group influence has only recently been examined explicitly. Hirschi et al. (2012) conclude, that forest policy processes had always been strongly determined by state actors, and that interest organizations are surprisingly marginalized (with respect to their centrality in the policy network), compared to other policy domains. According to Zabel et al. (2016) the actors representing forest economy (forest owners, forest industry) even complain that they seem not to be heard sufficiently in this process.

This paper will try to give an additional indication for stakeholder influence in Swiss forest policy by looking at the positions these actors communicated during the early public consultation process and by comparing them to the draft legislation. Assuming that the public consultation is just the end-point of the preceding pre-parliamentary coordination process, it can be expected that the more influential actors are positioned closer to the draft legislation.

## Objectives

As participants in the pre-parliamentary coordination phase, forest policy stakeholders act as “lobbyists”, trying to implement the agenda of their own organizations. Various forums and “participatory venues” at different levels – e.g. for the preparation of strategic decision at a rather high level as well as for the exchange of lower level agencies regarding implementation – exist in which new developments in forest policy making can be discussed. There are no strongly structuring

“rules of the game” in the various forums and most of the participants know each other rather well, since the group of potential participants is small. The environmental NGOs always strongly coordinate their positions Ulber (2013) and often present a unified position as the so-called “Environmental Alliance”. Curiously, the interests of the forest owners and the forest industry seem to be less well organized (Baur 2002). Cross-level coordination is an imperative given the strongly federalized organization of the country. As the resources and competences at the cantonal level are limited, the cantons are organized in the “Conference of the Forest Ministers” as well as the “Conference of the Cantonal Foresters”.

The expectation thus is that environmental interests and the cantonal actors have more weight in the pre-parliamentary coordination process and thus happen to be positioned closer to the draft legislation proposal than the other actors, namely those from the forest economy side.

### ***Methods and material***

The positions of the policy proposal and the actors are compiled from the answers of the stakeholders in the public consultation phase that precedes deliberation in parliament. For the time being, only the statements in German language are analyzed. However, virtually all important actors have given their statements in German.

The results were examined qualitatively by comparing positions taken relative to single issues of the revision proposal. The position of the policy proposal is elicited from the accompanying commentary given by the forest administration. This text is fairly long and rich and includes the legal text of the revision proposal. The results are subsequently verified by applying an automated text analysis tool – wordscores (Laver et al. 2003) – which is specialized in positioning the texts relative to pre-determined scores of selected “reference” texts, based solely on the comparison of word frequencies.

### ***Results***

The revision process of 2010 dealt mainly with one single issue: the more flexible definition of forest protection, including the introduction of the “static” as opposed to the “dynamic” forest delineation. This reform was supported by farmers associations, as it implied that forest clearings should not be compensated under all circumstances (mainly on agricultural land) and the forest surface should be defined as static, allowing newly grown forest to be eliminated in the future. The revision process of 2012 just only implemented this reform in the forest decree. The revision process of 2014 dealt with a multitude of issues but mainly with protection against invasive species and pests, the adaptation to climate change and support for the forest industry.

In all three analyses the positions of the environmental NGOs are at the opposite side of the draft proposal than those of the farmers associations (2010, 2012) and the forest industry (2014). However, the analysis also shows that in all three cases, the forest owners associations had to ward pressure that aimed at abolishing some of the exceptionally strong forest protection rules. This puts them rather close to the environmental NGOs particularly for the first two revisions examined. Hence, unity was not particularly high among the actors of the forest economy. The quantitative analysis supports this observation, as the forest owners are positioned at the same side of the revision proposal as the environmental NGOs in these cases. There is no special indication for a particularly high influence of the cantons, though.

### ***Conclusions and discussion***

The analysis has revealed that the pre-parliamentary process results in a draft revision proposal that is positioned fairly evenly between the positions of the most important stakeholders. From this perspective, this early participatory phase of the policy process seems to be successful. An excessive influence by state actors could not be confirmed, i.e. the “cantonal conference of forest ministers” is not always closest to the draft proposal. More interestingly, the analysis has revealed that the forest economy sector has not been closely united with respect to the three latest rounds of forest policy revision. This might be one explanation for their declining influence, as they perceive it themselves.



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# Assessment of timber supply under alternative futures

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## Keywords

Forest management, scenarios, modelling, economic assessment

## Abstract

The aim of the study is to simulate forest management behaviour for five decades (since 2013) under different qualitative scenarios taking into account the diversity of behaviour by forest owners and managers. Simulations reveal increasing timber production costs, incomes and net profits under all scenarios. Research results could be integrated in decision processes related to forestry considering types of the forest manager and provide many possible threads for future studies.

## Introduction and objectives

In Lithuania, forest planners tend to forecast the development timber supply mainly focusing on the situation on state forests with distribution of age classes as a key variable. They also usually assume uniform forest management behaviour irrespective of owner type. In contrast, this study explores timber supply in a multi-disciplinary approach including participatory scenario building that links the development of external socio-economic factors with diversified approaches to forest management.

## Methods and material

The methodological framework for the study is elaborated within the frames of the EU FP7 project INTEGRAL, including the following analytical steps: (i) participatory development of qualitative scenarios, following different trajectories of contextual factors affecting forest management (Schüll and Schröter 2013); (ii) identification of forest management programmes formulated at the stand level and associated with the scenarios (Stanislovaitis et al. 2012); and (iii) modelling of future flows of timber including their economic assessment. The research is carried out on the case study area (CSA) covering the territory of the Kazlų Rūda State training forest enterprise. State forests make 80% of the total forest area (36,785 ha), dominated by pine (*Pinus sylvestris*) (48 %). Notably, CSA constitutes a hub of the Lithuanian forest industries.

## Results

Four future scenarios are constructed for CSA namely: Business as Usual, used as a reference scenario; Efficiency and Reforms, expecting radical economic reforms aiming improving efficiency in private and especially in state forestry; Ecology, anticipating forest management and timber production under substantially increased environmental consideration; and Climate Change Mitigation, juxtaposing growing timber industries and increasing environmental consideration. Depending on scenario alternative future manifestations of aggregate factors are developed.

The following Six forest management programs describe the behaviour of state forest managers and private forest owners, with different combinations under each scenario: (i) following current management of commercial forests; (ii) current management of protection forests with prohibited clear-felling and rotations at so-called natural maturity; (iii) leaving forest for natural development; (iv) active management for nature, prioritizing other forest functions than timber production; (v) seeking for profit within the current legal framework, cutting when reaching the currently valid minimum allowable rotation ages without reserve of mature stands; (vi) liberalising the legal

framework and reducing allowable rotations by 20%. Forest manager behavioural matrixes are used to describe the variations within and across forest owner types. The development of forest resources is simulated for five decades starting from 2013 for each scenario, using simulator Kupolis (Petrauskas and Kuliešis 2004).

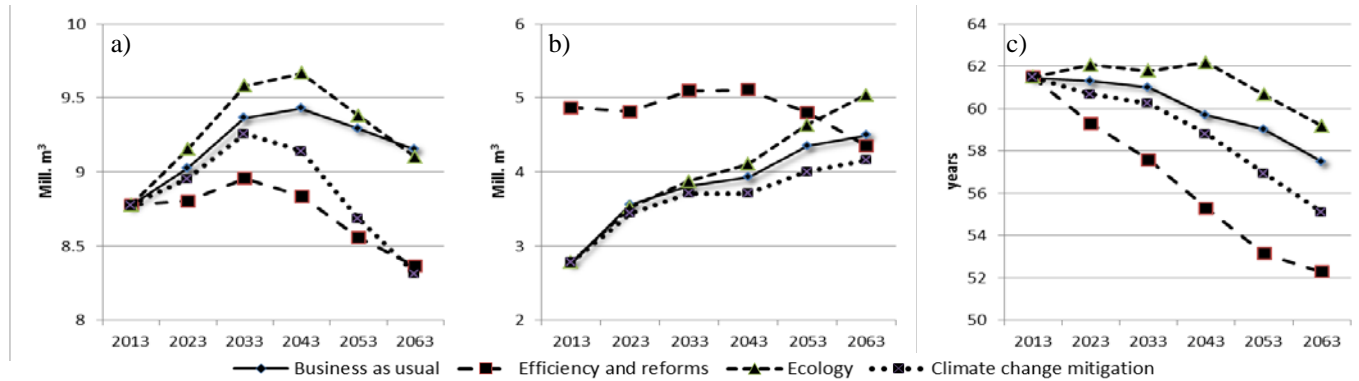


Figure 1. Dynamics of the total growing stock volume (a), volume of mature stands (b), and average age (c)

Simulations show increasing growing stock during the two to three decades, i.e. until 2043, followed by decline (Figure 1a). The largest volumes are accumulated under the Ecology scenario, while Efficiency and Reforms scenario entails the lowest volume accumulation due to more intensive management. The total volume accumulated in mature forests (Figure 1b) tends to increase under all scenarios except Efficiency and Reforms. It should be noted, that the total volume of mature forests under Efficiency and Reforms is nearly twice larger in year 2013 than for the rest of scenarios. The reforms assumed by this scenario included reducing minimum allowable rotation ages by 20% increasing the amount of forests that are “legally mature”. All scenarios, except Ecology, cause decreasing average age (Figure 1c). The changes are most drastic under Efficiency and Reforms. Timber production costs, incomes and the profits are increasing under all scenarios (Figure 2).

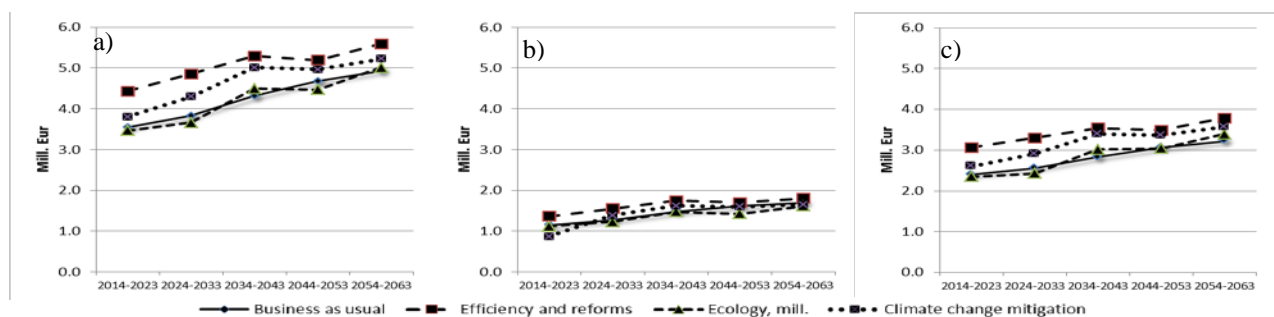


Figure 2. The dynamics of incomes (a), costs (b) and profits (c) under different scenarios

The Climate Change Mitigation scenario, which involves some liberalization on forest management within the current legal framework, generates 9 % higher total profit compared to the Business as Usual in 2063. State forestry seems to be more profitable per area unit compared to the private one only under Business as Usual scenario (Figure 2).

**Conclusions and discussion**

The qualitative methods of scenario development were linked with quantitative projections of timber supply, applying a forest decision support system to model behaviour of state and private forest owners. All four scenarios – Business as Usual, Efficiency and Reforms, Ecology, and Climate Change Mitigation – were generating steadily increasing timber production costs, incomes and the profits. The trends of the dynamics of forest characteristics and the timber supply as well as the flows of incomes and profit in the future are much dependent of the age structure of forest resources. This

wide area of research provides many possible threads for future studies, e.g. modelling of non-timber forest products and services, or neater specifications of forest management programmes according to different types of private forest owners. The methodological approach of the study could be suitable for integration in decision support system related to forestry considering interests of forest stakeholders.

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## Trade-offs between bioenergy and other ecosystem services in local forest policy: a case study in Italy

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### **Keywords**

*Bioenergy, carbon sequestration, biodiversity, recreation, Tuscany region (Italy)*

### **Summary**

The EU Bioeconomy Strategy (2012) aims to spread the way to a more resource efficient and competitive society able to reconcile sustainable use of renewable resources for industrial purposes with food security, while ensuring environmental protection. According to the potential development of bioenergy, the forest sector would play an increasing role in favour of smart and green growth. Italy, as other EU countries, is promoting biotechnology sectors but has not yet developed a comprehensive bioeconomy strategy. Some regions are defining preliminary strategies for bioenergy, taking into account the principles of forest multifunctionality. Through the 2014-2020 Tuscany Region Rural Development Plan, forest policy emphasizes the use of forest biomass for energy purposes, while developing sustainable management and guaranteeing synergy with other ecosystem services. The aim of the paper is to analyze the trade-offs between biomass use for energy and other ecosystem services (C sequestration, recreation and biodiversity) in a case study in Italy (Tuscany). The study site is the black pine forest of Monte Morello, near the metropolitan area of Florence. In order to analyze the trade-offs, the ecosystem services were quantified from ecological and economic point of views. Field survey with measures of dendrometric parameters, C sequestration and deadwood was used to assess bioenergy production, biodiversity and C sequestration. The value of recreation was assessed through the administration of questionnaire to visitors. First results highlight that an integrated management characterized by specific silvicultural treatments could be able to ensure a valorization of biomass for energy while reducing the negative impacts on other ecosystem services.

# Private forest owners motivations for adopting biodiversity-related protection programs

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## **Keywords**

Non-industrial private forest owner; Biodiversity program; Motivation crowding-out; Adoption decision

## ***Extended abstract***

Since economic incentives are typically fairly low for many non-industrial private forest owners, it is of interest for public policy to examine whether other motives might play a role on adoption of Biodiversity-related Protection Programs. Self-determination theory, developed by psychologists Ryan and Deci (e.g. [4]) is a general theory that argues that individuals may have both extrinsic and intrinsic motivations. In the present paper, economic motives include, primarily, financial compensations or penalties; fiscal exemptions; risk hedging; time saving; acquiring management information; and future or putative use. Social motives include reputation (networks, family, peer-pressure); self-image (moral satisfaction, warm glow); desire to belong to a group or differentiate from it; socialization; reciprocity. Intrinsic motives include the willingness to work for the quality of the environment; well-being of the community; bequest or patrimony values; attachment to the forest; mastery over forest practices; or definite personal ideas on how a forest should be managed.

These three categories of motives may act positively or negatively for any program, depending on the forest owner, e.g. economic incentive may be considered attractive for one, thus be declared as a motive for adopting a program; while it may be insufficient for another, and thus be cited for non adoption of a program. Motives may crowd-out each other in the sense that a policy that stimulates a particular motive (i.e. financial compensations for a certain program) might decrease the owner's other motivations, e.g. in Bénabou and Tirole (2006) [1] some of the adopters might be concerned that their social network believes they adopt for the money. The main goal of the present paper is to test whether the Bénabou and Tirole "crowding-out" theory applies to forest owners, and whether crowding-out effects are already at work with current forest biodiversity-related programs. The test operates in the following way.

A sample of non-industrial private forest owners answered a survey about their motives for adopting a number of current programs: Wood products sustainable forest management certification (PEFC-FSC), several types of forest management plans, the Natura 2000 program, various professional organizations such as cooperatives and syndicates (unions), environmental associations and the "ProSilva" organization. Owners also supplied individual and property characteristics. Figure 1 reflects the different motives for each program (after regrouping), and for not adopting any program. Out of 627 observations, 139 adopt one program, only 12 owners adopt more than one program.



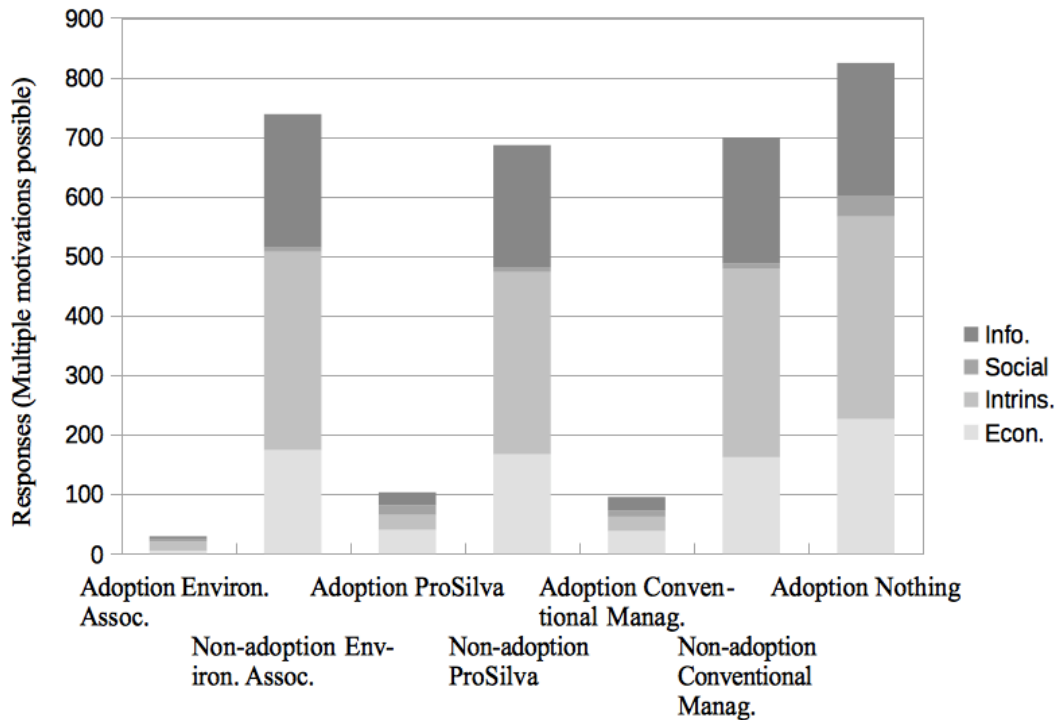


Figure 1. Different motives for each program

Each motives and characteristics are represented by variables, coded 1/0 (presence/absence) in the case the motives. These variables are inserted in an econometric discrete choice model of the decision to adopt a program. The model is a classical probit of the probability of not adopting any program. Probit models could also be estimated for each of the three programs (ProSilva, Conventional Management, Environmental association) separately, but that would assume a zero correlation between the three. Since it appears that few respondents are involved in more than one program, there is a strong negative correlation between the adoption decisions. The second model of interest is then a multivariate probit, see e.g. Cameron and Trivedi (2005) [2] p.517.

The output of the model is a set of estimated coefficients that reflect the quantitative effect of these characteristics and motives on the probability to adopt a program. The cross-product of the motives are also included in the variables of the model. Crowding-out is a case when the estimated coefficients of the social and economic motives are both positive but the estimated coefficient of the cross-product is negative, so that the simultaneous presence of both motives leads to a probability of adoption of the program that is lower than if the coefficients of the two motives were simply summed together.

Unsurprisingly, economic motives have a clear positive effect on the probability to adopt a management program (conventional or ProSilva), but not to adhere to an environmental association. Social motivations significantly impact adoption of all three types of program positively, while intrinsic motivations have a clear positive effect only on adhering to an environmental association. Non-adoption primarily depends on economic and social motives, not on intrinsic ones. There is significant crowding-out between the economic and intrinsic motives, but not between the economic and social motives. The crowding-out effect can only be shown for the Prosilva and for the Conventional management programs. The intrinsic motive, in the context of the present survey, refers primarily to feelings of attachment to the forest and concerns about the mastery of one's own practices. This crowding-out effect is then driven by a feeling of incompatibility between economic incentives and such attachment or mastery.

Such conclusions on individual motivations for adopting programs lead to questioning of the use of compensation for ecosystem services values from a policy point of view. Valuation leads naturally to the idea that forest owner might be financially compensated for these services, while economic incentives can crowd-out intrinsic motivations. As already seen in several circumstances, e.g. Oliver (2013) [3], such crowding-out might induce a decrease of ecosystem services.

Contrarily to the maintained hypothesis in Bénabou and Tirole (2006) [1], there is no crowding-out between economic and social motives. There is also no crowding-out between intrinsic and social motives. Therefore, social motives might appear in a particular position for being well used as leverages of public programs. Programs that enhance the social reward of the forest owners who adopt them might lead to more adoption at the same level of public spending - or less public expenses for the same level of adoption. The strong negative correlation between adoption decisions lead to recommend avoiding creating new programs and instead modify existing ones. This is possibly a major pitfall when designing forest biodiversity policies.

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# Assessing the feasibility of forest policy implementation under climate change: a case study on Scotland's National Forest Estate

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## Keywords

*Forest policy, uncertainty, climate change, ecosystem services, forest management simulator*

## Abstract

A forest simulation enabling evaluation of species and forest management system choice was used to assess forest resilience under climate change of Scotland's National Forest Estate. The simulation quantified the trade-offs in ecosystem service delivery under the combined effects of forest management trajectories and climate change. The simulation showed opportunities for maintaining forest resilience using more diverse tree species and management systems. The simulation can be used to demonstrate achievable national targets of e.g. timber production, carbon sequestration and biodiversity under climate change.

## Introduction

Scotland's recently revised Land Use Strategy (Scottish Government, 2016) provides an integrated policy agenda for all land use, with a focus on sustainable land management to maintain a range of ecosystem services under the pressures of climate change. Forest policy directs the delivery of a set of key commitments (FCS., 2013) from the National Forest Estate (NFE). A key focus for this policy development is: to manage resilient forests that deliver multiple public benefits; to quantify ecosystem services benefits; and to quantify the sequestered carbon, demonstrating how forests help to meet the Climate Change (Scotland) Act 2009 targets (by 2020 – 42% reduction; by 2050 – 80% reduction below 1990/95 emissions). We use the term 'resilience' to indicate the ability of the forest estate to continue to deliver future policy objectives. The simulation projects future ecosystem services benefits, as components of policy objectives, from forests under climate change.

## Objective

To assess the resilience of Scotland's NFE we simulated key forest ecosystem services under climate change and different forest management trajectories.

## Materials and Methods

A simulation can assess how different adaptation approaches to climate change (and to socio-ecological drivers) may alter the future provision of ecosystem services from forest land (Ray et al., 2015). Site types were defined by climate (baseline and downscaled climate projections from the 11-RCM<sup>1</sup> for the UK) and selected variants equivalent to the representative concentration pathway (RCP 4.5 - IPCC, 2014). A digital soil map of varying resolution (1ha to 1km) provides the edaphic component of site type. A spatially explicit forest inventory of the National Forest Estate (including information about species, age and management type) was used as inputs to the simulation. Simulations combined five forest models used in Britain: Ecological Site Classification to match species to site type; ForestGALES to provide the risk of wind damage; ForestYield to model stand growth and the time of maximum mean annual increment; ASORT to partition the volumes of sawlogs and roundwood; and BSORT to partition standing biomass and carbon. We used model

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<sup>1</sup> Regional Climate Model

outputs as indicators of forest ecosystem goods and services, such as standing carbon, sawlog volume, and a biodiversity index, to assess these ecosystem service benefits from forest land.

### Results and Discussion

Here we illustrate how climate change projections interact with different forest management trajectories to affect the delivery of ecosystem services. Three forest ecosystem services (Figure 1), calculated nationally, show which management trajectories will deliver more or less benefits and what trade-offs might be expected. Short rotation forestry shows a steep decline in standing carbon, but would increase biomass availability for society. This management strategy could help deliver a lower carbon economy, but at the expense of a steeply declining biodiversity indicator. Business as usual, with a continued reliance on Sitka spruce and Scots pine (major timber species) would maintain high timber production, but lower standing carbon and lower biodiversity than low impact silviculture. A strategy of diversifying species selection, and replacing some or all Sitka spruce (e.g. noss) with other suitable species, provides a small improvement in standing carbon, a slightly lower production volume, and no effect on biodiversity.

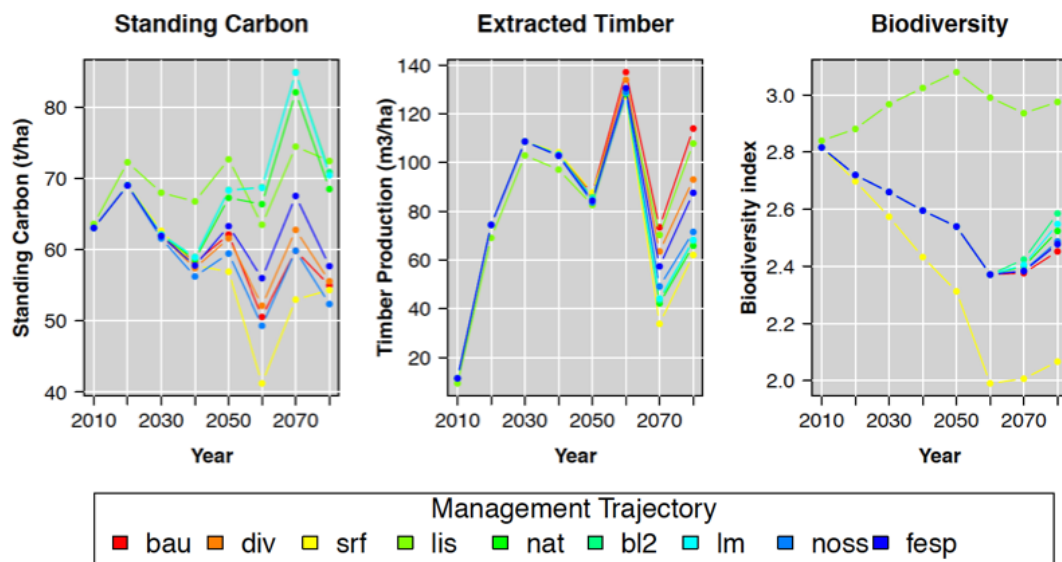


Figure 1 Variation in the provision of a selection forest ecosystem goods and services (and a biodiversity index) among nine forest management trajectories under RCP4.5 climate projection: business as usual (bau), diversity (div), short rotation forestry (srf), low impact silviculture (lis), native species selection (nat), broadleaved species selection (bl2), low maintenance silviculture (lm), diversity without Sitka spruce (noss), use of recommended species by FCS (fesp).

### Conclusions

The simulation approach: helps to target specific policies regionally and enables forest managers and planners to test climate change adaptation methods against agreed ecosystem service targets. The changes in ecosystem services delivery can be used in 'action expiration charts' (Petr et al., 2015) to guide adaptation progress and direction. The approach is consistent across land-use and, combined with results from other sectors, can help an assessment of land use policy delivery against national and international targets.

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# Effectiveness of forest conservation on private land

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## **Keywords**

Conservation, forest and energy industries, leakage, non-industrial private forests, partial equilibrium model, voluntary conservation

## **Abstract**

In forest economics literature leakage effects of forest conservation have been identified both at a global and national scales, when protection of land in one region leads to intensified timber harvests in another region. We analyze the effectiveness of forest conservation at national scale in a case where forest owners derive both monetary and amenity values from forests. A partial equilibrium model FinFEP (Finnish Forest and Energy Policy) is used to form scenarios with and without a government imposed forest land conservation program in Finland. We find that a strong leakage impact exists connected to national land conservation programs. Following simulated conservation programs where 50 000 – 450 000 ha of private land with over 100 year old forests were put under protection, the total area of old-growth forests (> 100 years) increased only between 33 % - 37 % of the initially protected land area. For sensitivity analysis, we varied the coverage of the conservation program, investment and final product demand scenarios. The results indicate that the effectiveness of forest conservation depends on the capacities of forest and energy industries, the size of protected area and the demand of the final goods.

## **Introduction**

Forests in Southern Finland are predominantly privately owned. Only about 3 percent of forestland in Southern Finland has been put under protection. This has prompted the government to initiate forest conservation program to increase the protection of private forests in southern Finland. Currently, however, this program is suffering from the lack of funding geared toward compensating landowners for the missed timber selling income. Nonetheless, the conservation policies still aim at increasing the protection of southern forests in Finland.

Leakage effects have previously been studied in international settings (Gan and McCarl 2007, Sedjo 1992, Sohngen et al. 2009), but not within national setting. In Finland the impacts of forest conservation has been previously studied, but not from the point of view of leakage effects (Linden and Uusivuori 2002, Leppänen et al. 2005).

## **Objectives**

In this study we investigate the impacts of increased forest conservation from the point of a possible leakage effects. Our aim is to test what the age-class distribution effects are when more forest land is put under conservation, i.e., we want to see how the unprotected forests are being used in a conservation scenario as compared to a business as usual scenario. Hence, the conservation impacts are measured as difference between two scenarios.

## **Methods and material**

We use a numerical partial equilibrium model FinFEP to form the scenarios (Lintunen et al. 2015). The model is based on utility maximizing forestland owners and profit maximizing timber demand side. Four different sectors are included: energy production, the pulp- and paper industry, the sawmilling and board industries and forest-owner behavior.

The model is formulated as a mixed complementarity problem (MCP) using PATH solver in GAMS modeling system, as well as MatLab.

Regional level data on forest resources are used. On the demand side, capacity data of large individual timber users of both the forest industry and energy industry is complemented with regional level data.

### **Results**

We simulated with FinFEP model as to what happens to the age-class distribution if an extra 50-450 thousand ha of old (>100 years) forests are put under protection by the year 2020.

Land area of forests over 100 years will be 100 000 ha larger by 2055 in the conservation scenario, when forestland protection (>100 year old forests) is increased by 250 000 ha between 2015-20. Mostly this occurs because harvests are redirected toward unprotected forests.

Scenarios were run where conservation program is carried out with increased capacity of pulp producing industries. In these scenarios, the effectiveness of forest conservation increases to some extent as compared to no-new-capacity scenarios, in the sense that conservation saves more of old forests, relative to the case when conservation program is not put into practice.

### **Conclusions and discussion**

The leakage effect occurs, as wood prices go up as a result of the conservation, which leads to compensatory harvesting of remaining un-protected old growth forests. The effectiveness of forest conservation is weakened by the fact that not as much old growth forests are effectively maintained as expected.

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## Poster: Stakeholders' involvement: the participation in the development of National Forest Programmes

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### **Keywords**

Forest policy, sustainable forest management, level of participation, stakeholders

### **Abstract**

The National Forest Programmes (NFPs) are policy tools that mainly aims to the Sustainable Forest Management (SFM). The sustainability of forest management is composed by several components including social ones. The social sustainability in forestry sector passes through key principles established by Intergovernmental Panel of Forests achievable thanks to participatory approaches.

Accordingly, the participatory approaches are important to define the effectiveness of NFP in the Sustainable Forest Management (SFM). In this study, a questionnaire was administered to 30 European experts involved in the COST Action ORCHESTRA - FP1207. The results show that the level of participation is quite high in all phases of the participatory processes in European countries. The decision-making processes concerning NFPs involve almost of the parties affected by forestry issues. Furthermore, the results show some strengths and weaknesses that are observable in all European participatory processes referring to NFPs. On the one hand, the participatory processes are important because they are the opportunities to involve stakeholders in cross sector processes that review forestry problems and policies. On the other hand, the participatory processes are time, cost, and effort consuming, non-representative, and participants usually have not enough skills and resources. Finally, the analysis shows that the strengths outrank the weaknesses.

### **Introduction**

National Forest Programmes (NFPs) are social and political frameworks regulated by International rules (Intergovernmental Panel of Forests, EU Forestry Strategy 1998) that aim to Sustainable Forest Management (SFM). Including the main goal of SFM, NFPs intend to maintain and improve the multiple products and services provided by forests in order to satisfy current and future generations (Paletto et al. 2014). The SFM is achievable considering the peculiarities of National, regional, and local levels. Accordingly, the International rules establish some key principles related to participatory approaches.

Participatory approaches are mechanisms based on consensus building principles, inter sector approaches, recognition and involvement of local communities, and the subsidiarity of decision-making process. In particular, participatory approaches aim to involve the parties affected by forest decisions and policies (Bruña García and Marey Pérez 2014) spreading information, responsibility, and decision-making capacity. Moreover, participatory approaches aim to improve effectiveness and quality of decisions thanks to different viewpoints (Skype 1999), and local knowledge (Fischer 2000). Nevertheless, the implementation of participatory approaches uses different mechanisms in the different European countries.



### **Objectives**

Accordingly, the present study aims to analyze participatory approaches used for the development of NFPs in European countries. For reaching the main objective, participatory approaches are analyzed according to the level of participation used in the phases of NFP development. Moreover, the rank of strengths and weaknesses permits to focus on the improvement of participatory approaches that will be used for the development of future NFPs.

### **Methods and material**

In the current study the characteristics of the participatory processes in the European NFPs were collected through a semi-structured questionnaire composed by fifteen questions (nine open-ended questions and six close-ended questions). The questionnaire was divided in three sections concerning (1) data on respondent, (2) characteristics referred to participation level of approaches used in the NFPs, and (3) strengths and weaknesses of used participatory approaches.

The questionnaire was sent by e-mail to 82 experts involved in COST Action FP1207. They were chosen according to two criteria: (1) direct involvement in one of the COST Action on forest policies and programs (i.e. COST Action FP1207 and COST Action E19); (2) participation as an author in a publication regarding the NFPs. The collected answers are analyzed based on the level of participation (IAP2000) (Tab. 1) in each phase of NFP development: (a) identification and analysis of the problem, (b) formulation of guidelines and goals for reaching the desirable future relative to forests, (c) implementation of decisions, and (d) monitoring and evaluation of the decisions.

### **Results**

The present study collected 30 filled questionnaires from 28 European countries. The results show that 14 countries have a more or less inclusive participatory process finalized to include the stakeholders in the NFP's decision-making process. The remaining countries have not a traditional NFP or the NFP was developed according to a top-down approach. Furthermore, the cooperation participatory level is the most used in the 14 countries that adopt participatory approaches for NFP (Fig 1). Finally, the analysis of strengths and weaknesses shows that the participatory processes in the NFPs are important tools to involve affected parties in a cross sector way. Nevertheless, they are time, costs, and efforts consuming decision-making processes. Some adjustments are needed to improve the effectiveness of participatory processes for the development of NFPs.

### **Conclusions and discussion**

The level of participation in NFPs development is quite high. In fact, the cooperation means that the affected parties are involved in balanced way in all the phases of decision-making process. Nevertheless, further studies should deepen the choice of affected parties to involve and the capacity of European countries to involve the right administrative level to make effective decisions.

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## Poster: Addressing forest policy and planning by combining participatory workshops and forest management decision support tools

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### **Keywords**

Ecosystem services, collaborative planning, group decision making, multiple criteria decision methods, Pareto frontier

### **Abstract**

This STSM contributed to the ORCHESTRA objectives by outlining and evaluating a general approach for analysis of alternative forest policies by combining participatory workshops with advanced forest decision support tools. This approach was applied in workshops and the approach and results were evaluated by the participants.

### **Introduction**

Sustainable forest management concerns multiple values and perspectives and involvement of stakeholders in policy and planning processes. Analysis of trade-offs among conflicting goals, e.g., timber production vs. biodiversity conservation, is also needed. However, these problems are usually complex and in recent years, a number of advanced forest management decision support tools have been developed in order to address such problems (Borges et al. 2014b). Rightly used, decision support tools can help forest owners, policy makers and stakeholders to understand what ecosystem services the forest can produce under different circumstances and what the trade-offs are between these ecosystem services. This knowledge can promote constructive discussions between stakeholders and support policy and decision making. However, there is a tension between using “hard” modeling approaches and “soft” participatory approaches (Menzel et al. 2012).

### **Objectives**

The overall objective of the study was to develop an approach for landscape-level management planning using a combination of participatory workshops and decision support tool to provide the trade-off information needed to address typical multiple objective and multiple stakeholder planning problems. The specific objective of the STSM was to assist in the design and evaluation of the workshops.

### **Methods and material**

A general outline for the participatory workshops was developed through discussions with the research team and test workshops. Specifically, the FGM/IDM technique (Borges et al. 2014a) was to be used to visualize the Pareto frontier, i.e., the set of efficient forest management alternatives and consequently trade-offs between ecosystem services. This approach was applied in workshop in the areas of Chamusca and Sousa in Portugal within the INTEGRAL project during the autumn 2014. The workshops were then evaluated by the participants using a questionnaire.

**Results**

The results of the questionnaires highlighted the potential of the approach to overcome obstacles of landscape-level forest management planning (Figure 1). Overall, the participants were positive, especially towards the negotiated solution (questions 8-11) but also towards the tool used in the workshop to get to that solution (questions 1-7). In the workshop in Chamusca, time for using the tool (questions 6 and 7), seems to have been the most critical point. In the Sousa workshop, the participants were more critical about the tool and the limited time for using it, and yet they were as positive about the solution as the participants in Chamusca.

**Conclusions and discussion**

In summary, this study demonstrates that the combination of participatory workshops and the Pareto frontier visualization method was successful in addressing landscape-level management planning. It provides an informed negotiation setting, where stakeholders and decision makers may sort out their differences to set targets for the provision of ecosystem services and to develop an acceptable landscape-level plan.

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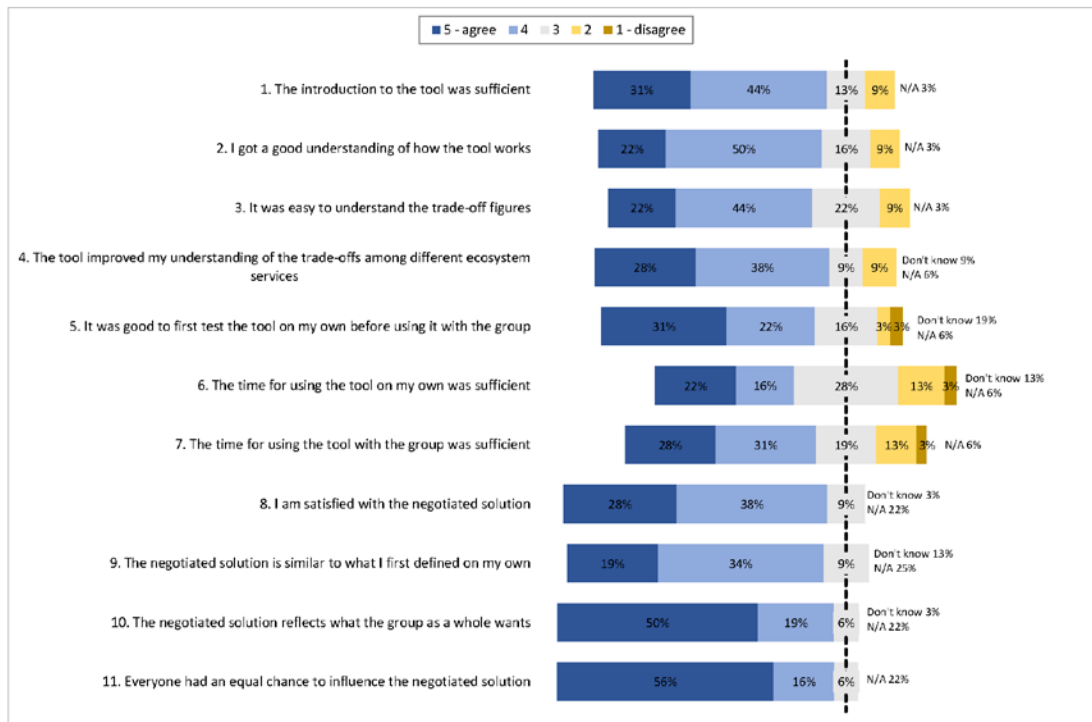


Figure 1. Results of the questionnaires from the two workshops (n=46). The vertical, dashed line shows the midpoint of a five-point Likert scale; the share of respondents that agree with the statements is displayed to the left of the midpoint line (in blue shades) and the share of respondents that disagree to the right (in yellow shades). Neutral responses (value 3 on the Likert scale) are displayed in grey with equal shares on either side of the midpoint line.

## Poster: Integration of forest policy goals at European, national and sub-national levels. The case of fire prevention and biomass production.

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### **Keywords**

European Union, Spain, Catalonia, literature review, stakeholders, questionnaire

### **Abstract**

Forest fire prevention and production of forest biomass for energy are receiving increasing attention in forest policy and governance. At European Union level, legislations and policies were formulated to regulate the way Member States deal with these two topics. Consequently, actions have been taken by Member States as well as lower policy levels to implement European requirements. This study analyzed the extent to which forest fire prevention and the production of forest biomass for energy were integrated in European Union, national and regional contexts. Spain and Catalonia (one of the Spanish Autonomous Communities) were chosen as case studies. The study focused mainly on integration in policy formulation but it provided insights also on aspects related to policy implementation. Results showed that while at European level the two topics were weakly connected in policy formulation, at lower policy levels the strength of this integration increased. Nevertheless, local stakeholders mentioned the need to improve this integration at regional policy level. In the implementation context, forest fire prevention and biomass production were better integrated than in the formulation context, thanks to initiatives taken by actors who played a key role in the Catalan arena.

### **Introduction**

Fire prevention and the production of biomass for energy from forest wood are very actual discourses in forest policy and governance, especially in Mediterranean forests because wildfires are among the main natural disturbances affecting them (Joint Research Centre, 2014) and because of the high potential to provide wood for energy attributed them (Regos et al., 2016). In Mediterranean forests, important possibilities exist to produce biomass while preventing forest fires by reducing wildfire risk (Becker et al., 2009; Regos et al., 2016). As a consequence, forest-relevant policies incorporate elements of forest fire management and of biomass production both at European and at lower policy levels. In some instances, these policies were criticized for the low level of integration between different policy objectives such as forest fire and biomass production (Plana et al. 2005). For example, policies addressing forest fires as well as the subsidies they generate mainly adopt an approach based on fire suppression rather than prevention (Plana et al. 2005), which is not easy to integrate with biomass production objectives.

### **Objectives**

1. Analyzing European Union, Spanish and Catalan forest-relevant policies to verify to which extent they integrate the two topics of fire prevention and production of biomass for energy.
2. Enquiring local stakeholders' perspectives on the policy and practical integration of fire prevention and production of biomass for energy.

### **Methods**

The study was carried out during a Short Term Scientific Mission at the Forest Sciences Center of Catalonia and it applied the following methods:

- Literature review of relevant European, Spanish and Catalan policies. Policies were either expressly dedicated to forests and to the two topics under study, or they treated these topics as side-issues to other subjects like climate change or renewable energies.
- Consultation of local stakeholders on the policy and practical integration of the two topics at regional level (interviews with Catalan experts and distribution of a questionnaire to Catalan forest stakeholders).

### **Results**

The literature review was completed during the Short Term Scientific Mission and it revealed that while the text of European policies integrated the topics of forest fire and biomass production to a very limited extent, Spanish policies integrated them to a slightly broader extent and Catalan policies encompassed an even broader integration (though also at lower policy levels such integration was not complete). Expert interviews and the retrieval of data through questionnaires were not finalized during the Mission but and provided only preliminary results. Local actors considered the integration of fire prevention and biomass production to be rather well accomplished in Catalan policies, though they highlighted the existence of some room for improvement. Stakeholders' suggested to 1) base forest fire policies also on prevention rather than only suppression approaches; 2) strengthen coordination among sectors dealing with biomass production and forest fire and 3) broaden the scope of subventions dedicated to biomass production to foster management in abandoned areas prone to fire risk. Moreover, stakeholders reported that in the practical context of policy implementation, initiatives of local entrepreneurs and organized groups of actors brought to life significant examples of integration between fire prevention and biomass production. For example, this was the case of a cooperative founded by a forest defense group (joined by forest owners, representatives of civil society and administrations who cooperated to prevent and suppress forest fires) which started to produce biomass for energy from its forests.

### **Discussion and Conclusions**

This study showed that the two topics of forest fire and biomass production should be better integrated in policies from the European to the regional level. Strategies to achieve this could be improving communication and coordination among policy sectors dealing with these topics and recognizing the need to support financially the integration initiatives developed at local levels. This study made clear that albeit weaknesses recognized in policy formulation, local initiatives can make up for the lacking policy integration between forest related objectives.

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# Poster: Q-25 years after the Rio de Janeiro conference: what has been the contribution of global forest policy to non-forest processes

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## **Keywords**

*Forest policy typology, International agreement, global forest institutions, multicriteria decision analysis*

## **Abstract**

The most important degradation processes which affect natural ecosystems recognized since the Rio de Janeiro conference (1992) are climate change, biodiversity degradation, soil desertification and deforestation, especially in relation to primary forest ecosystems.

In these 25 years many sectoral policies have been defined and a long list of aims has been produced and actions have been implemented in order to enforce global sustainable development. The expectation is currently that the general condition of forest ecosystems and the contribution that these have made to sustainable development will have improved since the conference.

Analyzing text in the main documents produced by global forest and non-forest institutions and statistical databases relating to the performance of various actions, the author implemented concordance and discordance analysis. The results were categorized as efficient, indifferent or as having regressive effects.

The conclusion describes some improvement and change in the actions for increasing efficiency, especially where regressive effects were registered.

## **Introduction**

1992 was an important year for forest and environment sectors. At the conference on "Environment and Development" held in Rio de Janeiro, the 172 UN Member States and 2,400 representatives of Non-Governmental Organizations defined actions for contrasting the degradation processes of natural ecosystems.

In the past, the most important regressive processes effecting ecosystems, which continue to have an effect even today, were: climate change, biodiversity degradation, soil desertification and deforestation, especially of primary forest ecosystems.

Forest policy can be defined as a sectoral policy. It is one component of a wider environmental policy and together they are part of the largest sustainable development policy designed by UN.

Many policy documents and strategies have been produced during this period and a large amount of money has also been invested, in order to promote sustainable development. 2

### **Objectives**

Expectation is that the state of forest ecosystems and their contribution to Sustainable Development has improved. Verifying this hypothesis has provided the opportunity to identify those actions that have been efficient, that have had no effect or have had regressive effects

### **Method and material**

Main forest policy aims have been obtained through text analysis of the documents adopted since 1992 in the global forest process. Every aim has been qualified using keywords and phrases. These have been used for the text analysis of documents relating to environmental processes (climate change, diversity biology and desertification) and sustainable development processes.

One or more actions have been linked to each forest policy aim in order to evaluate performance results over the last 25 years.

In order to evaluate the contribution of forest policy aims to sustainable development a concordance and discordance analysis has been implemented.

### **Results**

Forest policy actions have been assigned to one of three categories (efficient, no effects and regressive effects).

### **Discussion and conclusion**

Controversial results have been obtained. Many actions were shown to be efficient but discordant notes may be heard, as in the example of the overall reduction of global forests, despite the orchestration of diverse policies. New tools should be adopted to reverse negative trends.

## Poster: Framework for building Integrated Policies regarding Forest Risk Management: Insights from Wallonia (Belgium)

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### **Keywords**

*Integrated risk management, participatory process, stakeholders*

### **Abstract**

The aim of this project is to develop a framework for analysing risks arising in the forest-based sector and building integrated risk management policies in order to alleviate their expected economic, environmental and social impacts on the long run. The project will first focus on a regional management scale, but the methodology could be extended afterwards to national or supra-national levels.

### **Context**

European forests are facing manifold biotic and abiotic threats that may endanger forest-based economies as well as goods and services provided by woodlands (Thom et al., 2013). In addition, market and climatic uncertainties may lead to conflicting behaviours (Petr et al., 2014) and enhance mistrust between forests' users (Blennow et al., 2014). However, due to the complexity of those topics and diversity of stakeholders, there are nowadays few forest-related policies considering risks and their interactions as drivers of strategic decisions (Riguelle et al., 2016).

### **Goals**

The ultimate goal of this project is thus to build a regional risk management policy that will be able conciliate bioeconomic purposes and ecosystems' services, whilst taking in account long-term challenges and uncertainties and interrelations with other decisional levels (supranational, national). The intermediate objective will be to develop an analytical framework for addressing each individual forest-related risks and defining a common decisional scale.

### **Methodology**

For those purposes we choose to implement an integrated risk management approach, which allows considering simultaneously, at each level of decision, every component of the risk management processes together with external constraints, expectations and beliefs of various stakeholders (Orazio et al., 2014). Such global vision also enables diversifying the portfolio of adaptation and mitigation measures and reducing the overall residual risk for forest economies. The implementation of such methodology lies on the one hand on appropriate methodologies (i.e. system analysis, participatory processes) and on the other hand on policy-supporting tools such as model-based decision-support systems (Riguelle et al., 2015).

In a first step, every individual risk will be assessed, encompassing biotic (i.e. pest outbreaks, game) and abiotic (i.e. wind, drought, fire) threats, industrial issues and external drivers (i.e. legal or societal constraints). At this level, the main challenge is to identify which are the goals of the stakeholders facing those risks, what are the implemented or planned strategies for reaching those objectives, and what are the potential impacts of these strategies on forest functions (figure 1). In a second step, we'll try to integrate individual strategies into a common framework. This integrated framework will be crucial to highlight what are the consequences of individual actions on the whole system.



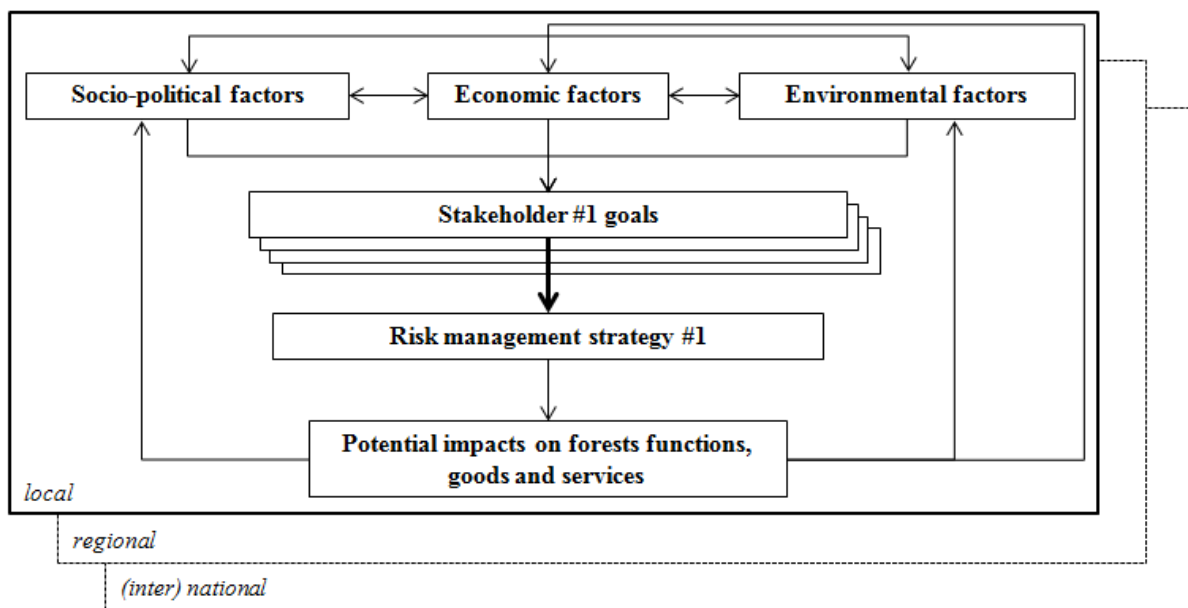


Figure 1. Generic framework for orchestrating integrated forest risk management at several decisional levels (Riguelle et al. (2016), adapted from Campbell et al. (2002))

### Outputs

The expected output of this exploratory research is a framework for assessing, defining and implementing integrated risk management policies at the regional level, based on the case study of Wallonia (Belgium). This framework will be discussed with private and public stakeholders and could be the basis for active risk management at the regional level.

### Outlook

As a regional strategy could not be totally effective without considering other decisional levels, further developments should take into account at least the supra-regional level. These should take place within European initiatives and networks.

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## Poster: Generalizable framework for monitor events and outcomes planned in forest policy context

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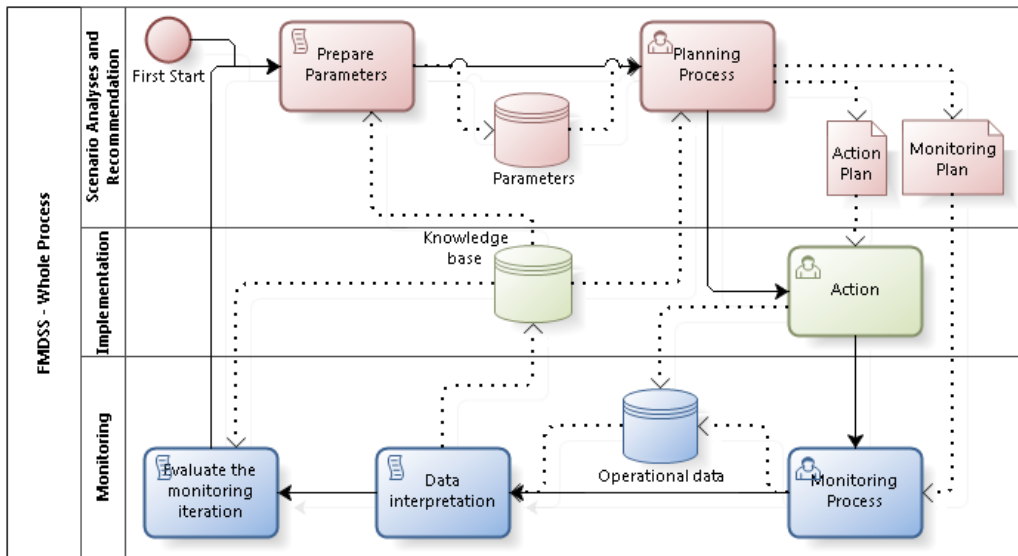
### **Abstract**

During the implementation of a forest policy, policymakers would like to have information about the effectiveness of the policy to improve them. To achieve the desirable incremental improvements, forest policy makers should collect information about the process and interpret them. This research analysed a case in São Paulo – Brazil where they are implementing a set of policies to stimulate the restoration of 300 thousand hectares of native forest in 10 years. To achieve the goal, the state is providing detailed technical recommendations to guarantee good productivities and profits. Landowners and institutional investors may be attracted by real benefits beyond succeeding concerning law and regulations requirements. Using this case as an example, we propose a framework with an architecture of a monitoring system.

Through a monitoring system based on information technology (**IT**), during the implementation of a forest policy, data could be collected from the process. Those data, if correctly treated, could give feedback to the policy makers and forest managers on how they should enhance the planning process or improve the planning parameters (Dickinson, 2016). The purpose of the research was to investigate whether it is possible to create a generalizable structure of the knowledge gathered in a Forest Monitoring Process to be successfully used in a Forest Management Decision Support System (FMDSS) to enhance not only the plans themselves but also the effectiveness of the plans.

According to Vacik and Lexer (2013), a complete planning process shall include a monitoring function to guarantee the improvement and sustainability of all types of forest planning. They describe a general planning process since the problem identification until put the plan into practice. However, he summarises the monitoring process in two main ideas: monitoring and evaluation of the actions.

In the case we are studying, we should consider that, we must know if landowners are doing the forest restoration as recommended and if the state achieved the goals of each year. This piece of the process is represented by the “Monitoring process”. After that, the system interprets the data received from inspection team and other process control systems. Then, the system stores the data interpretation results in a knowledge base. **Figure** shows the whole idea of the policy implementation process of our study case.



Virhe. Määritä Aloitus-välilehdessä Normal, jota haluat käyttää tähän kirjoitettavaan tekstiin. **Figure 1 - Whole Idea**

Next step is to evaluate the monitoring iteration; in our case is a year. The evaluation checks (i) if the goals were achieved and (ii) if the plantation intermediate results are acceptable. The goals' testing triggers the policies reformulation. Plantation inspection triggers tech recommendations review to guarantee good productivities and regulations accomplishments. Both cases are essential to improve the process.

From a general to detail analysis, we propose a generalizable model that is described in **Figure 2**. This process has the following characteristics:

- (a) A forest process can be defined as a sequence of events related to forestry or environment that happens in the field or in IT system context involving several stakeholders such as policy makers, IT resources, technical teams, landowners and researchers.
- (b) Each repetition of a piece of a process is called "iteration", and the results of one iteration are used as the starting point for the next iteration.
- (c) A process happens upon a set of forest geographic units. That can be farms, regions, stands, watersheds and so forth. In our generalizable model, we consider we have **U units**.

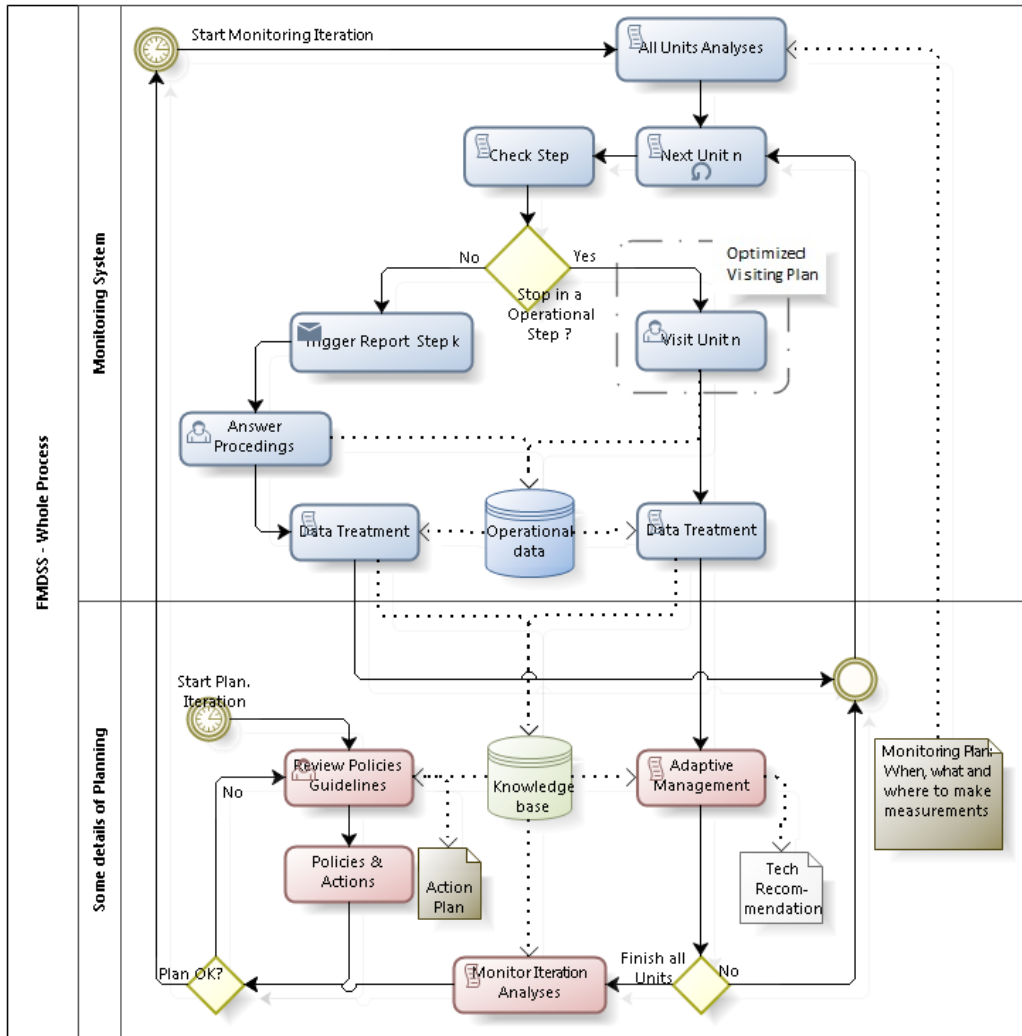


Figure 2 - Phase 3: Generalizable Process Model

- (d) The responsible for each unit should perform a sequence of different steps. This sequence constitutes an iteration. In our generalizable model, we consider we have **S steps**, from 1 to m.
- (e) For each unit, the system should check if the next step for this unit is an operational step or not. If it is an operational step, the unit must be visited. If not, the system has to investigate why the responsible for the unit stopped in that step.
- (f) The visit produces a set of data that describes the status of the operational activities.
- (g) All operational data are treated to build the knowledge base.
- (h) **Figure 2** shows that monitoring system and planning system takes part to the same process and uses the same database.

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# Europe's impacts on tropical forest changes through international trade and supply chains interventions

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## **Keywords**

Trade, embodied environmental impacts, land use, policies

## **Abstract**

Being both a large producer and consumer of land-based products, Europe has a major influence on global land use, in particular through trade of agricultural and forestry products. Here I will summarize recent works that analyse the different ways by which trade relations between Europe and the rest of the world affect forest cover mainly in the tropical regions. Attention will be paid on the impacts of EU's domestic land use and forestry policies on other regions. Finally, I will show how emerging tools to intervene on supply chains have the potential to modify the impacts of Europe on forests abroad.

## **Introduction**

Europe is a major producer and consumer of agricultural and forestry products, and a major player in global trade of these products. Land use decisions made in order to produce these agricultural and forestry goods often affect landscapes that are far remote from Europe, in particular in tropical and developing regions. With this increasing interdependence between Europe and these regions, it is crucial to better understand and quantify what are the social and environmental impacts of Europe's production and consumption choices on tropical forests.

## **Objectives**

The objective of this contribution is, first, to synthesize several recent works which analyse and quantify the impacts of Europe's decisions in terms of production and consumption of agricultural and forestry products on forests in tropical regions; and second, to identify the policy tools and interventions that can mitigate these impacts.

## **Methods and material**

I draw mainly on the recent literature utilizing methods of environmentally-extended biophysical accounting, material flow analyses, or multi-regional input-output analyses accounting for physical and financial flows as well as the associated impacts, combined with well as detailed studies on land use in case studies of tropical regions.

## **Results and Conclusion**

This contribution shows that Europe's production and consumption decisions, including policies, have strong and complex impacts on tropical forests. Emerging tools to intervene on supply chains, which combine methods for improving transparency of supply chains, private market-based initiatives and territorial policies have the potential to modify the impacts of Europe on forests abroad.

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# An Economic Impact Assessment of Community-Based Conservation Associations (CBCAs) in the Nzoia River Basin, Kenya: Taking stock of ecosystem services and welfare trends under Climate Change

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## **Keywords**

CFAs, Economic Impact Analysis, Socioeconomics, Ecosystem Services, Kenya

## **Abstract:**

Community-based conservation associations seek to address the trade-offs in conservation and development objectives through participatory approaches to sustainable ecosystem management. Some empirical research has been carried out in the past two decades to evaluate the impact of community-based conservation associations (Bowler, et al, 2011, Cook, et al, 2013). The findings on outcomes are mixed and still a subject of intense debate in the forest economics literature in developing countries. The issue of nonlinearity comes up with the outcomes of these assessments and management institutions hence further research and methods needed to understand these complex conservation problems in developing countries context, especially in Africa which has few impact studies globally. Past assessments of associations in conservation are faced with numerous limitations such as complexities in implementing communities-number of members, social capital, institutional context and programme attributes. Most of these assessments have several problems: methodological limitations, baseline data access, and selection of indicators of outcomes for evaluation, leakages and timescale measurements (Rasolofson, et al, 2015.). Despite the growing literature in community forestry, there are still lack of empirical local studies that can substantiate and quantify the impact on forest ecosystem services and welfare of community-based conservation association members in the Nzoia Basin in Western Kenya. Our economic impact study seeks to address some of these limitations raised above through the integration of ecosystem services and household livelihood outcomes. Field interviews are undertaken with key stakeholders in two forest ecological conservancies out of ten in Kenya (North Rift Conservancy-Trans-Nzoia Zone and Western Conservancy-Kakamega Zone). Sample of three different community-based conservation associations in different communities are considered for the economic impact assessment based on advice from Kenyan Forest Services and Kenyan Wildlife Services. These associations are (1) Kipsaina Crane and Wetlands Conservation Group (Saiwa Swamp National Park-North Rift), (2) Community Forest Associations (Kiptogot CFA, Kimothon CFA, Malava CFA, Muileshi CFA) (3) Kakamega Forest Reserve Conservation Arm(Kakamega Community Wildlife Association) and (4) Non-Members of community-based conservation associations in sampled research area. The study anticipates to (1) Quantify and explain drivers of CBCAs participation that fully capture the significant theoretical expectation, (2) Quantify the impact of community-based conservation association membership and non-membership on forest ecosystem services supply and household welfare based on sets of selected criteria from the household survey, (3) Assess the three (3) CBCAs and evaluate which one is doing the best in the supply of ecosystem services in the Nzoia River Basin and (4) recommended approach to “avoid the tragedy of the commons” in community forestry in the Nzoia Basin under current climate change conditions in Kenya.

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# International forest regime fragmentation: constraints and possibilities for international actors' external action

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## **Keywords**

Fragmentation, regime complex, rationality, external action

## **Abstract**

This contribution aims at shedding light on international regime fragmentation, with a special focus on its relevance for international actors' goal achievement. It provides conceptual and theoretical insights on international politics and international policy formation and implementation. Based on the creation and on the features of fragmented regimes, this contribution focuses on the way individual international actors<sup>2</sup> can use them strategically to achieve their goals on the international stage, hence exercising external action. The international forest regime is clearly fragmented. It will serve as a support to understand and exemplify my argument.

## **Introduction**

The forest issue is transboundary and multisectoral in nature. It goes far beyond the forest realm. As a matter of fact, a large amount of issues deal with and have an impact on forests. For instance, the climate regime progressively integrated the carbon absorption capacity of forests in its carbon mitigation strategy. While trying to map the international forestry regime, it takes no less than a minute to realise that the exercise is knotty. As a matter of fact, the international forest regime is defined by unhierarchical, sometimes overlapping, sometimes conflicting, loosely coupled sets of rules, institutions and obligations governing a same issue (Alter and Meunier, 2009, Faude and Gehring, 2014, Keohane and Victor, 2011). This ends up in highly fragmented governance architecture (Biermann, Pattberg et al., 2009), where no focal institution (Jupille, Mattli and Snidal 2013) oversees, commands and coordinates the issue. In such a complex environment, what features can individual actors rely on to achieve their goals? Most importantly, why would actors favour one strategy over another one?

Contrarily to what its name suggests, regime fragmentation is an integrative process (Biermann et al. 2009). Fragmentation occurs when individual regimes, international institutions and single actors of the international scene begin to interact when they share a common issue, creating de facto a fragmented regime. In this regard, The international forestry regime is highly fragmented (Rayner, Buck and Katila 2010, Giessen, 2013, Keohane and Victor 2011, Humphreys 2005, Humphreys 2006). The manifold international institutions dealing with forest-focused and forest-related issues (such as the United Nations Framework Convention on Climate Change, International Timber Trade Organization, Forest Europe, Food and Agriculture Organization, World Bank, Convention on Biological Diversity, UN Convention on Combat Desertification, Forest Law Enforcement, Governance and Trade Voluntary Partnership Agreement, UN Forum on Forests, Forest Stewardship Council, Convention on International Trade in Endangered Species of Wild Fauna and Flora, US Lacey Act etc.) constitute the forest regime. The international forest regime is composed of international organisations that have sought to integrate forestry concerns in their operations (World Bank, UNFCCC), of high level club-like forums involving political leaders of a limited number of states (G8, G20), of multistakeholders partnerships (NGOs), of large voluntary and regulatory markets that work

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<sup>2</sup> As opposed to international institutions and organisations, which are compound actors, individual actors on the international scene act solely on their behalf. They are states, NGOs etc.

independently from international contexts (EU TR), of actions undertaken by non-state actors (FSC), and of sub-national efforts. The fragmented governance of international forestry emanates from these sources, often related to multiple regimes, and is non-hierarchically ordered. Different actors serve different functions with different means. There is no focal institution steering and orchestrating international forestry. Built upon the assumption that a regime is necessarily framed by a multilateral legal framework, some call the forestry regime a 'no-regime (yet)' (Humphreys 2006), or a 'non-regime' (Dimitrov 2005). Even in the absence of a focal institution, I for my part consider the forestry regime fragmented, as one can observe some (growing) loose interplay between actors. Fragmentation is an indication of high diversity in legal norms and political objectives and approaches in the same regime (van Asselt 2014). Fragmentation features provides actors with a constraining and enabling environment, made of conflictive, synergistic and neutral interactions. This environment is characterised by (1) the presence of multiple venues, (2) that enhance the number of political and legal inconsistencies.

First, fragmented regimes are composed of a large set of actors differing in their nature. What does it mean to have a forestry mandate? To be forest-focused, such as the UNFF? Then the UNFCCC is not a forestry institution. Still, its policies have a large impact on the way forests are dealt with. The multiplicity of actors, institutions, perspectives and tools available provide actors with a large number of international venues, which create opportunities for actors and institutions to choose what to do from what approach, at any level of decision-making and implementation, using the most relevant tools. This regime structure unclarity offer flexibility, that centralised regimes do not.

Second, in the absence of cooperation and/or coordination, international venues adopt measures that are not necessarily consistent with one another. Inconsistencies are of two types: political and legal. Political inconsistency supposes that general approaches to forestry contradict each other, pulling forests in opposing directions. It is translated in the use of different principles (e.g.: precautionary approach vs. cost-effective) and the use of different economic incentives (e.g.: CBD vs. Montreal Protocol). Legal inconsistency reveals the impossibility to comply with two (or more) legal norms of the regime at the same time. For instance, when the CBD pushes for preserving forests for their inherent qualities, the UNFCCC calls for increasing fast growing monocultural forests, regardless the quality of the forest. Joint compliance is consequently not possible. Actors can strategically play with these inconsistencies to put forward their preferred one.

### **Objectives**

On the whole, the research proposal aims at explaining why a given actor (the EU) uses identifiably the features of regime fragmentation (various venues and inconsistencies) to achieve its goals. The objectives of the research are twofold. First, I develop a typology of the way actors can use fragmentation features. It covers institutional use, selection, change and creation. Second, and most importantly, I explain why individual actors of the international stage use a method over another. To do so, I drew theoretically driven hypotheses.

### **Methods and Material**

Individual actors can strategically adopt 'opportunistic' behaviour, using the features of the forest regime to achieve their goals individually. Once identified, the multiplicity of venues and legal inconsistencies can be strategically used by an actor to achieve its forestry objectives. In the following paragraphs, I develop on actors' use of the two features explained in the previous paragraphs to achieve their goals. Actors can adopt four strategies to use fragmentation characteristics (Jupille, Mattli and Snidal, 2013): institutional use, institutional selection, institutional change, and institutional creation.

The starting point is institutional use. Actors can strategically keep using the same institutions through time 'without any explicit consideration for institutional choice' (Jupille, Mattli and Snidal 2013: 41). Here, the focal institution is used unproblematically to address the issue. Actors may link a debate to another relevant issue within this institution. Issue linkage, or issue-linking, may make a

deal more attractive to some. Let picture an actor willing to foster environmental venues over trade venues to govern forests. This actor will emphasise the use of environmental venues, at the expense of trade venues. In this way, the environmental venue will be given inputs (be it money, information, administrative support, credit... all contributing to its power), that the trade venue will comparatively lack.

Then, fragmentation supplies a large number of institutions. As such there may not be only a single international institution able to deal with an issue but an array of relevant institutions. In this case, actors dissatisfied with the used institution may seek to pursue their preference elsewhere, selecting the most suitable one among already existing ones<sup>3</sup>. The array of institutions need only to have the given issue in common, which constitutes an overlapping zone. Selecting a venue in the array of existing venues pressurises (and eventually change) the disliked venue. Similarly, while facing legal inconsistency, an individual actor can select the most favourable venue to force its standards on the international stage. For example, Russia pushes for a binding agreement on forests in Forest Europe rather than elsewhere because Forest Europe signatories are receptive to binding objectives on forests. Likewise, the dynamic nature of fragmented regimes provides its actors a lack of clarity and regularity and a high flexibility that is the best provider of political opportunities.

Besides, actor member of a given international institutions can change the institution from within to accommodate to its preference. Trying to change an institution of which the actor is not a member is not considered institutional change. Institutional change refers to large reform of the institution, such as an institutional (treaty) change. It supposes engineering the rules of the game. Internal structural change generally reflect the adaptation of the institutions to new conditions (Colgan, Keohane and Van de Graaf 2001; Helfer 2004; Alter and Meunier 2009). These new conditions are internally driven. For instance, the EU can use its bargaining power at the UNFF to recalibrate the aim and structure of the venue (Delreux and Pirlot, forthcoming).

Finally, when no institution is suitable for the actor to pursue its objectives, an alternative strategy can prevail. The actor sees a necessity to create a new institution. While venue-shopping generates relatively minor costs and institutional change (Colgan, Keohane and Van de Graaf 2011: 120), a drastic turn and high costs occur when a new institution is created de novo. For instance, considering the slow pace of multilateral progress towards global sustainable forest management, the EU took actions against the trade of illegally harvested timber within and towards its own market (Overdevest and Zeitlin, 2014), creation the FLEGT VPA.

### ***Conclusions and discussion***

This contribution aims at disseminating political and legal concepts about regime fragmentation, using the case of the forest regime. Understanding the dynamics of fragmentation, its structure, its consequences and the way it is exploited by international actors individually is relevant for scholars of various disciplines and practitioners.

Based on the (limited) above, I see two interesting point to remember. First, fragmentation is often presented as normatively negative in the literature (Biermann et al., 2009, Gehring and Oberthür, 2006). In this view, fragmentation needs to be managed, complexity reduced, and institutions and measures orchestrated to increase the efficiency of the regime. I took another path and showed that it is thanks to fragmentation that actors can rationally, strategically and opportunistically use features to achieve their goals (such as venue shopping, institutional creation etc.) and carry out effective policies. Besides, fragmentation pushes for inventiveness. As there is no central legal norm or practice, actors can basically orient their policies according to their own interests with low constrain. Linked to inventiveness is flexibility. As a matter of fact, empirical observations show that “on the ground” cooperation often occurs between forestry measures.

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<sup>3</sup> A practice called venue-shopping

Second, this initiation on regime fragmentation provide the foundations to understand the way actor's external action is conditioned. The why question ought to be investigated. Why would an actor use fragmentation features in a way and not in the other?

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## Striving towards sustainability: integrating environmental concerns into the political bioeconomy discourse?

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### **Keywords**

*Bioeconomy, sustainable development, environmental policy integration, EU, forest sector*

### **Abstract**

Sustainable development (SD) is highlighted in different strategies as the overarching goal of the shift towards bioeconomy. Understanding how sustainable development (SD) is approached in the political discourse of bioeconomy is the main objective of this paper. This paper focuses on the ecological perspective of SD and analyses whether and how environmental concerns are integrated into the political bioeconomy discourse of the EU and four of its member states: Germany, Finland, France and the Netherlands. It is found that the political bioeconomy discourse does not strive to give priority to environmental concerns.

### **Introduction**

Bioeconomy has been identified as a (meta-)discourse supported in particular by the OECD, the European Union (EU), but also by many countries worldwide. The discourse has been taken up by diverse sectors, amongst them the forest and agricultural sectors. Bioeconomy has been characterized as a mixed source discourse basing on the assumption of limited resources and the relevance of (bio)technology to foster sustainable economic growth (Pülzl et al. 2014). SD in this regards is highlighted in different strategies as the overarching goal of the shift towards bioeconomy, which is partly already renamed to “sustainable economy”. It promises to address major societal and economic challenges and at the same time to create a more favourable environment. The bioeconomy in itself however cannot be considered as self-evidently sustainable and visions about the relationship between bioeconomy and sustainability differ substantially (Pfau et al.2014). How sustainable development is approached and ensured in bioeconomy strategies remains therefore an empirical question.

### **Objectives**

This paper focuses on the ecological perspective of SD. It aims to analyse and compare whether and how environmental concerns are integrated into the political bioeconomy discourse of the EU and of four different EU member states (MS) – Germany, Finland, France and the Netherlands – in general and in the forestry sector specifically. In doing so, the paper also indirectly studies the relationship between SD, environmental policy integration and bioeconomy.

### **Theoretical and methodological considerations**

Theoretically, this paper builds on the approach of environmental policy integration (EPI). The integration of environmental concerns in sector policies is at the heart of EPI. We take on an idea perspective describing integration as a learning process, distinguished by the reframing of perspectives in policies and strategies towards sustainable development (Nilsson & Eckerberg, 2007; Nilsson, 2005; Nilsson & Persson, 2003).

Empirically this paper is based on a comparative country study applying qualitative document analysis. The documents cover national and EU political strategies concerned with bioeconomy as well as political programmes of the forest sector dealing with bioeconomy. Additional to EU policies, MS bioeconomy policies in Germany, France, Finland and the Netherlands are covered in this study.

### **Results and Discussion**

Results reveal that the dominant focus of bioeconomy-related policy documents is clearly on economic development aimed at growth, employment and competitiveness and stressing the need for technological advancement to achieve these goals. The environment is addressed in three different frames: (i) being challenged, (ii) being a standard and (iii) benefitting from economic development. Given that the political bioeconomy discourse does not strive to give priority to environmental concerns, one can expect only weak environmental policy integration.

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# Role of social innovation in linking multifunctional forestry goals with sustainable development objectives in Scotland's uplands

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## **Abstract**

Considerable changes have occurred in Scotland's uplands. Expansion of businesses and new activities may support economic growth. However, some changes entail environmental and social threats affecting upland ecosystems. These areas require strategies for watershed management and risk prevention, and the preservation of biological, landscape and cultural diversity. In our paper, we seek to advance both conceptual and empirical knowledge of incorporating sustainable provision of ecosystem services into stakeholder considerations and socially innovative policy-making decisions. The focus is on experience and trends, opportunities and challenges, with the emphasis on participatory approaches and the development of capabilities for an enhanced end-user involvement in the assessment and implementation of multifunctional forestry (MFF) as a priority objective for sustainable development (SD) in the region. Research applies surveys followed by quantitative methods (e.g. Q-method) to identify and explain a range of attitudes and perspectives, among representatives of local communities and forestry/land use associated stakeholders, regarding MFF and SD. At times, entirely opposite attitudes towards forestry and its future, in the Scotland's uplands, were revealed. The different importance accorded by respondents to the issues in question made us aware of priorities and of factors that can hamper ecosystem based policies and management practices. Results signify that implementing sustainability requires high levels of stakeholder competence and capacity-building in forest policy, planning and resource management. Social innovations help create new responses to pressing social demands and strengthen actors' ability to respond to societal challenges, therefore, enhancing smart and inclusive growth of communities living and working in upland areas.

# Evaluation of forest management scenarios using a web tool for expert participation in a multi-criteria decision analysis framework

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## **Keywords**

*MCD, value functions, expert participation, forest management scenarios, sustainable forest management*

## **Abstract**

Demand for forest functions such as wood, fuel, biodiversity, and outdoor recreation is increasing. An increasingly diversified silviculture has been proposed to meet these challenges and a number of different management options are available. However, the way in which the various management options affect economic, ecological, and social aspects of sustainable forest management remains unclear. Scenario analysis using forestry decision support systems is frequently used to assess the consequences of different management options. In the present study, we use expert participation, through a web-tool integrated in a multi-criteria decision analysis framework, to evaluate 10 different forest management scenarios for two contrasting municipalities in Sweden. Experts in economic, ecological and social forest values were asked to weigh a number of indicators in their field of expertise against each other and create value functions for each indicator. Scenario ranking was then determined for different sets of weights for economic, ecological and social forest values. Our results indicate that current management practices are favourable for economic aspects, while scenarios containing more varied forest management and more set-asides would be beneficial if ecological, social, and economic aspects of sustainability are given equal weights. Expert participation through the web-tool was shown to be a promising alternative to physical meetings, which require greater commitment in terms of time and resources.

## **Introduction**

Apart from traditional timber production, other forest functions – such as biodiversity and recreation – have become increasingly important over the last few decades. In Sweden, as in many other countries, multi-objective forestry is also prescribed by legislation; production and environmental goals are given equal priority and legislation and forest certification necessitates consideration for social values, as well as reindeer husbandry. Furthermore, increasing demand for bioenergy in the context of climate change mitigation, along with a global increase in the demand for food, fiber, and fuel, driven by demographic and economic growth, are expected to increase wood demand even more in the future. Thus, demands on forests are increasing, making forest management and planning more complex. To meet these challenges, a more diversified silviculture has been proposed by the Swedish Forest Agency. A number of different management options are available, including changes in rotation periods and thinning regimes, changes in the share of area set-aside for nature conservation, a higher proportion of continuous cover forestry, and mixed species management. What often remains unclear, however, is the effect of the various management options on economic, ecological, and social aspects of sustainable forest management. Scenario analysis using forestry decision support systems is frequently used to assess the long-term consequences of different management options. However, scenario analysis in itself does not explore the scenario space based on different criteria and their evaluated importance given by decision-makers and



stakeholders. In order to truly deal with trade-offs, scenario analysis must be combined with other methods, such as multi-criteria decision analysis (MCDA).

### **Objectives**

The aim of the present study was to evaluate 10 different forest management scenarios for two contrasting municipalities in Sweden, with the help of expert participation through a web-tool integrated in a MCDA framework.

### **Methods and material**

Ten different forest management scenarios were created using the Heureka forest decision support system (Wikström et al., 2011), including one business-as-usual (BAU) scenario and nine alternative scenarios. These scenarios were evaluated in a MCDA framework, using several indicators for the economic, ecological, and social aspects of sustainability. Experts in economic, ecological, and social forest values, and in reindeer husbandry, were asked to weigh a number of indicators for their field of expertise against each other and to create value functions for each indicator. Scenario ranking was then determined for different sets of weights for economic, ecological, and social forest values.

### **Results**

Our results indicate that current management practices are favorable for economic aspects, while scenarios containing a more varied forest management and more set-asides would be beneficial if economic and ecological aspects of sustainability are given equal weights. Scenario ranking was similar in both case study areas. When equal weight was given to production and conservation values, the advantage of the more nature–conservation-oriented scenario over the business-as-usual scenario was higher in the case study area representing southern Sweden than in the case study area in northern Sweden. This finding could be due to the initial share of forest set-aside for nature conservation, which is significantly higher in the north than in the south, thereby creating more beneficial conditions for ecological forest values. Scenarios with more continuous cover forestry, a larger share of set-asides and longer rotation periods would be beneficial, not only for ecological forest values, but also for recreational values and for reindeer management. Expert participation through the web tool worked well in this study and was shown to be a promising alternative to physical meetings, which require a greater commitment in terms of time and resources.

### **Conclusions and discussion**

According to our results, the equal priority that Swedish legislation gives to production and conservation objectives is not fully implemented by current management practices, which favor economic aspects. Goal conflicts between production values on one hand, and ecological, social, and reindeer management values on the other, deserve more attention in the shaping of new forest policy. Expert participation through the web-tool was shown to be a promising and less resource-consuming alternative to physical meetings. Web participation also provides the potential to include a large number of stakeholders, which can be advantageous in a variety of decision-making processes.

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# Action expiration chart: integrating impact models with forest objectives to evaluate climate change adaptation options in the New Forest, England

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## Keywords

Decision-making, ecosystem services, climate change, forest planning, tipping points, deep uncertainty

## Abstract

Climate change will reduce the future provision of forest ecosystem services. Our new method of using action expiration charts allows assessment of overall forest objectives by combining information about modelled ecosystem services and forest actions. We found that climate change will affect the sustainable provision of several forest ecosystem services in the New Forest, England, which will have an impact on the delivery of future forest objectives. The action expiration chart helps synthesise and communicate the future threats to delivery of ecosystem services in the New Forest, and provides directions for adaptation.

## Introduction

To make robust climate change adaptation decisions in forest planning and to support policy making, decision makers need relevant information as well as approaches to evaluate the feasibility of forest objectives and targets. In the context of forest adaptation, policy making, and especially under deep uncertainty, we do not know how information from impact models can be integrated and used to evaluate future forest objectives. This uncertainty relates, among others, to climate change, socio-economic development, as well as changes in future policies. We have been missing approaches which can evaluate future objectives, and effectively communicate adaptation options to forest planners and policy makers. Therefore, we have developed action expiration charts to combine information about climate change impacts on forest ecosystem services (ES) with forest actions to support forest planning within the complexity of robust forest policy implementation.

## Objectives

The main objective of the New Forest Inclosure plan is to transform managed non-native woodland to native or woodland pasture, while maintaining key ES. An additional objective is to better communicate modelling outputs to 35 stakeholders during public consultations of the Inclosure plan. The objective of this study is to evaluate the feasibility of forestry actions using modelled ES integrated in action expiration charts for the New Forest Inclosures.

## Methods and material

To evaluate intrinsic climate change uncertainty with its impacts, we created the action expiration charts for New Forest Inclosures. This builds upon the first chart created for forestry actions in Scotland (Petr et al., 2015), which evaluated the future feasibility of forest objectives and policy needs. For the New Forest Inclosures, the main objective is a transition from mixed or non-native woodland to other types, mainly native woodland. Specifically, the New Forest long-term vision identifies four types of forest management structures: managed native woodland, mixed or non-native woodland, and pasture woodland. We linked these structures to forest management trajectories (Ray et al., 2015), namely: a focus on native species, on low-impact silviculture, and on business as usual. Under each forest trajectory we quantified climate change impacts on forest ES for

a range of tree species, such as native species and Norway spruce for native woodland trajectory. To assess the vision's objectives and to define action tipping points (environmental limits) we used four representative ES, as examples to assess the tipping points in different forest trajectories. These ES included: sequestered carbon, biodiversity, recreation, timber volume of 17cm or more diameter class, and forest operations (Ray et al., 2015). Each ES helped us to define tipping points – a specific point when forests stop providing the required amount of ecosystem goods and services - due to climate change impacts. To provide a realistic evaluation and useful information for forest planning we used the New Forest spatial information including, information about tree species and planting year.

## Results

The action expiration charts show when forest actions reach their limits due to climate change impacts on ES and also the time available for this transformation to happen. Our preliminary results in Figure 1 shows when tipping points (relative to no climate change) would occur for the provision of ES. We present the results as a relative difference in the provision of forest ES under climate change compared with no climate impacts over the next 70 years. In Figure 1, we demonstrate the transition from mixed/non-native woodland to managed native woodland and what changes in provision of ES we can expect. The first two tipping points occur at 30 years, when sequestered carbon and timber volume decrease by 10% due to climate change. The next tipping point emerges at 50 years, with sequestered carbon decreasing by further 10% (20%). Climate change will have no major impact on other forest ES, which will provide similar amounts of goods and services into the future.

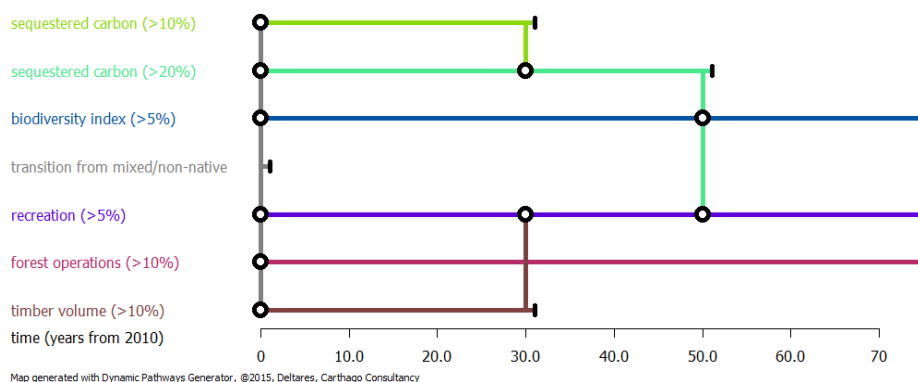


Figure 1 The action expiration chart with the transition from mixed/non-native woodland to managed native woodland in the New Forest in southern England

## Conclusions and discussion

This novel method of action expiration chart is still in development but it has already demonstrated its potential use for climate change adaptation in practical forest planning. The main strengths of the approach are the ability to: combine quantified ecosystem services with management objectives and actions, communicate and address climate change uncertainty, and provide a direction for climate change adaptation. Still, the approach has some limitations, such as: the complexity in communicating the outputs to stakeholders and policy makers, and definition of specific tipping points for actions. We are trying to overcome these limitations by improving this method through co-development and testing with forest planners and policy makers.

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# Forest policies in Europe: Issues, actors and research activities

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## **Keywords**

European Union, policy analysis, multi-level policies, transposition, implementation deficits, non-compliance

## **Abstract**

Within COST Action FP1207 "Orchestrating forest policy analysis", Working Group 1 (WG1) has been investigating forest-related targets and measures. The group members held five meetings and, additionally, three Short-term Scientific Missions (STSMs) were directly dedicated to issues of WG1. With regard to research questions, special focus has been laid on main actors and major issues of forest policy as well as implementation of forest-focused and forest-related policies in the multi-level context of European Union. A further field of interest was to assess current research issues and research structures in forest policy. As a main outcome, members of the group published a Synthesis Report on the basis of 23 country reports on forest policies (IUFRO Occasional Paper No. 29). The report highlights the variety of forest policy making in Europe through descriptions of the leading types of actors, pivotal issues and research structures.

## **Introduction**

As one of three working groups of COST FP 1207 "Orchestrating forest policy analysis", WG 1 was focusing on forest-related policy targets and measures. The group met four times during the COST conferences and organized a separate workshop in Prague in November 2013. Besides, three Short-Term Scientific Missions (STSMs) were held within the direct scope of WG1. One of these STSMs served the purpose to draft the Synthesis Report of 23 country reports that have been prepared by national scholars in forest and environmental policy (Dobšínská et al. 2015). Further interests of the group were, amongst others, to provide conceptual contributions to a Semantic Wiki on forest policy and to initiate a Special Issue on policy implementation in the Journal of Forest Policy and Economics (JFPE). In the following, the research approach and findings of the Synthesis Report will be presented.

## **Objectives**

Within most of the COST actions, country reports are an important instrument for assessing state of the art in the respective research field, as well as to identify research questions for further investigations within the scope of the action. In COST FP 1207, it was a special interest of the authors to collect actual material on forest policy issues in Europe, both with regard to policy making and research. Moreover, the synthesis report should stimulate mutual exchange of ideas and information as well as providing an incentive for further joint research activities.

## **Methods and material**

For drafting the synthesis report, reports from 23 countries in Europe were used. These reports were provided by leading national researchers in form of completed questionnaires, and the collected data were assessed and compared. Due to the very complex and partly diverse policy arrangements, most of the 28 questions were phrased as open questions. The questionnaires were essentially summarized to depict the activities of the respective countries in forest policy research and the relevance of several preselected topics. Hence, the synthesis report provides a general overview on forest-related policies in countries throughout Europe and recent research activities in this field.

## Results

Decision-making processes on forests in Europe are characterized by an enormous diversity. This is true both for the institutional settings as well as the political framework conditions. While a common forest policy still does not exist at the level of the European Union, there are a lot of interrelations and dependencies between local, sub-national, national and supranational level. Forest-related policies, mainly issues such as biodiversity, climate change, and trade, are playing an increasing role in addition to the established forest-focused approaches where the name forest is explicitly mentioned in the respective legal provisions or political programmes. Moreover, responsibilities for forest-specific topics are differing from level to level. These responsibilities are strongly depending on the integration in international processes, the division of tasks between ministries, power distribution between ministries and governmental agencies, and governance principles applied in the respective nation states and sub-national entities.

Today, a lot of *actor groups* are involved in forest policy formulation and implementation in Europe. Literally speaking, the landscape of actors is as different as the geo-political landscape. In addition to established actors like state forest authorities, private ownership associations are flourishing. The latter are gaining importance especially in countries with a high share of private forests, either traditionally or after processes of restitution and privatisation. An increasing influence of the supranational level (EU) is visible and non-forest owners, both state authorities and private organizations, articulate manifold demands towards amenity ecosystem services of forest land.

With regard to the most *actual issues* in forest policy, climate change is on top. It is followed by strategy formulation and biodiversity conservation. Regional issues, like e.g. forest fires in the Mediterranean area and illegal logging in Eastern Europe, have also been mentioned very often. Cross-sectoral policy issues (e.g. biomass, bioenergy, biological diversity, green economy) are emerging and, at least partly, seem to replace traditional issues like afforestation of agricultural land or nature conservation. Moreover, a shift of interest is visible from wood production to green (or bio-based) economy. Incoherence and contradictions of goals and measures between different policy sectors (energy, environment, climate, resource...) and policy levels might fuel further conflicts about the intensity and adequate way of forest management. In a multi-level perspective, implementation of international policy processes (UNFCCC, CBD, partly UNCCD) is a task where most of the countries are strongly involved. With regard to legal activities of the European Union, "old" countries of the EU have learned to adapt to the increasing political influence of this supranational organisation, even in the contested policy of Natura2000, by uploading own political approaches or modifying the provisions during the download process. On the other hand, accession candidates have still been busy with transposition of the *acquis communautaire*. It also became clear that forest policies in countries not belonging to the EU are affected by EU legislation, at least indirectly.

Notwithstanding national priorities, in the 23 countries covered by the report two different types of *forest policy research* seem to be distinguishable. The first type serves the assessment, evaluation and optimisation of country-specific challenges, e.g. forest ownership or forest legislation. Research of the second type focuses on process-oriented issues with a European or international dimension, e.g. Europeanization, climate change or green economy. Many of the recent research projects are characterized by inter- and disciplinary, cross-sectoral and international perspectives. It is especially the implementation of international commitments, like biodiversity, climate, combating deforestation and illegal logging that plays an increasing role in research. Monitoring, verification, forecasting, product innovation and governance have been further fields of interest. The EU dimension gained enormous influence, both with regard to definition of priority issues and channelling of research money. That is why a lot of research is conducted by national and international research networks. Another phenomenon relates to the organizations responsible for forest research. Classical (i.e. sector-oriented) forest research stations on national and sub-national level still exist in countries with abundant forest resources, although sometimes they have been

merged to larger organisational units. An increasing amount of research projects is conducted in agricultural, environmental or social research institutes operated by state or private entities.

### **Conclusions and discussion**

Many efforts have been made to standardize criteria and indicators for sustainable forest management on Pan-European and European Union level in the follow-up of the Rio UNCED conference since 1992. However, still today there is not only a high variety in definitions but also in conceptions about adequate policies for forests and forestry on the European continent. This seems to mirror the differing endowment both with forests and political resources in the respective countries. Policies on forests, either forest-focused or forest related, are formulated and implemented by an increasing number of public and private actors. These actors are representing different perceptions and views of problems and solutions, respectively. Besides, in a multi-level context, forest policies are nested vertically (e.g. transposition of EU law into national law, cf. Leventon 2015) and horizontally (e.g. policy diffusion). With regard to the vertical dimension, research on implementation deficits will have to scrutinize in detail if 'good' decisions on higher level just have been a victim of 'bad' implementation on national level (cf. Jordan 1999; Versluis 2004). Furthermore, not only against the consequences of the Brexit (cf. Winkel & Derks 2016), it also has to be assessed how orchestration of policies for forests in the multi-level political system of Europe can be improved to prevent adverse effects of policy making.

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# Forestry modelling for integrated policy analysis

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## Keywords

European Union, policy analysis, forest models, modelling and analysis tools.

## Abstract

Within COST Action FP1207 "Orchestrating forest policy analysis", Working Group 2 (WG2) has been investigating forest-related targets and measures. The objective of WG2 was to improve understanding of the use of forestry models for integrated policy analysis. In order to achieve this objective, the group met several times (e.g. during conferences, workshops and task force meetings). In addition, Short-Term Scientific Missions (STSMs) were held within the direct scope of WG2. Interviews involving one policy expert and one expert of DS tools were carried out based on questionnaires. The interviews were the base for the synthesis report for the WG2. The information gathered highlights the variety of tools available for policy making in Europe and the variety of forest policy topics addressed.

## Introduction

Decision-making processes on forests in Europe are characterized by an enormous diversity in institutional and political framework conditions. Although there is no common forest policy at the level of the European Union, a lot of interrelations and dependencies between local, subnational, national and supranational level exist. In addition to forest-focused policies, developed by forest authorities on the different levels, forest-related policies covering issues such as biodiversity, climate change, and trade are playing an increasing role. In general, there is a clear need to improve policy integration and management approaches in order to deliver the competing ecosystem services demanded by society. Currently, little information is available about decision support tools used for forest-policy development.

As one of three working groups of COST FP 1207 "Orchestrating forest policy analysis", the objective of WG 2 was to improve understanding of the use of forestry models for integrated policy analysis. The group met three times during the COST conferences and organized a separate workshop in Cascais in March 2015. In addition a task force meeting was held in Cascais in February 2016 in Cascais where questionnaires and the country report templates were prepared. Besides, two Short-Term Scientific Missions (STSMs) were held within the direct scope of WG2 and served to perform interviews to gather information about the use of decision support tools for policy analysis. The interviews were the base for the synthesis report for the WG2. Country reports are being prepared. A Special Issue on Models and tools for integrated forest management and forest policy analysis policy implementation is in preparation in the Journal of Forest Policy and Economics (FORPOL). The aim of the special issue is to investigate existing models, methods and/or decision support systems (DSS) that account for forest-related policy analysis at multiple levels and its application in real case studies. On the other hand, country reports are being prepared. In the following, the research approach and few findings of the Synthesis Report are presented.

## Objectives

The objective of WG 2 was to improve understanding of the use of forestry models for integrated policy analysis. Among the main questions that WG2 wants to answer are: i) What models do exist for forest-related policy analysis at multiple levels?, ii) What is the applicability of these existing forest (sector) models for forest-related policy analysis?, iii) How should and could the models be

used for forest-related policy analysis?, iv) How should and could the existing models be adapted for forest-related policy analysis?

### ***Methods and material***

As one of three working groups of COST FP 1207 "Orchestrating forest policy analysis", the objective of WG2 was to improve understanding of the use of forestry models for integrated policy analysis. The group met three times during the COST conferences and organized a separate workshop in Cascais in March 2015. In addition a task force meeting was held in Cascais in February 2016 in Cascais where questionnaires and the country report templates were prepared. Besides, two Short-Term Scientific Missions (STSMs) were held within the direct scope of WG2 and served to perform interviews to gather information about the use of decision support tools for policy analysis. The interviews were the base for the synthesis report for the WG2. The interviews involved one policy expert and one expert of DS tools. In total, 30 experts (mostly COST Action members) representing 19 European countries were interviewed.

A special issue on Models and tools for integrated forest management and forest policy analysis policy implementation is in preparation in the Journal of Forest Policy and Economics (FORPOL). The aim of the special issue is to investigate existing models, methods and/or decision support systems (DSS) that account for forest-related policy analysis at multiple levels and its application in real case studies. Further, special focus is on the information provided by different types of decision support tools at different scales and on the benefits and limitations/challenges of the approaches presented. Particular attention should be paid to forest-related policy fields such as biodiversity, climate change, bioenergy, trade and green economy.

Country reports are being prepared. These reports expand the information obtained during the interviews performed within the STSMs.

### ***Results***

Many decision support tools (DS tools) for forestry have been developed. However, the use of DS tools in forest policy processes remains limited in Europe. Preliminary results show that all Forest Policy Topics had at least one DS tool to support forest policy. Also most of DS tools were used for policy formulation and for policy evaluation. However, DS tools were less used for policy implementation. According to preliminary results, the main reasons that limit DS tools usage in forest policy are: "Users lacking confidence in how to use DS tools effectively", and "DS tools are too complex and primarily designed by and for scientists and not for policy processes in general".

### ***Conclusions and discussion***

The use of DS tools to support forest policy is not extended in all the European countries but the use of these tools would be beneficial. However, the sharing of DS tools between European countries is limited due to many different reasons. Main reason is lack of confidence in users how to use DS tools effectively.

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# Orchestrating forest policy-making: involvement of scientists & stakeholders in political processes in Europe

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## Keywords

Network governance, participatory governance, forest policy, science-policy-society interface.

## Abstract

Forest policy making processes in Europe can nowadays be characterized as multi-level and multi-sectorial governance processes, in which involved actors have an increasingly complex and gradually more contextually defined relationship. Boundaries between and within public, private and civic actors have become blurred and the role of scientists has changed, as other forms of expertise (e.g. practitioners, laypersons expertise but also citizen science) have become relevant. Working Group 3 (WG3) of COST Action FP1207 ORCHESTRA has worked with the aim of exploring these issues and stimulating a debate about participatory-based forest policy making processes. A survey at national and sub-national level in all involved countries, an international conference and a Special Issue within Forest Policy and Economics have been conducted. Results suggest that “orchestrating” forest-policy making can be a “mission impossible” (Pregernig, 2015) if not enough attention is deserved to procedural arrangements and policy makers commitment. Further research is needed to find out additional and systematic evidences of effectiveness of adopting participatory approaches, taking into consideration the potentially important (but often disregarded) roles played by scientists and citizens in influencing political processes.

## Introduction

The term “orchestration” is used for describing different elements working together in an aligned way. During the last two decades a shift from government to governance has been recognized in (forest) policy making (e.g. Pierre & Peters 2000, Rhodes 1996). This shift implies “governing with and through networks” where public and non-state actors collaborate and compete in different coalitions (Rhodes 2007: 1246). The concept of ‘network governance’ (Rhodes 1996) concentrates on the increasing importance of networks and partnerships focusing on the involvement of different kinds of experts and their interactions (Lewis & Marsh 2012). The other concept associated to the “new” forms of governance, i.e. ‘participatory governance’ (Grote and Gbikpi 2002; Newig and Kvarda 2012), concentrates in particular on participation of societal actors and the role of “citizenship” (i.e. the public) in political processes. The different involved actors in the governing networks deserve an “orchestration” for an aligned and, thus, likely more effective policy making. There have many studies dealing with related questions as well in the vein of forest policy research. However, these studies are mainly isolated starting from very different perspectives and different concepts of participation and expert involvement in governance, and are not significantly taking into consideration the emerging and challenging societal changes (e.g. new policy concepts demanding integrated approaches such as the bioeconomy and social innovation).

### **Objectives**

Working Group (WG3) is specifically concerned with the critically analysis of the various forms of participatory-based forums and decision-making processes involving experts dealing with forest-related policies in Europe. Three main questions guided the entire work of WG3 when involving the other participants: 1) What are the most effective means for participatory forest-related policy process involving scientists and stakeholders?; 2) What are efficient methodologies for developing, implementing and monitoring multi-stakeholder-based forest-related policies?; 3) Which factors hinder the establishing and implementing a participatory forest-related process involving scientists and stakeholders?

### **Methods and material**

WG3 promoted various actions and events in order to reach its main objectives. The first initiative was a structured interview with policy makers, scientists and stakeholders conducted by the Cost Action members. The collected data has been the basis for a cross-country comparison and the selection of case studies presented at the international conference organized by WG3 in Bordeaux on the 23-25/09/2015. More than 55 experts attended the conference and case studies from all over Europe were able to represent both best practices and major failures. The conference has been the basis to gather and discuss potential contributions for a Special Issue to be published within the international peer-reviewed Journal Forest Policy and Economics (guest editors: D. Kleinschmit, H. Pülzl, L. Secco, A. Sergent and I. Wallin). A conceptual paper with an extensive literature review on both science-policy and stakeholder-policy interface builds the basis for the SI.

### **Results**

The meaning and practices of participation differs a great deal across countries (e.g. Eastern European countries participation is a completely new form of debating policy issues in forestry, in Nordic countries the involvement of stakeholders has a long tradition) but as well across different process and political level (EU/national/local).

The literature review shows, that participation is often recommended as a solution of policy problems and is reported as more effective in influencing forest management decisions when carried out at local level (e.g. Ruppert-Winkel and Winkel 2011). However, only a few studies look into details of procedural arrangements and/or real effects of stakeholders and/or scientists participation in decision-making (e.g. Mårald et al. 2010). Frameworks for evaluating and designing more effective collaborative processes have been developed (e.g. Faehnle and Tyrväinen, 2013; Valkeapää and Karpinen, 2013), but empirical applications are largely missing. When described, forest policy participation processes are often reported as difficult or faulty, with problems of stakeholders' representativeness, poorly organized processes, lack of clear rules for stakeholders' involvement and debated role of science.

Scientists and stakeholders are linked through a bi-directional flow of interaction that should bring a combination of scientific knowledge with local, non-expert knowledge. But the dominance of expert knowledge is often mentioned amongst the critical issues of participation and the local non-expert knowledge is often disregarded. Nevertheless, a significant part of literature and presented case studies encourage policy makers to adopt more inclusive political processes, as a number of benefits are reported deriving from participation when properly arranged. While most of the studies focus on the "stakeholders-policy interface", minor attention gained the "science-policy interface" and even less the "science-stakeholders interface". The role of 'the public' (i.e. the citizens not having any particular stake into forest management) is hardly mentioned as relevant and the conceptual/theoretical implications of its involvement in forest policy making have not been explored yet. However, as pointed out by Weber and Schnappup already in 1998, increased participation of public and stakeholders cannot be avoided and foresters should make the best out of the situation to take the role as mediators and brokers between society and forest ecosystems.

**Relevance for the conference theme: bioeconomy**

The issue of participation and expert involvement gain particular relevance in cross-sectoral forest-related (forest) policy making processes with respect to two different innovation approaches to bioeconomy (Secco et al. 2015). The currently dominant approach is the traditional technological one. Expert knowledge and investment on traditional R&D science-based activities are core components of innovation, while stakeholders are likely to be involved just for specific consultation needs (e.g. to increase the acceptance by the community). The other emerging approach to bioeconomy is the social innovation approach, where the role of public-private partnerships, co-management contractual arrangements, civic society-led initiatives seem to be able to provide novel solutions to emerging social needs and societal challenges of forest policy (Secco and Pettenella, 2016). In this type of approach to bioeconomy, also local, non-expert knowledge is likely to play an important role, while horizontal networks among private, public and civil society actors – especially at local level - are expected to guide collective decisions. How the two innovation approaches to the bioeconomy and ecosystem services provision will be influenced in future by the dynamic and complex interfaces between practice-policy-science is an open question.

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**Notes**



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