ALTERFOR

ALTERNATIVE MODELS AND ROBUST DECISION-MAKING FOR FUTURE FOREST MANAGEMENT

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RECONSIDERING SILVICULTURE TO MEET CHALLENGES TO EUROPEAN FORESTS

ALTERFOR POLICY BRIEF No. 1

The Paris Agreement relies on European forests to contribute to climate mitigation and bioeconomy. An increased supply of forest products is expected, whereas principles of Sustainable Forest Management (SFM) should still be observed.

The EU Horizon 2020 project ALTERFOR investigates new ways of managing European forests to meet these upcoming challenges. To achieve these ambitious aims at the EU level it is necessary that adequate measures are taken by EU Member States with highly varying biophysical and socio-political conditions.

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ALTERFOR KEY FACTS

Project title: Alternative models and robust decision-making for future forest management

Project duration: 54 Months (01/04/2016 - 30/09/2020)

Ten case study areas in: Germany, Italy, Ireland, Lithuania, the Netherlands, Portugal, Slovakia, Sweden, and Turkey

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1 INTRODUCTION

This policy brief presents a selection of findings on the current challenges to European forests and desirable silvicultural alternatives for meeting those challenges. The focus is not on silviculture as such. Rather, the emphasis is on exploring the potential for overcoming the barriers to implementing new methods with due consideration of social, economic and environmental contexts. The findings are based on extensive surveys of silvicultural experts, desktop analyses, deep interviews, and multiple stakeholder workshops in all participating countries.

To cover the diversity of Europe, ALTERFOR involves 10 case studies in 9 countries, carefully selected to represent different bio-geographic, socio-economic and policy contexts (Figure 1). The project derives its strength from: (i) sharing knowledge between countries to increase the repertoire of silvicultural methods, (ii) considering multiple scales, from stand through landscape and national to global, and (iii) ensuring that new methods overcome institutional barriers by taking a strong stakeholder focus.

This policy brief starts by recapping findings from three selected ALTERFOR countries – Portugal, Slovakia and the Netherlands – to exemplify the main silvicultural challenges, options and implementation hurdles. Policy implications are then derived from the comprehensive data set acquired by ALTERFOR.

Figure 1:
ALTERFOR involves 10 case studies in 9 European countries throughout Europe:

Germany
Italy
Ireland
Lithuania
The Netherlands
Portugal
Slovakia
Sweden
Turkey

2 EUROPEAN EXAMPLES OF CHALLENGES AND POSSIBILITIES

2.1 PORTUGAL - VALE DO SOUSA

Forest fires are the single most decisive factor in forest policymaking and management in Portugal. On average, 2% of the Portuguese forest area is affected by fires annually, presenting a major risk to forestry investments and even to human lives (ICNF 2018; Mateus and Fernandes 2014). Forest management is further complicated by highly fragmented ownership structure, where most small-scale owners are either passive or of unknown identity. Inactive management of forests leads to under-realized potential for utilization and also contributes to increased fire risk.

These challenges are pervasive in ALTERFOR's Portuguese case study area (CSA) of Vale do Sousa in north-western Portugal, approximately 50 km east of Porto. The CSA comprises 14,840 ha forest, mostly under small-scale private ownership. Two forest owner cooperatives operate in the CSA. The forests are dominated by two species, Tasmanian bluegum (Eucalyptus globulus) and maritime pine (Pinus pinaster) in both pure and mixed stands.

Figure 2:
Participants in ALTERFOR's Travellab discussing forest management issues in a 12-year-old coppice stand of Eucalyptus globulus. The forest owner faces an important decision whether to clear-fell the stand now (avoiding the risk of stand destruction by fire) or wait for 1-2 years (the most profitable option, if disregarding the risk of fire).

Fast-growing eucalypt is by far the most profitable option and therefore is strongly preferred by both forest companies and by active small-scale owners. Expansion of eucalypt plantations has been a decisive factor for the growing contribution of the forest sector to the Portuguese economy. However, eucalypt is highly susceptible to fire and is also the least desirable species in terms of biodiversity. The provision of ecosystem services depends on landscape mosaics with a wider range of forest species and silvicultural systems (ICNF 2015). In the aftermath of widespread forest fires in 2017, the Portuguese government issued a decree prohibiting expansion of eucalypt plantations. There is thus is a dire need for alternative silvicultural methods that could deliver a more balanced mix of ecosystem services.

The following alternative methods were developed by the Portuguese research team in workshops together with forest owners, industry and other stakeholder groups:

- Pure maritime pine stands with rotation times of 35-50 years
- Pure pedunculate oak stands with rotation times of 40-60 years
- Pure cork oak stands
- Riparian deciduous forests

All of the proposed management systems aim to reduce fire risk. The programs are also expected to contribute to the bio-economy and climate change mitigation through more carbon storage on forest lands and a higher quantity of sawlogs fed into sawn wood products. Dedicated management of riparian zones will promote biodiversity and water quality. These solutions appear feasible from a silvicultural perspective and are highly promising from an ecosystem service perspective.

Figure 3:
Area managed by the company Floresta Atlântica in the CSA that was burned in 2017. Wildfires burned over 60% of the company's forest area in the CSA.

However, several policy-related challenges need to be overcome for their successful implementation. These pertain especially to the interrelated issues of ownership fragmentation and fire risk. It is imperative to help raise the managerial perspective from small-scale estates to landscapes. The next step will be to communicate possible policy options to decision makers (Borges et al. 2017). For example, a stronger governmental role in initiating land reform and devising a support scheme for desired forest management alternatives can help to achieve substantive changes.

2.2 SLOVAKIA - PODPOLANIE

Slovakia faces many challenges characteristic of Central and Eastern European countries that have been going through a socio-economic transition since 1990s (Navrátil et al. 2016). Reliance on heavy regulatory steering is the key legacy from the socialist era. Detailed stipulations on how each forest stand should be managed are provided in compulsory forest management plans, leaving little room for forest managers to make their own decisions. Even more restrictively, private owners have very little say about managerial interventions on their estates. The implementation of forest management plans is fully and obligatorily transferred to the licensed forest manager, except in rare cases when forest owners possess licences themselves. Stipulations and restrictions abound in commercial forests. Considerable further restrictions are imposed on non-commercial forests that, as specified through forestland zoning, occupy around 18% of the total forest area.

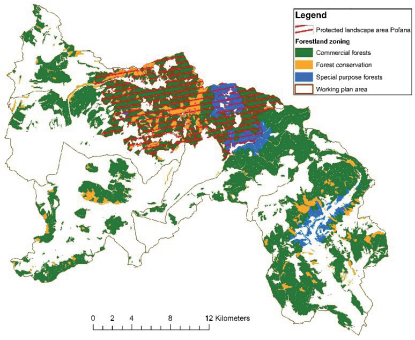

Figure 4:
The map of forestland zoning of the Slovakian case study area Podpolanie.

Forests in the Slovak Podpolanie CSA cover 30,000 ha with prevailing state ownership (75%). As in the rest of the country, forests are dominated by spruce (Picea abies) 41%, beech (Fagus sylvatica) 27% and oak (Quercus spp.) 9%. Forest rotations normally range from 90 years (mostly for spruce) to 150 years (mostly for oak). As in the Portuguese case, the choice of tree species, the most crucial silvicultural decision, is controversial. Climate change negatively affects the growth and vitality of Norway spruce on many sites due to increasingly severe droughts and large-scale disturbances by wind and bark beetle. On the other hand, spruce is still preferred by foresters due to its superior economy compared to other species (Holeksa et al. 2007).

Figure 5:
Roundtable in the Slovakian Travellab, November 2016. After the field trip, representatives of the ALTERFOR consortium engaged in a roundtable discussion with and among Slovakian forest stakeholders. The heated debate addressed many issues and potential solutions, with the need to liberalise governance and simplify forest management as the most recurring theme.

Workshops were organised to discuss forest management with Slovakian actors including, among others, representatives from national forest authorities, local state foresters, managers of private forests, and environmental NGOs. The following alternatives were selected:

- Multifunctional management in partly uneven-aged mixed stands, based on an innovative mix of even- and uneven-aged forestry practices.
- A model for sustainable timber production in even-aged mixed-species stands, based on flexible rotation lengths and regeneration times.

The uneven-aged mixed stand model is primarily motivated by concerns about the sustainability and economic future of spruce-dominated stands under climate change (Schütz et al. 2016). The model is applicable under current legislation but its implementation is challenging due to the need for investments in infrastructure, technology and education.

The even-aged mixed-species model is designed to improve cash flow within highly-regulated age-class forestry while avoiding declines in timber value in over-mature stands. In addition, the flexibility of the proposed model allows forest managers to meet demands for ecological stability. The model does not align with the current legislation and forestry paradigm in Slovakia.

As in the Portuguese case, the biggest challenges are policy-related rather than silvicultural. However, the policy issues are reversed. In Portugal, a key issue is ownership fragmentation and a lack of landscape perspective. In Slovakia, the landscape perspective is strongly present through forestland zoning, but the owner or manager perspective is largely missing. Legislation must be softened and planning procedures should become more flexible to make forest management more adaptive, to the benefit of forest owners' economy and decision freedom.

2.3 THE NETHERLANDS

Dutch forestry radically differs from Portugal and Slovakia in many respects, but most notably in its overall goals and desired ecosystem services. If timber production remains the backbone of the Portuguese and Slovakian forestry, environmental and recreational values take precedence over production in the Netherlands, a country with a high population density and little forest area per capita (Alterra 2013).

Dutch forest policy priorities have been in flux during the last 5 to 6 decades (Hoogstra-Klein et al. 2017). Since the 1960s, policy has been refocused from timber production to multifunctional forestry in which environmental and recreational values became dominant. Since 2000, forestry has largely lost the status of a sectoral policy area and has become regarded as a component of nature policy. By 2010, however, severe cuts in subsidies for forest management took place and the economic importance of forestry has been recognised again (Buijs et al. 2014). This has led to increased tree harvesting. Although Dutch timber is mostly used domestically it still supplies only a small part (about 10%) of the annual domestic timber needs.

Multiple-use forestry has been the prevalent policy concept guiding Dutch forest management since the 1980s. Within this focus, the sector developed the concept of integrated forest management. This type of management aims to integrate different forest functions in a more nature-oriented way. It developed out of a dissatisfaction with past timber-oriented silvicultural practices, i.e. monocultures with clear cut management. There is, however, no common agreement on the actual meaning of multiple use and integrated management other than that Dutch forests should be managed for multiple functions in a close-to-nature way. Interpretations differ widely from owner to owner, with no practicable guidelines for specific silvicultural measures or appropriate spatial scales. Thus, we have the somewhat controversial situation where the state sets ambitious goals for environmental and recreational values with increased timber production but the implementation is largely left to the discretion of forest owners.

Given the limited extent of Dutch forests, the team chose to consider management options for the country as the whole. Consultations with multiple stakeholders exposed the need for more segregated concepts of forest management on one hand and an integrated management option that confronts the forest management challenges of climate change.
The following alternative silvicultural models emerged from the consultations:

- Volume production with short rotation times, no thinning and conventional or coppice regeneration.
- High-quality production with multiple-species stands to strengthen natural competition and tree selection in stages to promote trees with knotless boles and large crowns.
- Park management with control of dead wood, understorey thinning and possibly pruning to form attractive forests.
- Climate resilience by multifunctional management to further increase species and structural diversity, enlarge the share of broadleaved species and practise small-scale harvesting.

Figure 6:
Experts discussing the role of veteran trees in the Dutch forest.

The first two approaches aim to increase production quantity or quality. Park forest management aims to deliver cultural services, especially recreational quality and aesthetic beauty; trees are only harvested to create a more attractive forest. The last alternative refines the current concept of multifunctional management to reduce the expected risks due to climate change.

Intensive management for woody biomass might be regarded with suspicion by some stakeholders but could be more acceptable if its contribution to climate change mitigation is properly communicated. Management for high-value timber demands much silvicultural knowledge. This can be a challenge given the large number of small-scale (< 5 ha) private owners. Park management effectively produces no timber and thus is less attractive economically. High browsing pressure hampers the use of natural regeneration, especially while promoting broadleaved species. More intensive game control or fencing should be considered.

In sharp contrast to Slovakia, current legislation poses no significant hindrance to alternative silviculture. Forest owners will bear most of the burden of implementing alternative silvicultural methods. There is currently no political momentum for stronger state guidance of owners toward desirable forest practices. Changes on the ground will only be possible through more and better scientific evidence and education, or possibly by introducing some well-targeted policy instruments.

3 POLICY IMPLICATIONS

The joint work by ALTERFOR researchers and forest stakeholders including forestry practitioners has resulted in an array of new silvicultural approaches. However, silvicultural research cannot solve the challenges by itself; dedicated efforts are needed at different policy levels.

The examples presented above yield important insights. **Slovak** forestry still prioritises maximising timber production, but faces increasing biotic and abiotic challenges. Moreover, the strict regulations that were designed for state forestry of the past were transferred with limited modification into current forest policies.

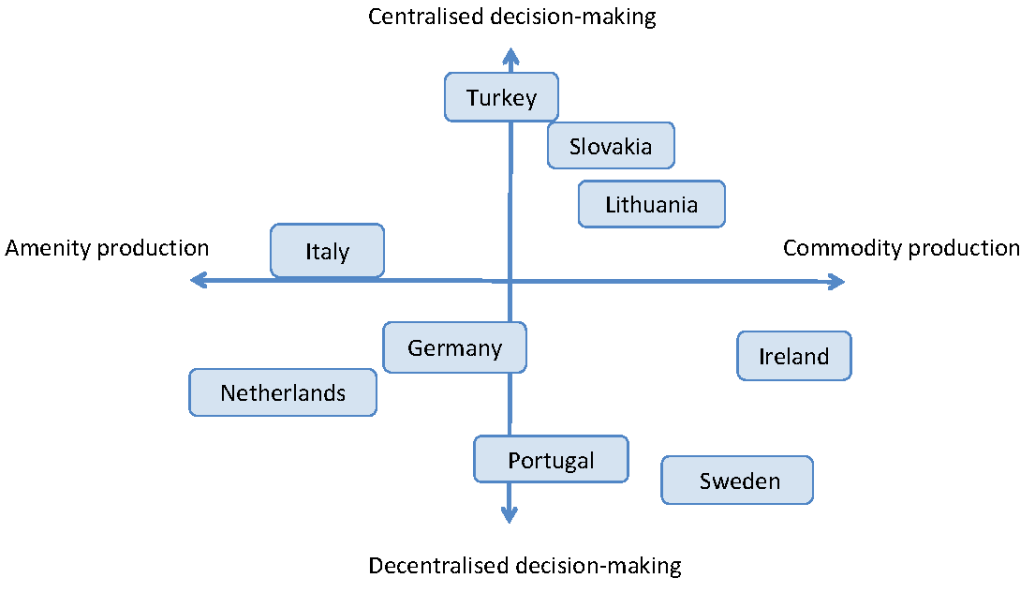

Figure 7: The current goal orientation and degree of centralisation of forestry in ALTERFOR countries.

To achieve a positive change, the key challenge is to reduce state steering, allowing more decision freedom to forest owners and managers, thus creating prerequisites for greater adaptive capacity in forest management and governance.

The situation in **the Netherlands** is quite the opposite. While the highest priority has been given to environmental and social amenities, there is an expressed wish to improve the economic performance of forestry. The increased demands for multiple ES will require more explicit choices to be made by forest owners and managers but also by the government. This calls for more attention to forestry in the Netherlands in general; and for more education and enhanced scientific knowledge that is usable by both forestry practitioners and forest policy makers.

The situation in **Portugal** resembles the Netherlands in that the regulatory framework is comparatively weak and there is a need to stimulate the activity of forest owners. But otherwise, policy makers face quite different challenges. In Portugal, the landscape perspective is paramount; wildfire risk emphasizes the need for concerted action.

A comprehensive synthesis of all ALTERFOR cases' aims and needs, silvicultural alternatives, and barriers that must be overcome is found in the Annex. Policy makers must consider what kind of ecosystem services are primarily in focus (commodity versus amenity production) and the degree of centralisation in forestry decision-making (Figure 7).

The mapping of countries in Figure 7 calls for explanations of how different countries coordinate their forestry aims and governance. Ireland, Portugal and Sweden are the three ALTERFOR countries strongly focused on timber production with a high share of private forest ownership. Forestry aims are quite well settled and the key concern is how to deal with forest owners' motivations and knowledge. Germany, Italy, and the Netherlands have the highest population densities among the ALTERFOR countries, representing highly-urbanised societies that have prioritised amenity production. However, such societal aims have to be operationalised in forests mostly under private ownership. This creates uncertainties about forest policy and management, especially the balance of increasingly divergent interests of forest stakeholders. The remaining three countries are characterised either exclusively by state forest ownership (Turkey) or by strong steering from the central authorities in both state and private forests (Lithuania and Slovakia). Increased decision-making freedom for forest owners and managers is the overarching condition for these countries to achieve higher adaptive capacity in forest management.

Better-motivated forest owners will help bring new silvicultural alternatives into practice. Limited knowledge among forest owners of how these methods should be practised hinders their adoption. It was explicitly mentioned in Italy, the Netherlands, Sweden and Turkey, but is also present in other countries. This realisation prompts policy makers to put forward programs to educate and inform forest owners. There is a concurrent need for research on owners' actual knowledge and on the most effective ways to conduct consultancy and extension.

Stakeholders raised questions about the costs and profitability of new methods in almost all cases. Costs of roads, tending, pruning and other necessary investments were all mentioned. In some countries, uncertainties like wind, fire and pests were raised, and browsing was a particular concern in the Netherlands and Sweden. From a policy point of view this calls for ways and means to secure the economy of operations. It also points at the need to commit resources for research into silviculture and related areas.

A general conclusion from these cases is that there is no panacea or one-size-fits-all solution. The diversity of relevant policy measures is large. What instruments are appropriate on what level is beyond the horizon of ALTERFOR. Still, ALTERFOR serves as an activating agent in this process. To maximise knowledge transfer and cross-border learning, ALTERFOR employs different modes of interactions between science and practice. One is the Travellab, an innovative method of presenting and discussing cases in the field. It helps not only to scrutinise the approaches to silviculture but also brings forward a better understanding of the complexities surrounding forest management and the potential for large-scale changes (see Travellab box below). Another instrument is the series of workshops with multi-stakeholder involvement that is carried out in all 10 CSAs. In Germany for example, one of the workshops brought together over 40 representatives including the Brandenburg state secretary for forestry.

The next steps of ALTERFOR will support policy processes at the national and EU level by quantitatively assessing ecosystem services due to the introduction of management approaches at the landscape level. The results of the landscape-level projections under different scenarios will then be used in a global model to estimate the cumulative effects at the EU level. This will provide unique material linking policy processes at EU and national levels where stakeholder involvement plays a key role.

*Inspired by the successful experience of the EU Cost Action FACESMAP, ALTERFOR uses **Travellab**, an innovative format for cross-regional learning. Instead of a conventional scientific excursion, Travellab contains a targeted field trip where scientists meet local stakeholders. This is preceded by a preparatory session illuminating local and national contexts; and complemented by a round-table session where stakeholders and scientists debate hot forestry topics. Travellab thus goes well beyond narrow technical discussion of certain silvicultural methods, providing important insights into socio-economic contexts, stakeholders' power and interests, and the overall capacity to implement alternative forest management. The format was first tested in Zvolen, Slovakia (2016) and, following the successful event, was implemented in Galway, Ireland (2017) and Porto, Portugal (2018). Due to its solution-oriented approach and high recognition among local stakeholders, this unique format is expected to generate a long-term impact, inducing the implementation of the desirable silvicultural approaches locally and nationally.*

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ANNEX

Summary of major aims, silvicultural methods to meet those aims, and the obstacles to get the methods implemented in ALTERFOR countries. The numbers in parentheses under 'Alternative methods' refer to the corresponding aims.

CASE	AIMS AND NEEDS	ALTERNATIVE METHODS	OBSTACLES
Germany I Brandenburg	1. Higher demand for wood and energy 2. Find balance among all ES 3. Higher cultural services 4. Higher environmental values	(1) Scots pine timber and energy (2,3) Biodiversity-centred management of pine (4) Oak biodiversity set-aside	Stakeholders with strong and directly opposite perceptions of forest management and goals Powerful stakeholders (often NGOs) argue for some ES in conflict with other ES
Germany II Bavaria		(1) N. spruce timber and energy (2,3) Biodiversity-centred management of spruce (1) Beech biodiversity set-aside	
Ireland	1. Less fertilisation 2. > Environmental values 3. Higher wood production 4. Bigger share of broadleaves	(1,3) Lodgepole pine (LP) fibre production (1,2) Lodgepole pine wilderness/ biodiversity (2,3,4) Sitka spruce under birch nurse	Uncertainty about how low-density LP stands might develop Costly to build roads in non-commercial forests Finding suitable sites for Sitka spruce and birch
Italy	1. > Environmental values 2. Keep/increase recreational, cultural services 3. Higher combined ES value 4. More timber and biomass	(2,1,3) Recreational selective management (4) Uniform shelter-wood and coppice	Improper management can increase invasive species High cost for tending Local communities not used to shelterwood
Lithuania	1. Higher economic efficiency 2. Better adaptiveness to climatic and social changes 3. Maintain high environmental and social values	(1,2) Adaptive rotation ages (2,3) Care for deciduous trees (2,3) Non clear-cutting	Too rigid steering by state Old scientific "truths" Outcomes of natural regeration hard to predict Public opinion
The Netherlands	1. Maintain high environmental and social values 2. Higher wood and energy production	(2) Management for wood biomass (2) High value timber (1) Park management (1,2) Climate-resilient management	Owners' will and knowledge Low profitability Lack of scientific knowledge High browsing pressure
Portugal	1. Reduced fire risk 2. > Environmental values 3. Higher production of sawtimber	(1,3) Pine and oak with long rotations. (1,2) Cork oak (1,2) Riparian deciduous forest	Fragmented ownership Unprofitable management Lack of coordinated landscape management
Slovakia	1. Less drought damage and reduced risk of storm damage 2. Higher economic efficiency	(1) Multifunctional partly uneven-aged management (1,2) Even-aged mixed species stands	Excessive steering by state Excessive management restrictions Insufficient technologies
Sweden	1. > Environmental values 2. Maintain/increase wood production 3. More varied forests	(2) Sitka spruce and Douglas fir (1,3) Spruce-Birch mixtures (1,3) Border zone management (1,3) Selection systems	Owners' will and knowledge High browsing pressure Lack of scientific knowledge
Turkey	1. Higher water quality 2. Higher wood production 3. > Environmental values 4. Improved visual quality	(1,2,3,4) CCF - Continuous Cover Forestry	Poor road network Lacking technical and managerial support Need for training of foresters

Project Title

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