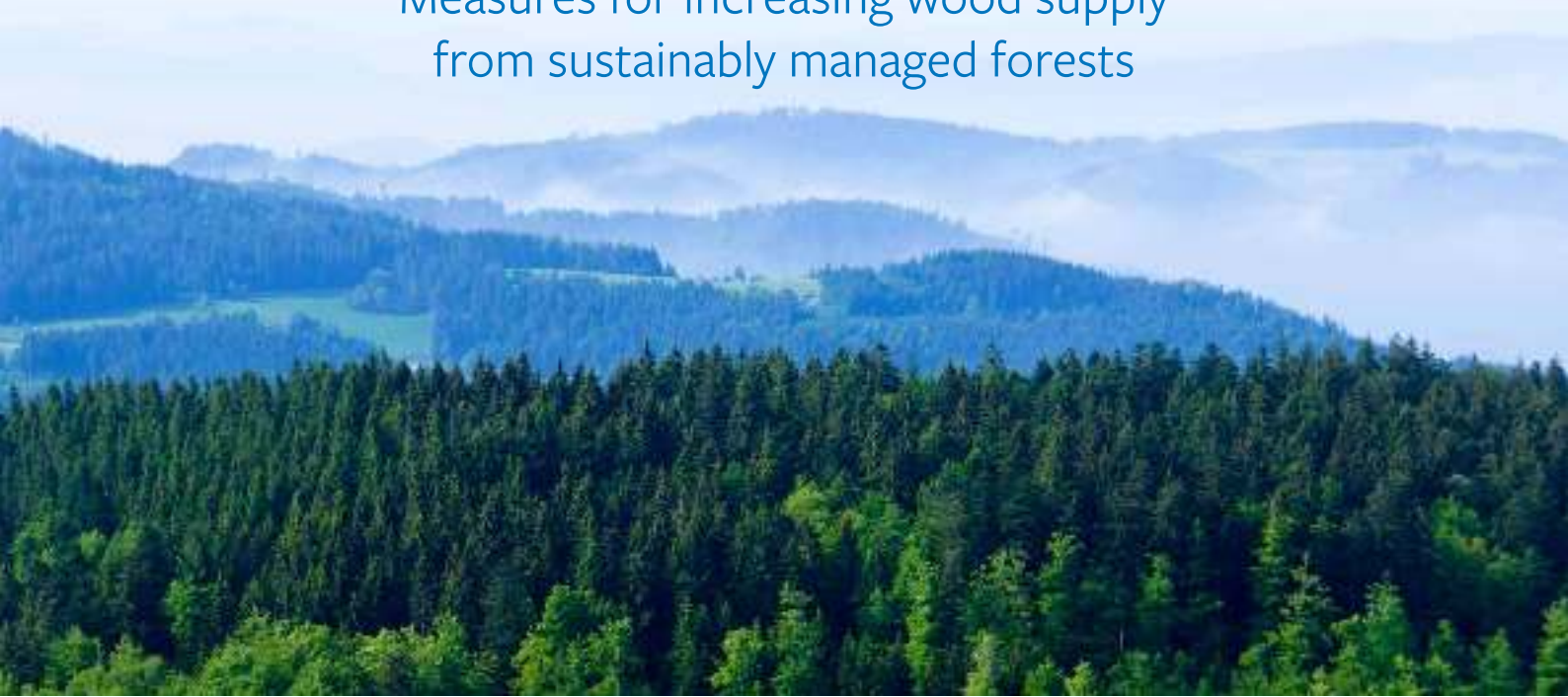


Handbook for wood mobilisation in Europe

Measures for increasing wood supply
from sustainably managed forests



simwood.efi.int

Layout and printing: Grano Oy

ISBN 978-2-9519296-4-9



Handbook for wood mobilisation in Europe

Measures for increasing wood supply
from sustainably managed forests



Authors

Christophe Orazio
EFI European Forest Institute, 69, route d'Arcachon, 33612 Cestas, France
www.efiatlantic.efi.int , christophe.orazio@efi.int

Uwe Kies
InnovaWood, 66 rue du Luxembourg, 1000 Brussels, Belgium
www.innovawood.com , uwe.kies@innovawood.com

David Edwards
Forest Research, Northern Research Station, Roslin, Midlothian EH25 9SY, UK
www.forestry.gov.uk/forestresearch , david.edwards@forestry.gsi.gov.uk

Contributors

Rebeca Cordero Montoya, Nataša Lovrić, Stephanie Hayes, Tim Green
EFI European Forest Institute, France, Finland

Roland Schreiber, Marc Koch
LWF Bayerische Landesanstalt für Wald und Forstwirtschaft, Germany

Aine Ni Dhubain
UCD University College Dublin, School of Agriculture and Food Science, Ireland

Mart-Jan Schelhaas, Gert-Jan Nabuurs
Wageningen University and Research, The Netherlands

Anna Lawrence, University of the Highlands and Islands, Scotland, UK

Phil Tidey, Small Woods Association, UK

Jorge Olivar, Pablo Sabin, AGRESTA, Spain

Andrew Kitching, RDI Rural Development Initiatives Ltd, UK

2017



EUROPEAN FOREST INSTITUTE



This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 613762.



Foreword

Wood is a very versatile raw material and thus an important resource for many industries, such as construction, furniture, pulp and paper, bioenergy and biorefineries (new chemical products). Using wood is one of the safest ways to reduce the CO₂ emissions that are the main cause of climate change. Already today, a variety of innovative products can be produced from wood which are expected to stimulate significant growth of the forest-based sector within the green economy.

Mobilising more wood therefore offers a major opportunity for Europe to reduce its impacts on the environment and develop a sustainable bio-based economy. Today, Europe's large unused wood potential is 'locked' in forests where harvesting is limited due to complex barriers associated with regulation, accessibility, ownership structures and other technical, social and economic factors. A large share of the unused potential can be mobilised through more active forest management and without disturbing other forest functions.

This handbook aims to raise awareness of the challenges and opportunities of wood mobilisation from managed forests by increasing the sustainable harvesting of wood. Based on a survey of initiatives and pilot projects in several European countries, the main barriers impeding wood mobilisation are presented along with a set of corresponding measures and interventions that are considered capable of lifting these barriers. It provides a thorough overview of the topic from a European perspective and is aimed at practitioners and policy makers in the forest-based sector. It is also useful as an introduction for readers interested in wood and biomass who have a different background, for example in biochemistry, new materials or renewable energies.

The handbook is an outcome of the EU-funded SIMWOOD project. The results of which are accessible through the websites www.simwood-project.eu and <https://simwood.jrc.ec.europa.eu>

Roland Schreiber
SIMWOOD coordinator

Table of Contents

1	Mobilisation of wood: a key issue for the emerging bioeconomy	7
1.1	An increasing need for wood raw material from forests	9
1.2	Main policy drivers of increasing demand	10
1.3	What does sustainable wood mobilisation mean?	12
1.4	The key role of forest owners and wood markets	12
1.5	Sustainable forest management at the enterprise level	13
1.6	Risks for sustainability	15
1.6.1	Risk of overharvesting	16
1.6.2	Risk of declining ecosystem productivity	16
1.6.3	Risk to other ecosystem services	16
1.7	Concepts and definitions used in the handbook	18
2	Barriers to wood mobilisation in Europe	21
2.1	Forest resource barriers	24
2.2	Regulatory and legal barriers	26
2.3	Financial and material barriers	27
2.4	Organisation and enterprise barriers	28
2.5	Knowledge and attitudinal barriers	31
3	Measures and actions to improve wood mobilisation in Europe	35
3.1	Activating forest management and enterprise	37
3.1.1	Enterprise management and planning	39
3.1.2	Harvesting and transport	39
3.1.3	Alternative products, services and markets	40
3.2	Regulatory and legal framework	41
3.2.1	Land ownership regulations	41
3.2.2	Forest management regulations	43
3.2.3	Other regulatory and legal frameworks	44
3.3	Financial and material incentives	46
3.3.1	Forest access and infrastructure grants	46
3.3.2	Land ownership tax incentives	48
3.3.3	Forest management grant and tax incentives	50
3.3.4	Market development incentives	53
3.4	Organisation and cooperation	55
3.4.1	Structural improvement of land ownership	55
3.4.2	Cooperation in forest management	59
3.4.3	Market development	67
3.4.4	Knowledge exchange actions	70
3.4.5	Information services and tools	78
3.4.6	Research & Innovation	84

4	Lessons learnt from wood mobilisation initiatives and projects	89
4.1	Under-utilised forest resources versus market barriers	92
4.1.1	Wood mobilisation can be increased, but sustainable levels of harvesting differ significantly between regions	92
4.1.2	Additional wood is not always accessible for harvesting due to multiple regional barriers	92
4.1.3	Growing wood markets need to become an opportunity for forest owners	93
4.2	Activation and professionalisation of forest owners.....	95
4.2.1	Broader awareness is needed of the benefits of Sustainable Forest Management	95
4.2.2	Forest owner access to useable knowledge is key	96
4.2.3	Continuous knowledge exchange and support actions to professionalise forest owners.....	96
4.3	Research needs and policy recommendations.....	97
4.3.1	Major market barriers require long-term research and appropriate innovation strategies.....	97
4.3.2	Wood mobilisation measures need broader testing and evaluation	98
4.3.3	Innovation in forestry supported by information technologies will be essential.....	99
4.3.4	Multi-actor approaches can foster integrated solutions for wood mobilisation	100
4.3.5	Coordination of European and national programmes can ensure real impacts.....	101
5	References	102
6	Annex	105
6.1	SIMWOOD project summary	105
6.2	SIMWOOD pilot projects	106
6.3	SIMWOOD Evaluation Framework	108
6.4	SIMWOOD Information System portal.....	111
6.5	SIMWOOD partners.....	112

Abbreviations

CAP	Common Agricultural Policy	JRC	Joint Research Centre of the European Commission
CO ₂	Carbon dioxide	m ³	Cubic metre
EAFRD	European Agricultural Fund for Rural Development	NFI	National Forest Inventory
EIA	Environmental Impact Assessment	NIPF	Non-industrial private forest owners
ERDF	European Regional Development Fund	NUTS	Nomenclature of Territorial Units for Statistics
ESF	European Social Fund	NWFP	Non-wood forest products
EU	European Union	PEFC	Programme for the Endorsement of Forest Certification
EUTR	EU Timber Regulation	R&I	Research and Innovation
FLEGT	Forest Law Enforcement, Governance and Trade	RED	Renewable Energy Directive
FSC	Forest Stewardship Council	SFM	Sustainable Forest Management
GIS	Geographic Information System	SME	Small and medium-sized enterprises
ha	Hectare		
ISO	International Organisation of Standardisation		



1

Mobilisation of wood:
a key issue for the
emerging bioeconomy



1 Mobilisation of wood: a key issue for the emerging bioeconomy

1.1 An increasing need for wood raw material from forests

Forests are the green lungs of our earth, protecting natural cycles and the climate. Trees take up CO₂ from the atmosphere through photosynthesis and bind it in wood. With regional exceptions, wood is one of the most widely available renewable resources. Forests cover approximately 37% of Europe's land base.

Managed forests supply wood for a variety of forest-based products in a sustainable way. Wood is a remarkably versatile material with a wide range of purposes. It is, therefore, an important resource for many industries, such as construction, furniture, pulp and paper, bioenergy and biorefineries (new chemical products). Collectively, these industries are termed the forest-based sector. Forestry represents the initial supply side of various supply chains from the raw timber in the forest up to manifold manufactured products for the consumer.

A lot of research and innovation is leading the way to new bio-based materials, higher value products and value chains, which can replace products based on fossil or highly exploitative raw materials. Construction, packaging, textiles, pharmaceuticals or fuel are just a few examples of the variety of innovative products that can already today be produced from wood and are expected to stimulate growth of the forest-based sector within the bioeconomy¹⁻⁴.

In short, wood is at the same time renewable (natural growth), reusable (conversion in value chains), recyclable (zero waste) and refinable (upgraded products). Producing wood and using wood sustainably is

therefore one of the safest ways to reduce the CO₂ emissions that are the main cause of climate change, notably through the carbon sink effect of growing forests (sequestration), the carbon storage function of wood products (e.g., in timber construction), and the substitution of fossil fuels and energy-intensive, non-renewable materials^{5,6}.

Wood is today a globalised commodity. A constantly growing demand for the raw material wood in European markets has been anticipated by many foresight studies, and is expected to lead to a significant increase in competition in the sector and higher imports into the EU in the coming decades. However, the demand for forest products is increasing globally, notably in fast-growing, emerging economies. This trend shows that the EU forest-based sector cannot rely on increasing imports and underlines the importance of a long-term strategy for domestic resource mobilisation⁷⁻¹⁶.

Mobilising more wood and ensuring its sustainable use is a key factor for the emerging bioeconomy. It is a major opportunity for Europe to reduce the large impacts caused by traditional industries on our environment and develop a greener, more sustainable economy based on one of its most abundant regional renewable resources. The mobilisation of wood involves a multitude of companies and stakeholders along the supply chains from the forest up to the final products. Tangible solutions therefore need to be specifically adapted to the socio-economic conditions, forest types and markets across different regions of Europe.



1.2 Main policy drivers of increasing demand

Besides general demographic trends and the economic growth of the forest-based sector, a multitude of policies and legal actions represent major drivers for stimulating the growing demand for wood. In areas of harmonised EU policy, the Member States have to respect the EU treaty law. Most of these targets have been decided in other policy areas that are not directly related to forests, but will directly and indirectly affect forests in the short and long term. Among these are targets to: reach significant shares of energy produced from renewable sources to reduce greenhouse gas emissions; ensure the legal compliance for wood or forest products that are being imported to the EU; and halt biodiversity loss. Major important policies and actions are:

The **Common Agricultural Policy (CAP)**¹⁷ represents the main source of EU funds for forestry,

with roughly 90% coming from the *European Agricultural Fund for Rural Development (EAFRD)*. Among its main measures is the mobilisation and marketing of forest products (measure B. Bioeconomy including bioenergy). Forestry projects can also be co-financed by other instruments¹⁸; for example, by the *European Regional Development Fund (ERDF)* or the *European Social Fund (ESF)*. It is up to the Member States to decide which forestry measures they implement.

The **New Forest Strategy**¹⁹ proposes an EU reference framework to be used when drawing up sectorial policies that also affect forests. The Strategy highlights that multiple functions of forests need to be safeguarded: forests are not only important for rural development, but also for the environment (especially for biodiversity), for forest-based industries, bioenergy, and in the fight against climate change. The new approach addresses the value chain, i.e., the way forest resources are used to generate goods and services, which strongly influence forest management.



It also stresses the need to take into account the impacts of other policies on forests as well as developments beyond the forest boundaries through a holistic approach.

The **Bioeconomy Strategy**²⁰ addresses the need to develop a more innovative, resource efficient and competitive society that reconciles food security with the sustainable use of renewable resources for industrial purposes, while ensuring environmental protection. It supports enhanced wood mobilisation by defining good practice guidance (blueprints) for resource- and energy-efficient manufacturing and cascade use, targeting especially small and medium-sized enterprises (SMEs).

The **Renewable Energy Directive (RED)**²¹ establishes the overall policy for the production and promotion of energy from renewable sources to decarbonise the economy. The EU has set itself the legally binding target of 20% of total energy consumption coming from renewable energy sources by 2020 (including bioenergy).

Member States are encouraged to establish *National Renewable Energy Action Plans*. Among other actions it calls for greater mobilisation of existing timber reserves and the development of new forestry systems. There are high penalties if Member States do not meet their national targets. The proposed revision (2016) of the RED (still under negotiation) gave a more stringent definition of sustainable mobilisation of resources for energy purposes.

The **Habitats Directive**²² aims to ensure the conservation of a wide range of rare, threatened or endemic animal and plant species, in particular through the EU-wide *Natura 2000* ecological network of protected areas. It sets out the protection regime for habitats and other species at European level and aims at an integrated conservation approach that combines conservation goals with traditional land uses. The type of actions taken for forests is diverse, ranging from forest conservation to innovative ways of merging conservation with economic activities. In



some cases this conservation approach can restrict wood mobilisation by limiting changes in forest management.

The **Biodiversity Strategy**²³ aims to halt the loss of biodiversity and ecosystem services in the EU, which is an enormous challenge with around one in four species currently threatened with extinction. Forests and forestry are addressed directly (Articles 73-78), calling for a reduction in the loss of natural habitats and encouraging the adoption of forest management plans to develop sustainable forest management (SFM).

The **EU Action Plan for Forest Law Enforcement, Governance and Trade (FLEGT)**²⁴ is a trade and industry policy set out to prevent the importing of illegal wood into the EU. Illegal logging has devastating social, environmental and economic impacts, especially in developing countries, causes vast carbon emissions, and fosters poverty and corruption. The overarching ambition of FLEGT is to improve the supply of legal timber and to increase the demand for wood coming from responsibly managed forests. The key concept is to ensure traceability of the wood back to its point of origin. In line with this aim, the *EU Timber Regulation (EUTR)*²⁵ was developed. The EUTR essentially obliges wood importers and traders to know the source of any wood (or forest) product that they are buying, to ensure that it is legally compliant.

It has to be noted that these policies represent a complex set of enabling and constraining factors within a constantly evolving legal and regulatory framework for forest management in Europe. They are thus subject to considerable debate among the representative landowner and forestry organisations, forest-based industries, environmental interest groups and policy makers.

1.3 What does sustainable wood mobilisation mean?

Wood mobilisation comprises all kinds of initiatives and measures leading to harvesting and extraction of wood and woody biomass from

forests. It engages forest owners, forestry professionals and other stakeholders in the forest-based sector. The main purpose is to set up the supply chain from raw timber and residues in the forest towards the industrial transformation into solid material, energy or biochemical uses of wood. Put simply, it includes all activities to obtain wood from forest to use it for human activities. Looking at a tree and its parts, the harvesting can include the trunk, the branches, the stump, dead wood, and even bark, for example, cork.

Sustainable wood mobilisation is a more inclusive concept, which takes into account additional criteria based on extracting large volumes of timber and biomass in a balanced and well managed way that does not harm the forest ecosystem. In Sustainable Forest Management (SFM)²⁶ less wood is harvested than that produced via forest growth. Social and environmental issues are also considered. Furthermore, forest management has to ensure that the forests remain intact as a productive ecosystem. Europe's forest types are mostly in the temperate climate zone and are, therefore, among the most productive ecosystems with a strong annual increment and regeneration capacity.

1.4 The key role of forest owners and wood markets

Forest owners - who are to a large extent private individuals - own the land and the trees. The key decision for wood mobilisation, i.e., whether or not harvesting will take place on their land, ultimately lies in their hands. Forest owners and also the forest enterprises that operate on their behalf, are the main target groups for interventions seeking to increase wood mobilisation.

Today the largest unused potential of Europe's wood resources is 'locked' in *small and medium privately owned forests*, typically defined as properties of less than 200 ha per owner. A large share of forest land is not actively managed due to its fragmented ownership structure. An estimated 16 million private forest owners exist in Europe, of which about two-thirds own forest

areas less than 3 ha. More than half of private forest owners hold only one hectare or less. The area and the number of private forest holdings are still increasing owing to the afforestation of agricultural land and privatisation of formerly nationalised forest land in eastern Europe ²⁷⁻²⁹.

Small, dispersed forest property with difficult access results in high costs for timber harvesting per hectare. The comparatively small amount of harvestable timber represents a low incentive in monetary terms for the single owner. Joint forest management by many owners can make wood mobilisation economically attractive, but it requires strong coordination and hence is only viable if conducted on sufficiently large areas of land. A critical factor is that forest owners often lack the capacity for investment in the set-up of forest management.

Demographic factors also play a role: the number of private forest owners is increasing due to inheritance and continuous division of land property. However, private owners who actively manage their own forest are becoming less important, because younger generations often refrain from working in agriculture or forestry. These *urban forest owners* with more modern lifestyles gradually lose their interest in the land, and the knowledge to manage it ^{30,31}.

In any other market for primary materials and resources, such as fossil energy and mining, or fisheries and agriculture, an increase in demand induces a rather quick increase in supply. Wood production is, however, different. There are a number of reasons for this. First, the forest resource grows and evolves over much longer timescales than economic markets: forestry needs to plan in production cycles of several decades. Secondly, the majority of producers are forest owners who are not professionals, but to a large extent private individuals with other sources of income. Europe's wood production is not concentrated within a limited number of organisations, but scattered across millions of forest owners who have diverse interests situated within diverse ecological and socio-economic contexts affecting tree growth and harvesting.

Wood markets do not react as quickly as other markets. The number of industries working with a certain species or assortment of wood is usually rather small, and a large number of factories are owned by a few groups; therefore, those wood markets often lack transparency and prices do not necessarily follow the increase in demand. Forest owners are not pushed to sell their timber immediately and often prefer to wait until prices rise. Harvesting wood as a raw material resource is a complex activity, because trees are heterogeneous and diverse due to the large number of species and variability of soils, climate and management systems. This makes wood a challenging resource for industrial processing.

Mobilising more wood is essentially about activating forest owners, promoting active forest management according to sustainability principles and stimulating regional wood markets. It has to take account of different forms of ownership and different objectives of forest use decided by a large number of individuals. A key lever for this main barrier is, therefore, to equip forest owners and market actors with the right knowledge and useable tools to establish or enhance sustainable forest management and efficient timber harvesting - on their own, in association with other owners, or entrusted to a third party such as professional foresters and entrepreneurs.

1.5 Sustainable forest management at the enterprise level

Tending, harvesting and regenerating a forest are activities that can last for generations, and hence forestry is an enterprise like no other. This section explains the core features of managing a forest enterprise according to good practice. The following passage can be considered general knowledge for foresters and professionals in the sector. It is, however, important as an introduction for readers from other backgrounds to

understand the special nature of forest enterprises.

As pointed out in the previous section, the majority of forest enterprises in Europe are managed by large number of landowners, who are not professionals, but private individuals owning small parcels of land. One important group are farmers and other ‘traditional’ owners who still live in rural areas and manage their forest on their own, even if it is often only a part-time activity. Another group are urban forest owners with different lifestyles and objectives. Many have lost interest in their land, which is why a large share of this forest land is today not actively managed. Therefore, the adoption of basic, regular forest management practices by previously inactive forest owners can be considered an important outcome for wood mobilisation initiatives.

Sustainable Forest Management (SFM) ²⁶ at the enterprise level is about tending the forest in such a manner that a continuous production of timber is achieved and the long-term integrity of the ecosystem is ensured. To reconcile and manage the economic viability of timber sales with long-term silvicultural planning cycles over decades according to this principle is a challenging task. The core activities of forest enterprises comprise the administration and planning of the forest and the selling of designated harvesting volumes.

Suitable management has to take account of given biophysical conditions, the potential of the current forest stock, a viable silvicultural regime, accessible markets and long-term perspectives for wood and biomass. As the evidence for climate change and its more frequent impacts on forests (e.g., windbreak, droughts, fire, pests and shifts in ecological zones) is increasing, forest enterprises also need to consider suitable adaptive strategies. The basis for taking management decisions is to make use of state-of-the-art planning instruments and the available advisory support for forest enterprises. The main components of such a management system include:

- a. Administration
- b. Forest inventory and monitoring
- c. Forest management plans
- d. Timber marketing
- e. Harvesting techniques and systems
- f. Workers’ competence and safety
- g. Suitable forest access
- h. Alternative products, services and markets

Each of these components is described in further detail in Section 3.1 ‘*Forest enterprise management*’. The main purpose is a professionalisation of the organisational set-up and the managerial capacity of the forest enterprise. Obviously, the forest owners need to have or obtain the relevant knowledge to implement these features. The lack of such knowledge is a common barrier especially in the increasing number of urban forest owners.

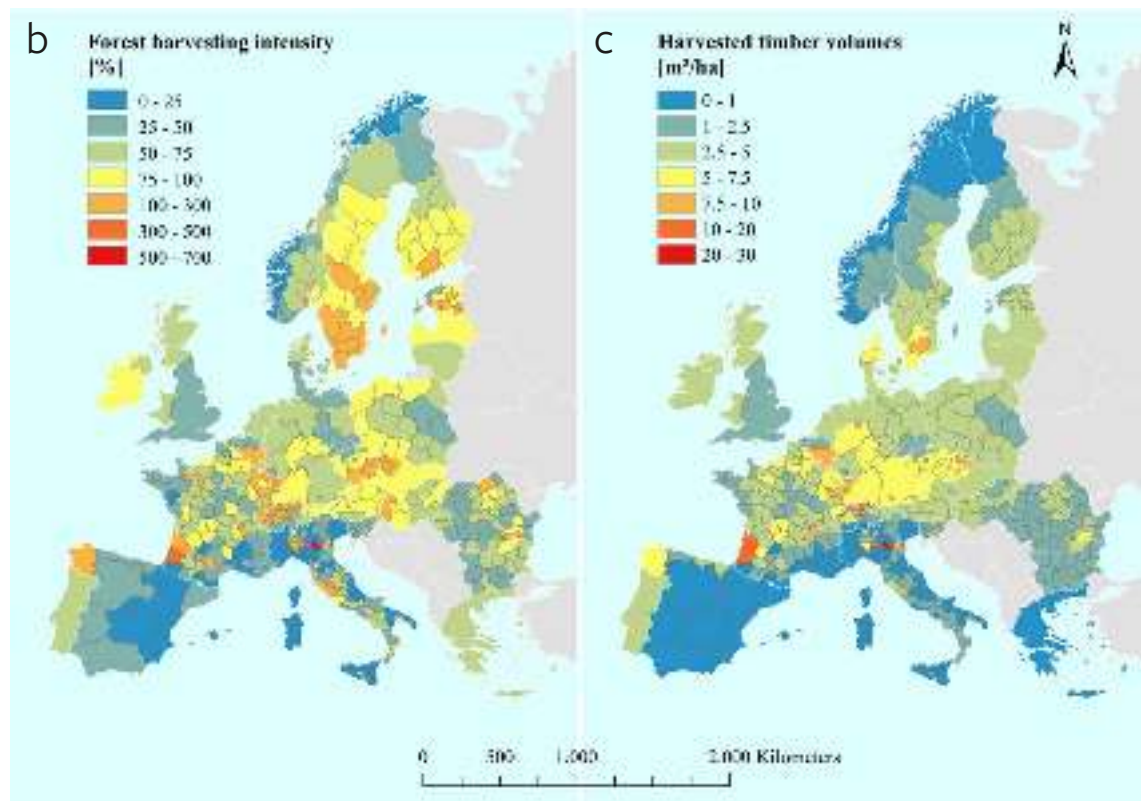
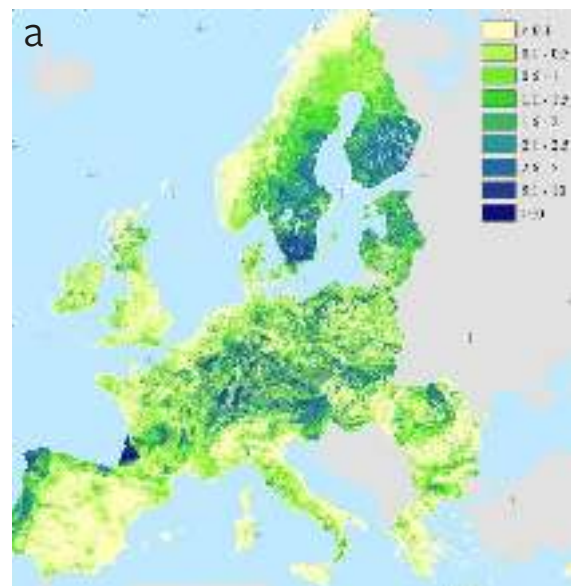


Therefore, Section 3.5 ‘*Knowledge and persuasion*’ collects specific knowledge exchange measures that can support forest owners in acquiring and improving their practical skills and managerial capacity. Especially for small and medium-sized forest enterprises, it is important that a lot of these features can be obtained as a service from professional foresters, forest entrepreneurs or experts.

1.6 Risks for sustainability

Increasing wood mobilisation from Europe’s forests raises concerns for sustainability. The main risks are addressed by the SFM principle, which aims to ensure a responsible, balanced mobilisation of wood.

Figure 1: Wood production in European forests (Verkerk et al. 2015, Lever et al. 2014^{32,33}). a) Predicted wood production in Europe (m³/ha/year) averaged over the period 2000–2010. b) Average forest harvesting intensity (%) and c) Average harvested timber volumes (m³/ha) from 2000 to 2010 in European administrative units (NUTSo-3)



1. Risk of overharvesting

An increase in demand for wood can put significant pressure on forest land and lead to non-sustainable levels of harvesting, which may harm or deplete the ecosystem. Going back in history, deforestation on a large scale occurred in Europe during the 18th century. As a consequence of a growing need for agricultural land to feed a growing population, and the growing demand for timber used in manufacturing, international trade and war (e.g., wood fuel for steam machines, construction timber for shipbuilding, mining, housing), forest cover fell in most countries below 10%. The reforestation of these lands was a major endeavour that led to the foundation of forestry as a systematic, institutionalised form of land management as we know it today, to reduce the risk of deforestation and overharvesting.

Today, the first principle of sustainability established worldwide is, therefore, that the forest area is maintained and ensured through a legal status of ownership. The second main principle is that the level of harvesting of a given area does not exceed its growth rate in the long term. The annual increment is generally expressed as the total volume of timber produced on a given area per year. The balance between the net annual increment and the annual wood felling thus determines the level of sustainable harvest. Most of the best practice guidance for SFM is based on these key principles ^{34(p)}.

2. Risk of declining ecosystem productivity

Forest productivity of a given site under a given climate should ideally be maintained at a constant level, because the forest ecosystem regenerates after harvesting under a sustainable management regime. However, practices that lead to soil erosion can have a considerable negative impact on site productivity. Because a significant proportion of unused wood resources is located in steep areas, it is important that recommendations from soil science ³⁵ are accounted for when mobilising extra resources. Not only soil quantity, but also soil quality (texture, richness and biological activity) should be maintained so that trees can grow well. Especially on poor soils, fine structures of woody biomass (i.e., leaves, needles and bark) contain high concentrations of nutrients

and, therefore, play a key role in maintaining soil fertility in a forest ecosystem.

A general consensus is that these types of biomass are not to be harvested frequently and should remain in the ecosystem. Removing this biomass may reduce productivity and affect the volume and quality of biomass produced per hectare. This effect is very site specific and tree species dependent, but highly relevant on poor soils. There is also evidence that climate change could have a considerable effect on ecosystem productivity (e.g., more frequent droughts can lead to water stress and reduced growth). Management for sustainable wood mobilisation has to consider all these processes when selecting appropriate harvesting method and strategies to secure long-term provision of wood.

3. Risk to other ecosystem services

Besides wood or woody biomass production, forests provide a multitude of other ecosystem services for human beings, some of which are of major importance for forest owners, local populations or society more broadly. In this section, the main ecosystem services are presented along with specific related measures required to minimise the impacts of wood harvesting.

a. Carbon sequestration and substitution.

Global warming is triggered by human-induced emissions of fossil carbon into the atmosphere. Trees are natural factories: a beech tree of about 70 years and with a 15 m crown diameter fixes around two CO₂ net kg per hour for 12 hours a day. Through photosynthesis, trees are removing CO₂ from the atmosphere, so growing forests is an active contribution to climate protection. Using and storing wood (e.g., in construction of houses) is also an active contribution to climate protection because it substitutes fossil fuels and energy-intensive materials. One cubic metre of wood stores approximately one tonne of CO₂. Using wood-based fuels for energy instead of fossil fuels also has a positive impact on climate, as long as forests are regenerated.

b. Soil protection. Forests cover roughly 30% of Europe's land area and protect a large diversity of natural soil ecosystems, which is another



major factor for climate protection. Active soil protection through management is mainly an issue on steep terrain or in terrain prone to any kind of erosion such as dunes. Appropriate measures comprise site-adapted machinery (e.g., harvesters with special low-impact tyres, cable or crane logging systems), silvicultural systems aiming at continuous canopy cover or limited gaps during harvesting, and fostering natural regeneration in ageing forest stands.

c. Watershed protection. Forests are crucial for the protection of water catchment areas on the landscape level. They store, purify and control water flows and play a key role in the balance of the water cycle. Trees covering slope areas slow down runoff water significantly, so they are especially important for the mitigation of

floods and landslides. Active management needs to avoid the release of soil matter (erosion) and the release of pollutants (e.g., fuel, oil, chemicals) into rivers and streams. Solutions include, for example, zoning of sensitive areas prevented from harvesting, use of appropriate low-impact harvesting machinery, appropriate period and timing of harvesting (dry or frozen soils), and use of appropriate thinning regimes that ensure a minimum remaining vegetation cover for protection.

d. Habitat protection. Forests are a main reservoir of Europe's biodiversity, protecting various natural landscapes and endangered species. The number of forests where environmental regulation forbids any harvesting is limited, but for most forests, adapted forest management and harvesting practices are recommended to ensure habitat



protection. Such measures include for example defined harvesting periods with minimal disturbance of fauna, consideration of the floristic lifecycle and water regime in forest operations planning, ensuring that a sufficient amount of old trees and deadwood remains in the forest, and active conservation of ecologically valuable sites in forest.

e. Social functions. Forests serve human society in multiple ways. Besides their productive functions, they also provide natural landscapes and green infrastructure in urban environments that benefit human health and well-being. They offer areas for leisure, tourism, outdoor sports and environmental education. Forests also provide a vast diversity of so-called NWFPs³⁶, for example venison, forest fruits, mushrooms, nuts, oils or resin. Hunting, the collection and processing of NWFPs and the various other human uses of forest are also an important economic factor, creating employment, notably in rural areas.

SFM needs to pay attention to all of these ecosystem services and needs to be carried out in a way that does not disrupt their continuity of supply. When taking decisions about harvesting

wood, the impacts of these actions on other forest functions have to be considered carefully. The main goal is to balance economically viable wood mobilisation while ensuring the ecosystem's long-term integrity.

1.7 Concepts and definitions used in the handbook

This handbook outlines a wide range of measures that can influence wood mobilisation for the benefit of forest owners, practitioners and policy makers in the forest-based sector. It gives a broad overview of measures that have the potential to be applied on a wider scale to improve wood mobilisation in Europe. Therefore, the handbook is also useful as an introduction for readers who are interested in wood and biomass and who have a different background, for example, in biochemistry, new materials or renewable energies.



The main target groups for the wood mobilisation measures described in the handbook are forest landowners, public and private forest managers and forestry entrepreneurs; i.e., the people who are actively managing the land and harvesting the forest. A second target group are the decision-makers defining the legal framework for these activities. These groups are the intended users of the solutions and who will apply them for their own purposes in their region. In addition, other actors engaged in the supply chains from forests are addressed, such as forest-based industries, traders, network organisations, public agencies, consultants, advisors and trainers.

This handbook represents a novel attempt to understand the causes and consequences of wood mobilisation solutions at European level in a systematic manner. The SIMWOOD project carried out a broad survey of existing solutions in 17 European model regions³⁷, which are representative of the EU forest sector as a whole. The survey was complemented with relevant literature and expert knowledge, also considering various previous studies^{38–40}, expert groups^{41,42}

and other publications on the topic⁴³. A common framework was developed to assess and organise the large variety of initiatives and projects for wood mobilisation in Europe (see Annex 6.4). The concept is built on the following components:

- **Barriers** are conditions that inhibit the development and uptake of effective solutions for wood mobilisation. They are foremost determined by a specific set of forest resources, markets and governance conditions in a region, often related to structural disadvantages or a lack of usable knowledge by the actors.
- **Measures** are targeted actions to implement a specific solution, which can be understood as a set of knowledge, techniques and/or a governance approach that improves the conditions for wood mobilisation. These typically comprise public programmes, regional initiatives, specific knowledge exchange activities, R&D projects and dedicated solutions at the enterprise level.

Table 1: Main groups of barriers and measures for wood mobilisation in Europe

	<p>1. Forest resource / enterprise</p>	<p>This group comprises structural and managerial barriers at the level of the forest stands and forest enterprises. They describe disadvantages associated with the actual forest resource or management situation, and are often perceived by the landowners and forestry professionals as the main 'problems' that impede wood mobilisation.</p>
	<p>2. Regulatory and legal framework</p>	<p>This group relates to laws and regulations according to national or regional legislation that define how forest management is practised in the regions and can pose barriers to wood mobilisation. The measures within this group include new legal frameworks which facilitate mobilisation actions.</p>
	<p>3. Financial and material inputs</p>	<p>This group refers to barriers at the regional level that result in high transaction costs for active forest use. The measures are mostly financial incentives implemented by government or public actors and can positively influence the financial viability of forest use and leverage potentials for mobilisation.</p>
	<p>4. Organisation and cooperation</p>	<p>This group relates to managerial and governance barriers of forest enterprises that impede active management and cooperation. The proposed measures typically encourage the formation of groups of forest owners, supported by forestry professionals. The measures enhance competitiveness through joint actions and cooperation.</p>
	<p>5. Knowledge and attitudes</p>	<p>This group includes all barriers related to a lack of knowledge about or opposing attitudes towards available solutions held by local landowners and practitioners. The types of measures comprise a diverse range of supportive knowledge exchange and innovation activities.</p>

A long list of specific barriers and measure types was identified during the survey of the SIMWOOD model regions. To structure this complexity, the barriers and measures are organised into five thematic groups (see Table 1).

The types of measures are defined in response to certain barriers; for example, building a new forest road is the appropriate action required to improve access to a forest area for harvesting. However, the relationship between measures and barriers is complex:

- *One barrier can be addressed by different measures*, e.g., a fragmented ownership structure can be improved through the creation of a forest owners' association, or a cooperative, or through a land consolidation procedure (these measures differ in the extent to which they transform private ownership).
- *One measure can address several barriers*, e.g., the foundation of a forest owners' association does not only address fragmented landownership, but it is also a suitable means to overcome

insufficient skills and knowledge of owners (by offering advice to its members) or insufficient cooperation in the supply chain (by becoming a sizeable partner for wood industries).

- *Measures can integrate other measures, and can address barriers within other thematic groups*: especially if a measure has a broader scope (e.g., by setting up a regional initiative, a cluster organisation or an R&I project) it usually builds on several other more specific actions (e.g., training and outreach activities or dissemination tools), and thus responds to several barriers belonging to various groups.

In the following chapter, we provide a brief overview of the different types of barriers. Chapter 3 then describes the different groups and classes of measures, which are illustrated through selected practice examples from various countries in Europe. Chapter 4 summarises the main lessons learnt in the SIMWOOD project and presents recommendations for policy development and further research in Europe.



Barriers to wood mobilisation in Europe



2 Barriers to wood mobilisation in Europe

Barriers are any conditions that inhibit the development and uptake of effective solutions for wood mobilisation and active forest management. They are mostly determined by a specific set of forest resources, markets and governance

conditions of a region, often related to structural disadvantages or a lack of usable knowledge by the actors. Table 2 provides a systematic overview of barriers categorised into the five main groups identified in the previous Chapter.

Table 2: Classification of barriers for wood mobilisation in Europe



B1. Forest resource barriers

- B1.1 Steep or difficult terrain
- B1.2 Forest resource characteristics not matching market demand
- B1.3 Inefficient harvesting techniques and practices
- B1.4 Sustainability concerns and climate change impacts



B2. Regulatory and legal framework

- B2.1 Lack of enabling legislation for ownership
- B2.2 Restrictions for productive forestry
- B2.3 Lack of enabling legislation for cooperation
- B2.4 Other regulatory and legal barriers



B3. Finances and material inputs

- B3.1 Access to forests or markets limited by poor infrastructure
- B3.2 Unfavourable working conditions and labour market
- B3.3 Lack of access to capital and other inputs



B4. Organisation and cooperation

B4.1 Land ownership barriers

- B4.1.1 Small-scale owners and land fragmentation
- B4.1.2 Urban, distant or disconnected forest owners

B4.2 Cooperation barriers

- B4.2.1 Insufficient cooperation of forest owners
- B4.2.2 Insufficient cooperation within supply chain

B4.3 Market barriers

- B4.3.1 Weak markets for forest products
- B4.3.2 Lack of market recognition for quality products
- B4.3.3 Major market fluctuations & disruptions



B5. Knowledge and attitudes

B5.1 Knowledge and skills barriers

- B5.1.1 Insufficient advisory capacity
- B5.1.2 Insufficient forest management skills
- B5.1.3 Insufficient forest management and silvicultural knowledge and planning
- B5.1.4 Insufficient business, marketing and cooperation knowledge

B5.2 Attitudes and values barriers

- B5.2.1 Disinterest or opposition shown by forest owners for non-financial reasons
- B5.2.2 Disinterest in forest-related careers for non-financial reasons
- B5.2.3 Disinterest among public or stakeholders or politicians

B5.3 Research & Innovation (R&I) barriers

- B5.3.1 Lack of accessible evidence or critical information
- B5.3.2 Potential technological solutions not yet developed and tested

Source: own concept

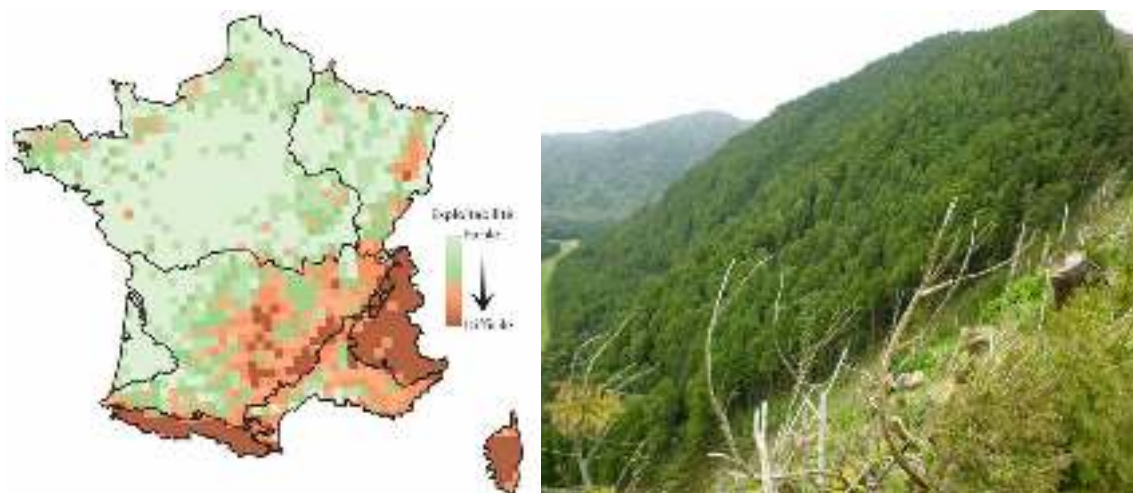


Figure 2: Forest harvesting accessibility map of France based on a combined index of distance to roads, slope level and soil properties (IGN 2012 44), Forest on steep terrain (EFIATLANTIC).

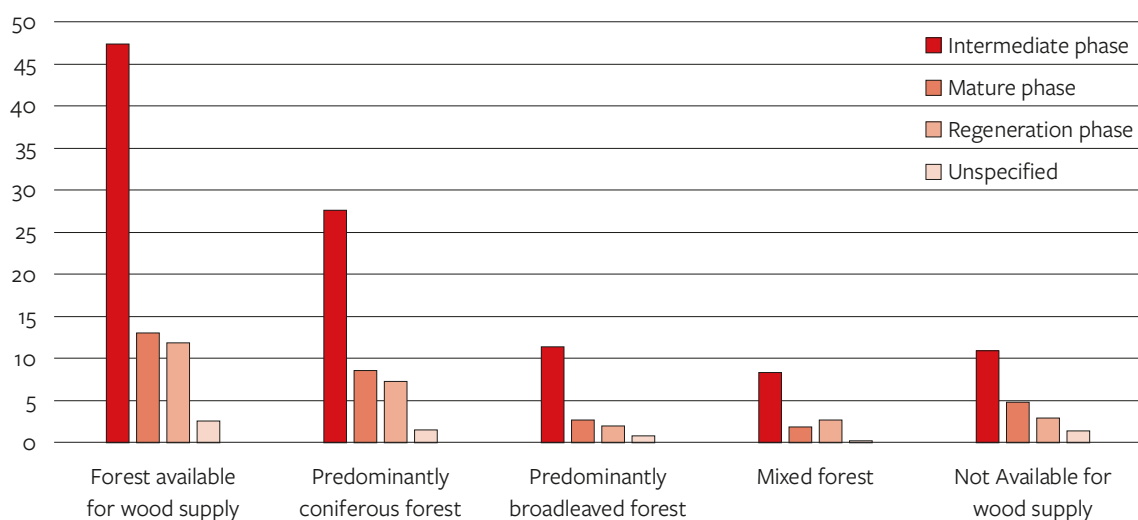


Figure 3: Forest area (million ha) in Europe per type of forest and development phase (age class of even-aged stands), 2010. Mature phase are stands older than 90% of recommended rotation age. Regeneration phase are stands between 0 and 20% of recommended rotation age. Only countries with available reporting (Forest Europe SoEF 2011, Indicator 1.3A⁴⁵).

2.1 Forest resource barriers

This group comprises structural and managerial barriers related to a particular forest area, (e.g., the forest stands belonging to one forest property) which may completely impede active forest management in that area and thus effective wood mobilisation.

B1.1 Steep or difficult terrain. The topography of a forest area is a decisive factor for forestry. Harvesting of forest on steep slopes or

other terrains with difficult access is costly and requires special knowledge. In general the level of harvesting in such areas is considerably lower than on flat terrain. For this reason, a large share of Europe's unused wood resources is located on this kind of terrain.

B1.2 Forest resource characteristics not matching market demand. The current condition of a forest is the result of interventions over many years by previous generations of forest owners and foresters. Tree species composition, tree age distribution and timber quality

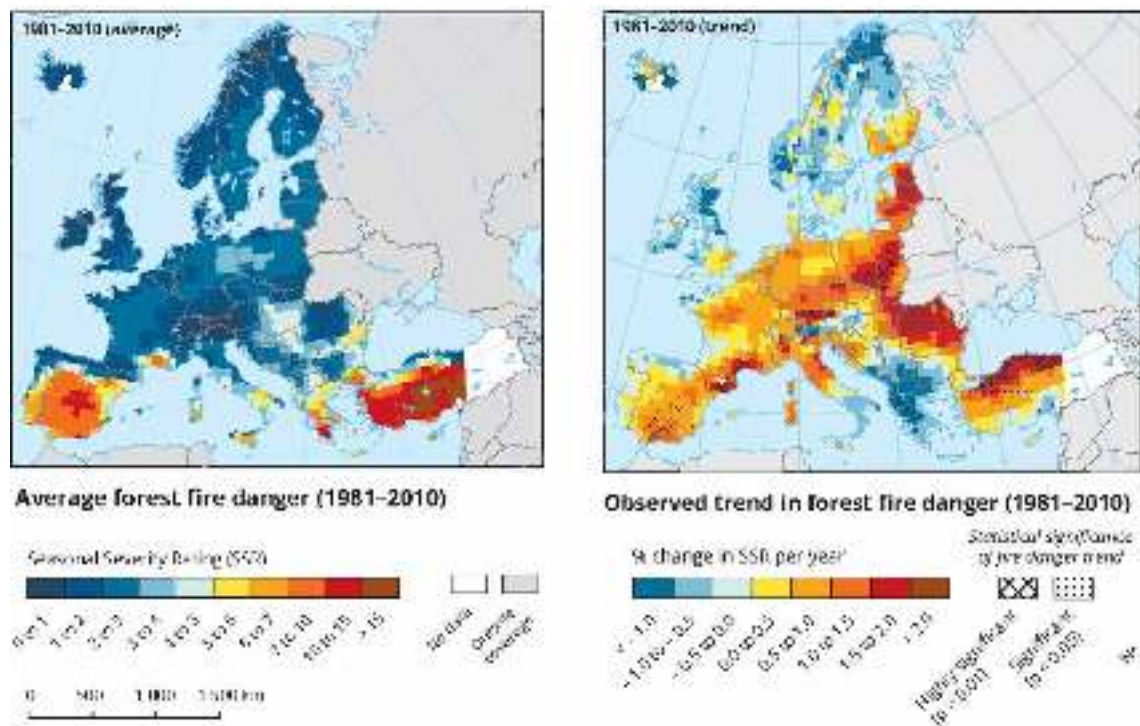


Figure 4: Forest fire danger map of Europe: trend is increasing in Southern and Eastern Europe (EC 2016 ⁴⁶)

are among the basic characteristics of a managed forest area. They are the result of specific site and growth conditions related to the forest ecosystem (e.g., soil, climate and forest genetics) and management. Together, these factors determine how much timber is harvestable. Major barriers to wood mobilisation comprise forest resources that do not correspond to the demand from accessible wood markets forest stands that are not yet mature for harvesting or that hold insufficient timber of a certain quality.

B1.3 Inefficient harvesting techniques and practices. There are many ways of managing forests and harvesting wood, each of which has a direct influence on mobilisation costs and wood prices. Inappropriate choices of infrastructure design or harvesting techniques can increase the costs of timber extraction and discourage harvesting, even if marketable timber stocks are available. Modern knowledge and equipment for mechanised harvesting - which can significantly increase the productivity of harvesting processes and the safety for workers - is not yet widespread, especially among small owners, and thus can be a major barrier to mobilisation.

B1.4 Sustainability concerns and climate change impacts. The concern among forest owners or forestry professionals about the risk of forest ecosystem degradation as a result of increased harvesting levels can also be a barrier to wood mobilisation. These limitations are not legally bound, but are established *de facto* on forest lands, for example, by owners who are concerned about soil compaction and nature conservation. Furthermore, forest vulnerability to diseases, pests, forest fires or storms is increasing as a result of climate change. More frequent occurrence of environmental impacts reduces forest stability and the amount of available timber for harvest.

The types of forest resource barriers described above are often conceived as the main 'problems' by the local forest owners and foresters. Most of them are linked to barriers within the four other thematic groups, which are in fact easier to address. For example, foresters might identify 'steep slopes' as the fundamental barrier to wood mobilisation. However, this problem cannot be resolved directly, and it may be more helpful to understand the underlying barriers as

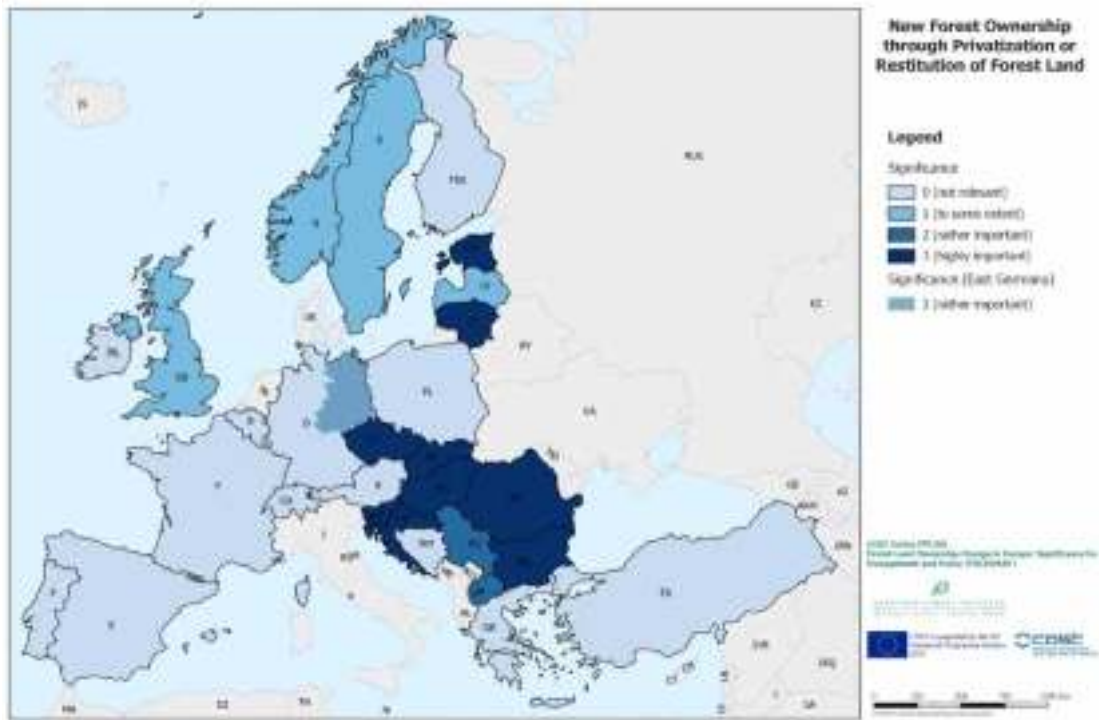


Figure 5: New forest ownership through restitution or privatisation of forest lands (COST action FACESMAPS 2015³¹).

'lack of access to capital' or 'insufficient advisory capacity', which can be more readily resolved through intervention. For this reason, we have not identified any measures associated with 'forest resource barriers', because they typically belong better to the other four thematic groups.

2.2 Regulatory and legal barriers

This group relates to laws and regulations according to national or regional legislation, which define how forest management is practised in the regions. While regulations are put in place to ensure common rules and standards for good forestry practice, the complexity of different regulations that forest enterprises have to comply with can increase transaction costs and pose a significant barrier to active, productive forest management.

B2.1 Lack of enabling legislation for active ownership. This class comprises laws on ownership and inheritance which permit a further

increase in land fragmentation between isolated owners, or which discourage the improvement of forest property. Small-scale ownership structures have been identified as a key challenge to wood mobilisation across much of Europe. Inheritance practices can lead to a further division of forest property among heirs, and the legal framework is not adapted to mitigate this effect.

B2.2 Legislation and regulations restricting productive forestry. This class comprises laws and regulations, which set effective restrictions and/or induce high costs or uncertainties for productive forestry. They include, for example, limitations on the use of chemical pest control on forest land to avoid contamination of soils and water, obligations for environmental impact assessments (EIAs), or restricted use in designated areas for nature conservation and habitat protection. An important general barrier especially for small enterprises is the heavy bureaucratic burden ('red tape') that results from the complex regulatory framework for forestry.



B2.3 Lack of enabling legislation for effective cooperation. This category refers to legislation which is not conducive to cooperation in forest management and markets or which encourages individual operations. Cooperation between individual private owners (e.g., within associations or other forms of local organisations) is often informal, whereas being an active market actor requires a clear legal basis. Enabling legislation is a necessity if the formation of functioning collaborative groups of owners is to be facilitated.

B2.4 Other regulatory and legal barriers. This class refers to laws and regulations which set restrictions and induce high costs or uncertainties for transport, markets and trade (import/export). Transport of the heavy raw material wood is a major cost factor; therefore national legislation that sets limits for the weight of timber trucks has a decisive impact. Tariffs on forest products are a key factor shaping the international import and export markets of the EU forest-based sector. Import taxes or quotas on EU forest products are effectively protectionist subsidies for rival goods, and taxes or bans on timber exports into the EU can be a limiting factor for raw material supplies, further restricting the market potential. Regarding competitiveness, legal requirements for health and safety of workers differ largely between countries, and can be

an important cost factor. Lastly, forest health regulations, especially phytosanitary measures to prevent the spread of pest organisms across country borders through quarantine, are necessary, but they can significantly limit wood mobilisation and transport.

2.3 Financial and material barriers

This group refers to barriers related to infrastructure and material inputs mostly at a regional level, through which forest enterprises encounter high transaction and operational costs for active forest use.

B3.1 Poor road infrastructure to access forests or markets is one of the most important, widespread barriers across Europe. A lack of a functional road network for trucks and equipment makes wood mobilisation costly and inefficient, and can completely inhibit the exploitation of a potential useable wood resource in a given area. Building forest roads requires expensive operations, especially if the topography and environmental conditions are challenging. The proportion of forests that lack access are significant e.g., 9% in Bavaria, Germany, and 16% in Catalonia, Spain ³⁷).





B3.2 Unfavourable work conditions and labour market in forestry.

Salaries and wages are typically lower in wood industries and forestry compared to other sectors. Female wages continue to be significantly lower than male ones. Migration, the increasing age of active forest owners, and the disinterest of the younger generation in forestry reduces the available labour force in many parts of Europe. The lack of a sufficient number of adequately trained workers, skilled entrepreneurs, harvester operators and harvesters is a major bottleneck for increased wood mobilisation ⁴⁷.

B3.3 Lack of access to capital and other inputs.

Forest owners and forest entrepreneurs require capital for the purchase of land, equipment, supplies and facilities to ensure and enhance wood mobilisation. A lack of investment capacity is a widespread barrier among forest owners, contributing to the low level of management. In particular, small-scale forest owners are often poorly equipped and are unable to invest in proper equipment. Investments are also needed to develop and promote new products or technical innovations.

2.4 Organisation and enterprise barriers

This group comprises managerial and governance barriers in forest enterprises which are related to the main issues of fragmented ownership, lack of cooperation and undeveloped markets.

B4.1 Land ownership barriers

B4.1.1 Small-scale ownership and land fragmentation.

Fragmentation is one of the most common barriers, particularly in private forests owned by individuals or families (often termed non-industrial private forest owners, NIPF). An estimated 16 million private forest owners exist in Europe, two-thirds of which own forest areas less than 3 ha. A majority of owners hold only around 1 ha of land or even less. Forest management is challenged by forest land fragmentation due to small size of property, unfavourable spatial shape of property (long and thin parcels), unclear borders, division into dispersed land parcels, unclear or complicated ownership forms (communities of heirs), private patches



Figure 6: Typical small-scale ownership structure of private forest lands in a rural area of France. Land parcel boundaries and numbers are shown in yellow on top of an aerial photograph. Such fragmentation patterns of private forests can be found in many European countries (Picture from Geoportail.gouv.fr, 2017).

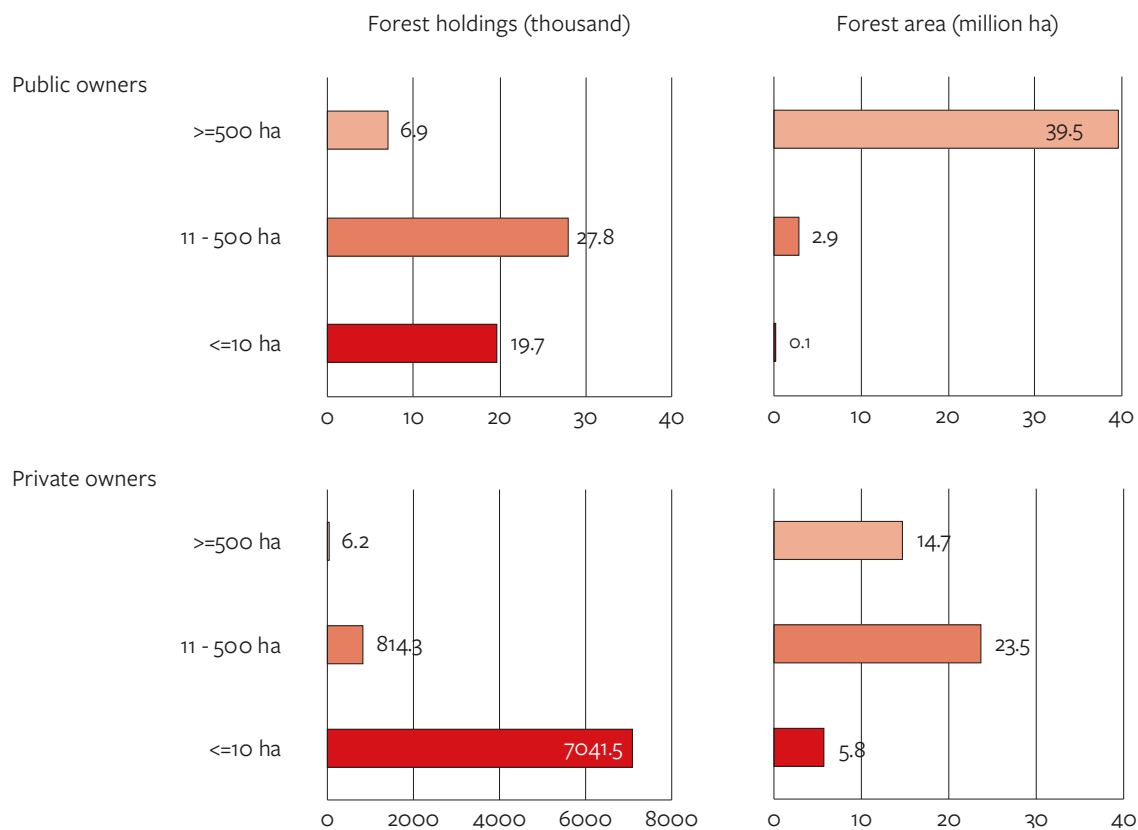


Figure 7: Forest holdings and their forest area in Europe per size classes, 2010. Only countries with available reporting (Forest Europe SOEF 2011, Indicator 6.1C ⁴⁵).



interlocked with other ownership types, and less developed access. Fragmentation is therefore a key challenge for wood mobilisation ^{27,28,48}.

The historical origin of fragmentation can be linked to the conversion of proprietary systems for common land during the intensification of agriculture at the end of the 19th century. In many regions, forests owned by communities were divided among the citizens who obtained private land rights. This was often executed following a rigid scheme, by literally dividing the land on the map with a ruler. Over the generations, these small land parcels were then further divided. The traditional partible inheritance system, which demands that property should be divided as equal shares among the heirs, is the unfavourable reason why fragmentation is still increasing today.

This barrier is especially significant in Western European regions with partible inheritance traditions, and in some Central and Eastern European countries, where the number of private owners is increasing as a result of ongoing restitution and privatisation processes ^{29,49}. Many SIMWOOD model regions also reported fragmentation of ownership as a main concern: 63% of private forest owners in Slovenia, 52% in Bavaria, Germany, and 52% in Catalonia, Spain, own less than 1 ha ³⁷.

B4.1.2 Urban, distant or disconnected forest owners.

The exodus from rural areas, modern lifestyles and the adoption of new occupations by forest owners are causes of a growing ‘disconnection’ of the latter from their forest land. This growing spatial and emotional detachment also leads to an increasing lack of forestry knowledge and skills among such owners, who seldom know how to manage their forest and who to ask for help. A particular problem also arises for ‘new’ forest owners in regions where large-scale afforestation has taken place in recent years on private farmland, like, for example, in Ireland and Portugal ^{30,31}.

B4.2 Cooperation barriers

B4.2.1 Lack of cooperation among forest owners.

Forestry operations can be carried out more efficiently when implemented simultaneously across larger areas, leading to reductions in harvesting costs and pre-treatment and transport of timber. However, forest owners have a diverse range of objectives for their forests, and building trust and effective cooperative groups is not always an easy task. In fragmented forest holdings, mobilisation can only be carried out through some form of cooperation between landowners.

B4.2.2 Lack of cooperation in the supply chain. Cooperation is also required between supply chain actors or regional stakeholders to achieve a critical mass for larger contracts for forestry services, harvesting operations and wood supply. This barrier involves a lack of trust and cooperation between forest owners, forestry professionals, wood processing industries and other clients, as well as poorly developed communication and logistics, or simply a lack of any industrial organisation in a region. A missing link in a regional supply chain is often the reason why wood processing plants sometimes only tap into a limited proportion of the local forest resource.

B4.3 Market barriers

B4.3.1 Weak or lack of markets for forest products. Insufficient demand or capacity from regional wood processors and consumers (e.g., sawmills, panel producers, biomass boilers) or wood traders can be a limiting factor for mobilisation. Given the diversity of potential uses for wood, it has to be noted that the demand for a forest product is often specific to a certain tree species and wood quality: in a regional context, one segment of the wood market might be characterised by a low demand and unused supplies, while another segment might show a high demand leading to a regional shortage of supply.

Europe's wood processing industries and related markets depend primarily on softwoods (i.e., wood from coniferous tree species like spruce or pine) and regions might face a low demand if they cannot supply a certain requested quality (e.g., areas with large areas of young or unmanaged forest). However, a large share of the available unused forest resources are in fact hardwoods (i.e., wood from broadleaved tree species like oak, beech or birch), which currently encounter a very low market demand owing to a lack of application in end-user products, and therefore are not fully integrated into industrial processing.

B4.3.2 Lack of market recognition for quality products. This barrier describes a situation where a specific forest product of high value is potentially available, but is not sufficiently developed and marketed to the point where it is recognised by customers, and hence lacks demand.

Premium prices paid for products of high quality, which are also produced sustainably, can be a decisive lever to initiate additional mobilisation, yet this can only work if the market responds to this offer. This barrier is common to hardwoods.

B4.3.3 Major market fluctuations and disruptions. Wood markets have become increasingly globalised, which also makes them more sensitive to price competition on different scales. Market conditions for traditional forest-based industries are also changing due to the emergence of new market players who are competing for the same raw material, (e.g., bioenergy and bio-fuels). International trends in demand or trade competition can have strong impacts on regional markets. Furthermore, catastrophic events like storms, forest fires or severe droughts can also lead to major fluctuations, because a sudden surplus, or conversely a lack of marketable timber, disrupts the usual price development. Such events can affect several regions in Europe simultaneously, depending on the scale of the events, due to the interdependencies across regional wood markets.

2.5 Knowledge and attitudinal barriers

This group includes all barriers related to the accessibility of knowledge about, potential solutions, and negative attitudes towards those solutions or towards wood mobilisation itself, held by local land owners and practitioners.

B5.1 Knowledge and skills barriers

B5.1.1 Insufficient advisory capacity. This barrier addresses a lack of, or decrease in, institutional capacity to understand local barriers, disseminate relevant knowledge and offer professional guidance, consultation and training to private forest owners. Various organisations such as public institutions, forest owner associations, non-government organisations or private consultants offer advisory services to forest owners (in some countries this used to be, or still is, an official duty of the state forest service). While some countries have developed good technical



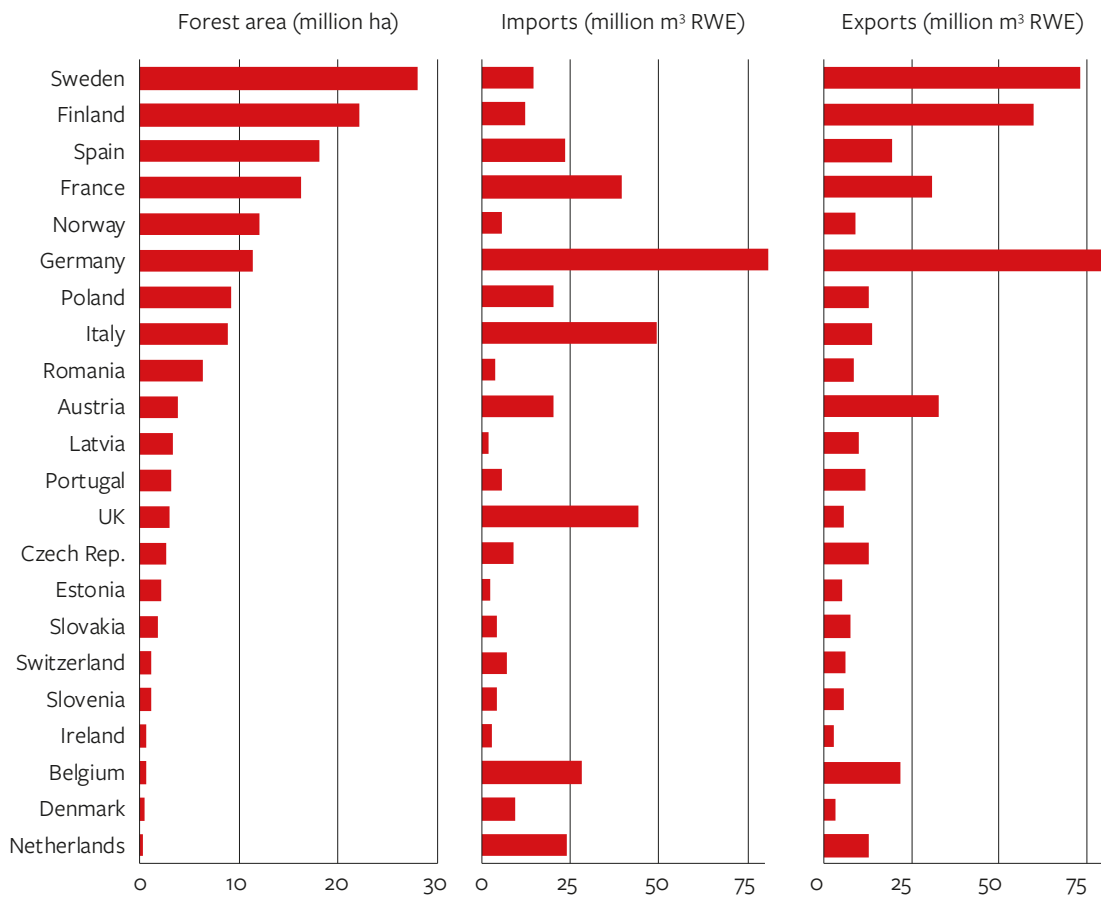


Figure 8: Forest area, forest products imports and exports in European member states. Only countries with available reporting (Forest Europe SOEF 2011, Indicators 6.8A&B ⁴⁵).

advisory networks, such dedicated institutions and services are completely unknown or new to other countries. However, public budget cuts, on-going restructuring of organisations or termination of project-based funding often mean that advisory capacities are diminished or discontinued. Furthermore, the established mechanisms are seldom effective when engaging with the heterogeneous group of urban forest owners.

B5.1.2 Insufficient practical skills for forest management. Many forest owners today have less of the basic practical knowledge required for forest management and forestry operations; for example, how to select the most suitable trees for harvesting; how to use a chainsaw and carry out the tree felling and removal safely and efficiently; how to qualify and divide stems into marketable assortments; or how to plant new trees and carry out basic thinning or tending of forest stands. This barrier also relates to skilled forest

owners who have specific knowledge gaps in important fields, such as how to avoid damage to the remaining trees during harvesting. In particular, the group of new or urban private forest owners, who are no longer working on a regular basis in agriculture, have fewer of these practical skills. These gaps in basic knowledge among forest owners, as well as a shortage of skilled forest workers and entrepreneurs, are an important bottleneck for increased wood mobilisation.

B5.1.3 Insufficient forest management and silvicultural knowledge and planning. This barrier addresses a lack of more advanced forestry knowledge among forest owners or specific knowledge gaps in important fields. Experienced forest owners can have deficits of specific knowledge, such as how to harvest a specific forest type, work on steep terrain or reduce impacts on soils. A more general problem can be a limited understanding of forest management options



and long-term strategies, which take into account costs, benefits, risks and impacts on forest functions; for example, which tree species, provenances and silvicultural systems impede or diminish wood mobilisation. Owners who lack general forestry knowledge may also not understand the benefits of a sufficiently detailed forest management plan; they may see it more as an expense or imposed obligation, rather than a long-term investment in their property. Several SIMWOOD regions indicated a low proportion of private forests under management plans (e.g., 15% in Bavaria, Germany, 15% in Auvergne, France and 27% in Catalonia, Spain ³⁷).

B5.1.4 Insufficient business, marketing and cooperation knowledge. This barrier concerns insufficient knowledge and experience among forest owners of business relations, marketing (e.g., prices, trends, accounting, quality control, breakouts, energy-wood assortments), access to inputs (e.g., capital, equipment, facilities, labour, supplies, advice) and cooperation with business partners in the supply chain. It is also linked to the fact that small-scale private forest owners often share a view in common with society in general that forests are a romantic, natural legacy passed on by our ancestors, and should not be associated with any kind of economic interest. A lack of knowledge can also contribute to a lack

of trust between woodland owners and forestry professionals.

B5.2 Attitudes and values barriers

B5.2.1 Disinterest or opposition of forest owners for non-financial reasons. Forest owner commitment (or opposition) to wood mobilisation depends partly on their personal objectives. As a very heterogeneous group, private forest owners show a range of different social, cultural and ecological motivations and attitudes towards forest use in general, and harvesting of trees in particular. A lack of trust in public authorities or industries, conservative attitudes towards co-operation with other owners, or romantic views of nature are common and can be a major constraint on the initiation of wood mobilisation partnerships. This barrier can be linked to the increasing spatial and emotional detachment of owners from their forests, the lack of forestry knowledge and also the decrease in advisory capacity.

B5.2.2 Disinterest in forest-related careers for non-financial reasons. Despite an increasing interest by the younger generation in green jobs, the low attractiveness of forestry jobs is partly a consequence of presumptions and, at times, wrongly informed opinions about the role of forests in the economy, or about the job itself. Forestry or forest-based industries are in general



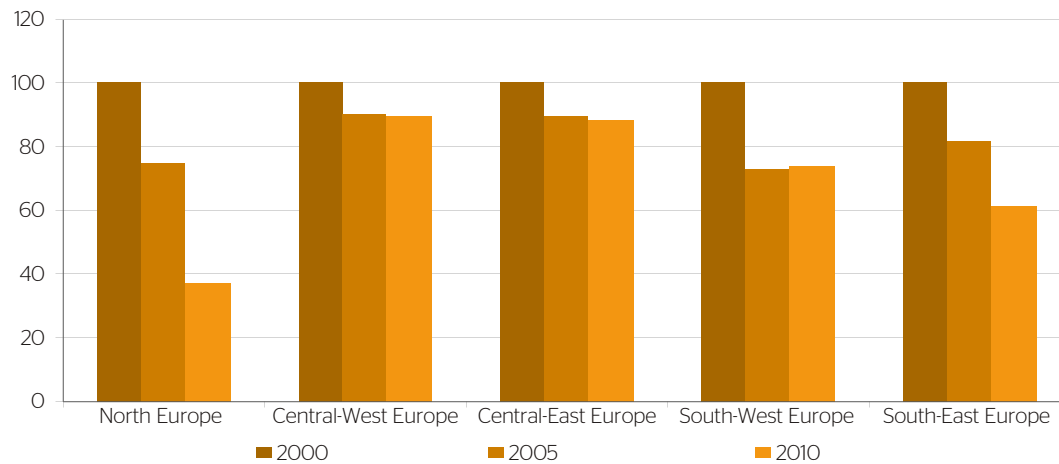


Figure 9: Trend of occupational accidents in forestry in European regions, 2000 to 2010. Frequency per region expressed as percentage of the reference year 2000 = 100%. Only countries with available reporting (Forest Europe SOEF 2011, Indicator 6.6 ⁴⁵). National reports on Joint FOREST EUROPE/UNECE/FAO Questionnaire on Pan-European Indicators for Sustainable Forest Management - Quantitative indicators

not imagined as a modern, innovative career opportunity. Forestry operations are often wrongly perceived as difficult and dangerous, with the assumption that there is a lack of health and safety regulations.

B5.2.3 Disinterest among the public, stakeholders or politicians. This barrier relates to insufficient political will and support for, or even opposition towards, the forest-based sector, partly as a consequence of public perceptions, which have too often been negative or contradictory, and wrongly informed. Public perceptions of forestry are often focused on environmental aspects, aesthetics, recreation, animals, or bad practices communicated in the media, and arguably they neglect or underestimate the positive economic, environmental and social contribution of the forest-based sector. Some policy makers appear to consider forest as a permanent component of the landscape that will always remain without requiring any specific effort. These perceptions influence laws and regulations, private property rights, the profitability of forestry, and the availability of timber and competitiveness in a global market ^{50,51}.

B5.3 Research and Innovation (R&I) barriers

B5.3.1 Lack of accessible evidence or critical information. This barrier describes a lack

of the science-based data and knowledge that is necessary for wood mobilisation actions (e.g., inventories, land registers and cadastres, mapping, surveys, decision support tools for forecasts, cost and impact assessments and evaluations). Transparent, proven information is key for effective decision-making and to the development of trust in business relations. Specifically in forestry, the required evidence can relate to many relevant domains (e.g., ecology, ownership, legal, technology, socio-economics, and business management). Specific research and innovation actions can close such knowledge gaps.

B5.3.2 Potential technological solutions not yet developed and tested. This barrier addresses a lack of applied research, testing and market development of available innovative solutions of high relevance for the sector. The required data and knowledge may be in principle accessible, but the solutions have not yet reached their full development cycle. This especially relates to innovations in other fields, such as IT, logistics or automation, which need to be adapted to forestry. Further research and innovative actions at higher technology readiness levels are needed, for which the appropriate management of intellectual property rights is required. ⁵²



3

Measures and actions to improve wood mobilisation in Europe



3 Measures and actions to improve wood mobilisation in Europe

Measures are targeted actions, which can be understood as a set of knowledge, techniques and/or governance approaches that is capable of lifting the barriers described above. While all measures aim to benefit the individual forest owner or enterprise, most are more effective when targeted at a larger group of forest owners or enterprises. Many measures also have wider positive effects on society. The different types of measures presented here have been implemented with success in several European regions which were studied as preparation for this handbook, and are therefore also considered potentially suited to improve the conditions of wood mobilisation in other regions of Europe.

The range of measures can be understood as a collection of ‘building blocks’, several of which could be combined to form a larger integrated solution. This can be, for example, a regional initiative, which enables the main target groups such as forest owners, forest managers and forest entrepreneurs to take action and collectively improve their forest management and timber harvesting in the context of a regional development programme or public support scheme.

The SIMWOOD pilot projects (see Section 6.3) include examples of such coordinated knowledge exchange actions targeting local forestry stakeholders, combining sets of measures in a given context of barriers. Their results were documented and evaluated following a common approach, and can be accessed through the SIMWOOD Information System (see also Section 6.5).

Table 3 presents the classification of types of measures according to which the following

sections are structured (codes are used for numbering different subsections). For each measure, a selection of examples is described, illustrating various ways in which these measures have been implemented in countries across Europe. A concise description points out the key aspects of each example. A list of text sources and websites are offered to readers who want to learn more about the examples or contact the local initiatives that have been mentioned¹.

Section 3.1 outlines the elements that a landowner or enterprise needs to put in place for active forest management and wood mobilisation. Sections 3.2 to 3.5 contain measures that support forest owners and enterprises in gaining access to knowledge of and inputs for suitable solutions, and implementing them to enhance their forest enterprise management system.






3.1 Activating forest management and enterprise

Wood mobilisation requires engagement and action from the side of individual forest owners and forest enterprises. A substantial increase in mobilised wood will only be possible if landowners and enterprises manage their forest resources more actively. It is paramount that more forest owners, notably small-scale private owners, become aware of their key role in the supply of wood resources through SFM.

This first group of measures addresses the key components of a forest enterprise management system which owners and enterprises should

¹ A helpful hint: Many sources given in this handbook are in national language. To read these sources in your native language, use the PDF-version of the Handbook and copy-paste the active weblinks into an online translation website.

Table 2: Classification of types of measures for wood mobilisation in Europe

 <p>M1. Activation of forest management and enterprise</p> <p>M1.1 Enterprise management and planning M1.2 Harvesting and transport M1.3 Alternative products, services and markets</p>	 <p>M3. Finances and material inputs</p> <p>M3.1 Forest access and infrastructure grants M3.2 Land ownership tax incentives M3.3 Forest management grants and taxes M3.4 Market development incentives</p>	
 <p>M2. Regulatory and legal framework</p> <p>M2.1 Land ownership regulations M2.2 Forest management regulations M2.3 Other regulatory and legal frameworks</p>	 <p>M4. Organisation and cooperation</p> <p>M4.1 Land ownership improvement M4.1.1 Forest land consolidation M4.1.2 Joint ownership/shareholders</p> <p>M4.2 Cooperation in forest management M4.2.1 Joint forest management M4.2.2 Cooperatives M4.2.3 Joint timber marketing</p> <p>M4.3 Market development actions M4.3.1 Certification and labelling M4.3.2 Investments in processing</p>	 <p>M5. Knowledge and attitudes</p> <p>M5.1 Advisory capacity</p> <p>M5.2 Knowledge exchange actions M5.2.1 Regional initiatives and action plans M5.2.2 Promotion initiatives and campaigns M5.2.3 Practical training and capacity building M5.2.4 Advanced training and capacity building</p> <p>M5.3 Information services and tools M5.3.1 Infoportals for private forest owners M5.3.2 Logistical systems M5.3.3 Market information systems M5.3.4 Other specialised information systems</p> <p>M5.4 Research & Innovation (R&I) M5.4.1 R&I capacity M5.4.2 R&I funding</p>

implement for their forest. It serves to control the forest's growing stock within silvicultural planning cycles over decades and to ensure the ecosystem's integrity and productivity (see also introduction in Section 1.5).

The main purpose is a *professionalisation* of forest owners and forest enterprises with the aim of improving their organisational, managerial and technological capacity to reduce the transaction costs for timber harvesting and generate opportunities for marketing and supply. The main fields in which individual forest enterprises can enhance their core forestry activities are: efficient administration, improvement of silvicultural planning, modernisation of harvesting processes and development of alternative products and services.

In addition, the adoption of basic, regular forest management by previously inactive forest owners can be considered an important measure for wood mobilisation. Forest owners can choose to manage their forest on their own or delegate the responsibility to another party who takes care of the management on their behalf. Today many organisations (e.g., larger forest owners, forest owner associations or cooperatives, consultants and public forest agencies) provide management as a professional service (see also Section 3.4 'Organisation and cooperation').

Note that the following subsections include only a general description of the key components according to good practice. These aspects are considered general knowledge for most forestry

practitioners, but shall serve as an introduction to readers who do not have this forestry background.

M1.1 Enterprise management and planning

Administration. Efficient and effective book-keeping and administration is needed to establish the forest enterprise as a potential partner for timber traders or wood industries.

Forest inventory and monitoring. Baseline information about the forest area and growing stock is essential for long-term planning (e.g., registers and maps of all individual forest stands). Suitable assessment methods need to be in place, or data needs to be acquired from external sources, to provide and update such inventory records on a regular basis. While many owners still only have paper-based records, digital geoinformation currently represents the state of the art. If a forest certification scheme (e.g., FSC or PEFC) is adopted, specific standard indicators have to be reported on.

Forest management plans are the main tool for establishing a systematic approach to the management of a forest area. In most countries, forest owners can obtain substantial support to set up such a plan. The basis is a suitable silvicultural regime that is translated into an operational plan for forest management and harvesting throughout the life cycle of the forest stand (the so-called rotation). It defines a series of stepwise interventions which typically comprise: a) felling of small trees (thinning) to provide light and space to stimulate growth of the target trees, b) stem enhancement or sanitary felling interventions to ensure forest health and good timber quality, c) the final harvest of the mature trees (selective versus clear-cut of the whole stand), and d) regeneration of the forest stand through planting of seedlings, young trees or fostering of natural regrowth. Depending on the type of forest and timber stock, these plans can range from quite simple concepts (e.g., mono-species plantations with a short rotation length with timber as the main objective) to very complex silvicultural systems (e.g., mixed forests with many species and age classes for multifunctional use and



close-to-nature silviculture that helps to maintain biodiversity and other ecosystem services).

Timber marketing. A good knowledge of market demand, prices and trends is needed to designate forest stands for harvesting, prepare suitable timber assortments for selling and negotiate good prices for the timber. An efficient handling of the delivery is important to keep good relations with confident buyers.

M1.2 Harvesting and transport

Harvesting techniques and systems. An appropriate, site-adapted harvesting method has to be selected and the harvesting operations need to be planned accordingly; this choice depends on the forest's structure and stand characteristics (e.g., tree species, age, terrain, climate, soils, ecology) and the targeted forest product responding to specific wood assortments and



qualities demanded on the market. The harvesting method can range from simple manual felling and traditional forwarding of logs with tractors or horses to modern systems. The latter usually include some combination of methods of motor-manual and mechanised felling with professional forest workers and advanced forest machinery, such as harvesters, skidders and forwarders. Applying the latest information and communication technologies, such harvesting operations can today be part of sophisticated supply chain management systems that maximise efficiency throughout the whole chain from felling the tree and transporting the log to the sawmill in time. Enhancing low-impact harvesting systems, technologies and supply logistics through applied research and development is one of the main fields of innovation in forestry today (see also Section 4.3.3).

Workers' competence and safety. Forest owners and forest companies are responsible for ensuring and checking that the work in the forest is carried out in compliance with national legislation for workers' safety. These usually relate to the use of appropriate safety equipment, correct handling and regular maintenance

of machinery, maintaining an appropriate level of training of workers with regular updates, ensuring fixed working hours and avoiding overtime, and having functional emergency plans in place.

Suitable forest access. Establishing new forest roads and maintaining existing ones is the responsibility of the forest land owner. It is a major cost factor, which is why a variety of public financial support schemes are available for this activity. Furthermore the harvesting companies are supposed to maintain the forest road infrastructure in reasonably good shape during any kind of work.

M1.3 Alternative products, services and markets

Diversification of products, services and markets. In forest regions where low forest growth and productivity prevents the profitable sale of wood, the diversification of forest products can generate additional income that can justify an active management of forest. For example, various non-wood forest products (NWFP)³⁶, including mushrooms, cork, resin, berries and those produced by hunting, and special services for tourism and environmental education are gaining in importance in several forest regions of Europe.

3.2 Regulatory and legal framework

National legislation enables and ensures the active management of forests, which has a direct or indirect effect on wood mobilisation. It includes laws and regulations directly related to forestry and to various other fields since forests are subject to many different policy fields (see Section 1.2). Regulations on ownership, enterprise, trade, transport, environment and nature conservation, among others, are equally important for landowners and enterprises in the forest-based sector. Land and ownership fragmentation is one of the main barriers within forestry in Europe that comes into play here. Solving this problem is very difficult, because it involves properties owned by a large number of isolated individuals.

Private property rights have a strong legal foundation, but can be restricted for the benefit of a common societal interest. The key aspect in view of regulatory measures is how far they influence the decisions of a single landowner, or groups of owners, and to what extent they represent an opportunity or an obligation to the owner. They can either empower the ownership (e.g., by ensuring the legal status of the property status long into the future) or support common interests (e.g., by allowing joint ownership arrangements or groupings which make decisions on the basis of a majority vote and overrule the private right of individual owners). The rules and decision processes laid down in the regulations and the related forms of ownership and organisations show an interesting diversity of regionally specific solutions (see Section 3.4).

M2.1 Land ownership regulations

Two main types of regulatory schemes are identified that aim to limit fragmentation of ownership:

- 1) *Regulations limiting the division of forest properties* during transmission to prevent the level of fragmentation from increasing further
- 2) *Regulations supporting the legal grouping of forest owner properties* to reduce existing fragmentation

Practice examples

The **Real Property Transaction Act** (Grundstücksverkehrsgesetz) in Germany regulates, among others, the purchase or sale of forest land. It aims: 1) to secure the continued existence of agricultural and forestry holdings by protection from sell-offs of their land, 2) to protect nature and the environment by preserving and strengthening agricultural and forestry structures, and 3) to guarantee food security for the population. Thus the sale of agricultural and forestry holdings larger than one hectare only becomes legal when an official permit approving the sale has been obtained. However, many forest parcels are no longer part of an agricultural or forest holding and these can be sold without such a permit.

- Koch M, Maier C. Forest Land Ownership Change in Germany. COST Action FP1201. FACESMAP Country Report. Vienna, Austria: EFICEEC-EFISEE; 2015. <https://tinyurl.com/y8eee3dd>

Preferential rights of adjacent forest owners and of the municipality

in forest land sales in France (*Droit de préférence des propriétaires forestiers voisins, Droit de préférence de la commune*) since 2010: In the case of the sale of a property classified in the cadastre as woodland and with a total area of less than 4 ha, the owners of an adjacent forest land parcel have to be informed of the sale and have a **purchase right of preference**.

The municipality may also assert such a right, even if they do not own an adjacent woodlot. The property for sale includes all parcels to be sold, regardless of whether they form a block or are disconnected. The seller has to notify all the neighbours and the mayor of the municipality about the price and conditions by registered letter. If the municipality declares to exercise its right and competes with neighbouring forest owners, the seller is free to choose the one to whom he sells his property. This preferential right has unfortunately



many exceptions. For example, the right of preference no longer applies if the property being sold comprises parcels that are not registered as woodland in the cadastre.

- ▶ www.foretpriveefrancaise.com/n/droits-de-priorite/n:127 ; <http://archive.is/j3mmb>

Pre-emptive rights of the municipality and of the state (*Droit de préemption de la commune, Droit de préemption de l'état*): If the municipality or state has an adjacent woodland area that is managed according to a management plan, the town has a right of pre-emption in case of sale of a property classified in the cadastre as woodland and with a total area of less than 4 ha. The pre-emptive right of the municipality takes precedence over preferential right of the neighbouring owners and the pre-emptive right of the state takes precedence over the municipal pre-emption right and over any other preferential right.

- ▶ www.foretpriveefrancaise.com/n/droits-de-priorite/n:127 ; <http://archive.is/j3mmb>

Legal restrictions on dividing private property. In some provinces in Austria, farms are not allowed to sell off parcels if the remaining farm holding is too small to be profitable or to support a family. Specifically for forest land, the Austrian Forest Act stipulates that forest parcels may not be divided into parcels too small for regular management (*Forstgesetz, §15 Waldteilung*). This minimum area is typically specified in provincial laws to be around 1 ha. In Slovakia, according to the Act no. 180/1995 Coll. on Certain Measures for the Settlement of Ownership Rights to Land, in case of purchase or sale of forests, division of forest land into parcels with an area of less than 0.5 ha is forbidden; this does not apply to community forests.

- ▶ Živojinović et al. 2015. FACESMAP report, p.6 and p.535. <http://bit.ly/2wJqBHA>

The **Community Forest Act**

(*Gemeinschaftswaldgesetz/GWG*) in North Rhine-Westphalia (NRW), Germany, is a special regional forest law that unifies the many heterogeneous traditional forms of community forests into public bodies by law with a clear legal status. These community forests, termed forest cooperative societies (FCS, see Section M4.2) are jointly owned based on land shares and are advantageous for joint management. The FCS are enabled to act on behalf of a majority vote while the property is still explicitly stated as private and can be understood as 'bounded private forest' with a closed community of owners. The FCS administers the community assets, but it is not their owner. Shareholders in the FCS can sell their shares, but not the land, and the FCS has a pre-emptive right to purchase, prohibiting any future fragmentation of the jointly-owned forest land. The second important aspect of NRW's GWG is that it allows a land consolidation of several FCS into a new, larger FCS (see Section M4.1). Therefore, a readjustment of land property per owner is legally possible, as well as a merger of several community forests and additional private owners. Compared to conventional land consolidation, which essentially reduces only the number of land parcels but not the number of forest owners, this procedure according to GWG can significantly enhance the degree and effect of the consolidation on wood mobilisation.

- ▶ MIK NRW. Gesetz über den Gemeinschaftswald im Land Nordrhein-Westfalen – Gemeinschaftswaldgesetz – 8.4.1975 (GWG). 1975. <https://tinyurl.com/y7fncm9n> ; <http://archive.is/ZUiqy>
- ▶ Kies & Peter 2017. SIMWOOD Pilot Project NRW Final Report. EFI, IWWH, BRA. www.simwood-project.eu ; <https://tinyurl.com/yb8pnq73>



Prerequisites

To restrict the size or give preference to a neighbour, it is necessary to have a cadastre listing forest owners and a map with the land they own. In countries such as Portugal with less than 50% of the country covered by a property map, implementation of land ownership restructuring becomes extremely complex. In addition, as the natural trend in inheritance is to share land between the heirs, there is a need for effective political intervention and a good understanding of forest issues to address this natural process and establish appropriate regulation tools.

M2.2 Forest management regulations

Private ownership rights ensure that citizens are able to decide how to use their property. However, a lack of a regulatory framework that sets certain constraints on forest ownership can lead, as the history of forestry has shown, to

deforestation or serious risks for forest owners (e.g., erosion, fire risk, pests, etc.) as a result of overharvesting or incorrect management. Most regulations have been established to restrict the freedom of forest owners, not only at the individual level but also collectively, to secure the provision of ecosystem services for the society in the long term. Important regulations for securing wood mobilisation in the long term include:

- 1) Obligations to ensure a continuous forest cover
- 2) Obligations to maintain regular forest management according to common rules
- 3) Obligations to participate in joint actions for a specific purpose and/or territory (mandatory grouping)

Note that these regulatory frameworks are closely linked with groupings of forest owners for management activities (see Section M4.2 ‘Cooperation in forest management’).



Practice examples

Article L5 of the Code Forestier, the French principal *Forest Code*, states that a forest owner must reforest, manage and maintain his/her forest and it obliges him/her to maintain the forest land under forest cover. Sanctions are defined in the case of illegal harvesting when it changes the land use.

- ▶ Legifrance.gouv.fr. Code Forestier. Article L5. <https://tinyurl.com/ydyt9edx>; <http://archive.is/JAXpV>

The **Zona de Intervenção Florestal (ZIF)** in Portugal are joint *Forest Intervention Areas* that assemble and organise small forest holders for forest management and protection. The idea emerged after the catastrophic wildfires of 2003 and the ZIF approach was legislated by the Law 127/2005 and revised under the Law 15/2009. Each ZIF of private forest has to include at least a contiguous area of 750 ha, 50 landowners and 100 forest plots, and it has to be managed by a single body as defined by ZIF members. All landowners in the ZIF are obliged by law to have a forest management plan for their land in place and have to carry out the forest protection plan of the ZIF as decided by the majority of its members.

- ▶ Valente S, Coelho C, Ribeiro C, Soares J. Forest Intervention Areas (ZIF): A new approach for non-industrial private forest management in Portugal. *Silva Lusitana*. 2013;21(2):137-161. www.scielo.mec.pt/pdf/slul/v21n2/v21n2a01.pdf
- ▶ Coelho C. Forest Intervention Area (ZIF) in Portugal. WOCAT SLM Database, entry no. 2588. 2017. https://qcat.wocat.net/en/wocat/approaches/view/approaches_2588/



The **Association Syndicale Autorisée (ASA)** is an authorised trade union in France. It is a public body created following an enquiry by one or several interested forest owners, a local authority or a group of local authorities. Its prerogative is to carry out actions on private lands. For example, the *Association Régionale de Défense des Forêts Contre l'Incendie* (DFCI) is an ASA for forest fire defence in the Landes forests of Southern France. Forest owners are required by law to join the ASA for fire defence in each municipality as it is key to effective fire prevention. However, this is also beneficial for wood mobilisation as it secures resources and activates forest management. See the detailed description of the ASA in Section M4.2. for further information.

- ▶ DFCI Aquitaine. Guide des procédures des ASA de DFCI. 2006. www.feudeforet.org/telecharge/docs/guide_des_procedures.pdf

Prerequisites

As these regulations limit property rights they can be applied easily whenever there is a history of common understanding of forest issues. In the context of afforestation, it might be necessary to allocate significant means to new forest owners to explain and justify the importance of these measures for securing forest resources in the long term.

M2.3 Other regulatory and legal frameworks

Policy fields that do not directly relate to forests do, however, influence wood mobilisation through industry regulations that concern other aspects of the wood supply chain (see also Section 1.2). The regulations have legitimate objectives (e.g., to ensure safe and fair conditions for workers and environmentally sound business

practices), but the bulk of numerous regulations generate additional procedures and costs for forest and wood-based enterprises and thus have an impact on the profitability of harvesting and logistical operations.

Laws and regulations may be seen as favourable for domestic wood mobilisation when they affect forestry outside Europe (e.g., a ban on raw timber imports) or as unfavourable if they pose an additional burden for forestry inside Europe. EU policies that can be considered favourable for wood mobilisation include the *Bioeconomy Strategy*²⁰ and *Renewable Energy Directive (RED)*²¹, as they foster emerging wood and biomass markets. On the other hand, forest-related policies, such as the *EU Action Plan for Forest Law Enforcement, Governance and Trade (FLEGT)*²⁴, that are aimed at the international timber trade do not necessarily help increase wood mobilisation in the EU.

Other types of regulations were identified:

1. Work regulations, e.g., work duration, health and safety, foreign workers.
2. Transport regulations, e.g., truck load weight limits.
3. Phytosanitary regulations, e.g., treatment measures of seed material.
4. Land use regulations, e.g., limitations to or promotion of tree plantations on agricultural land.
5. Tax regimes affecting tree sales or woodland inheritance.
6. Regulations favouring wood use, e.g., priority given to wood material in construction or cascading use.



Practice examples

Temporary derogations of regulations for immediate crisis response have proven successful in the case of major storm events causing widespread damage to forests. In many countries, for a certain period after catastrophic events, the authorities can issue temporary derogations of regulations for transportation (e.g., an increase in the maximum weight from 44 to 48 tons per truck) or for employment (e.g., easier subcontracting of foreign forest workers) effective measures leading to an instant increase in wood mobilisation.

- ▶ Gardiner B. et al. 2013. Living with Storm Damage to Forests. What Science Can Tell Us 3. EFI. http://www.efi.int/files/attachments/publications/efi_wsctu_3_final_net.pdf; <http://archive.is/wF7Bk>
- ▶ Odenthal-Kahabka J. 2005. Holztransport - Strategien im Katastrophenfall. FVA. <https://tinyurl.com/yafybvml>; <http://archive.is/qYPGT>
- ▶ Bulletin Officiel. Circulaire no 2000-12 du 21 février 2000 relative au régime spécifique temporaire de circulation des transports de bois en grume sous le régime des transports exceptionnel. <https://tinyurl.com/yb3984cx>; <http://archive.is/wF7Bk>

The establishment of phytosanitary regulations against the pine wood nematode

is an example of a measure aimed at preventing the spread of harmful organisms. The pine wood nematode infects pine trees and causes pine wilt disease. It was introduced in Portugal from North America through contaminated wood originally from Asia. It mainly affects maritime pines, but can potentially damage all European conifers. To limit its spread, any wood or bark material traded from Portugal or any other contaminated area in the world (e.g., North America, Japan, China) has to be fumigated or pre-treated with heat by the producer, according to the regulatory export conditions following phytosanitary standards defined by the FAO.

- ▶ EFIATLANTIC 2014. Pine wood nematode information web page http://www.efiatlantic.efi.int/portal/policy_support/pine_wood_nematode_information



The exemption of inheritance taxes

related to the standing tree stock on forest land in Wallonia, Belgium, is an example of a measure to prevent unsuitable forest practices during inheritance. A high tax on woodland inheritance may lead the owner to carry out a premature harvest of trees before the legal transfer, whereas a high tax on income from the sale of timber may lead to a postponement of harvesting. This exemption was included in the Belgium *Code des droits de succession* (Act on inheritance rights), article 116.

- Maus J-M 2009. Code forestier, droits de succession et donation. *Silva Belgica* 116, 24-26. <https://tinyurl.com/ycdvazoj>

A cascading wood use policy to discourage combustion of clean wood is in effect in Flanders, Belgium. The cascading use principle states that wood, from a climate protection perspective, should first be used and re-used as long as possible as material (e.g., in building, furniture and paper) and only as energy at the very end of its life cycle. This strategy ensures that the wood's carbon storage and substitution functions are maximised. Post-consumer wood is increasingly becoming a commodity which is subject to market forces. The measure issued in 2008 by VREG, the Flemish electricity and gas regulator, ensures that wood which still has other industrial uses cannot be awarded renewable energy premiums. Companies that burn clean waste wood must prove their compliance with this measure via an audited report. The measure may have contributed to the recycling rate of 66% for wooden packaging waste in Belgium in 2012, which is one of the highest in the EU.

- Vis, Mantau, Allen (eds.) 2016. Study on the optimised cascading use of wood. No 394/PP/ENT/RCH/14/7689. Brussels. p.47. http://ec.europa.eu/growth/tools-databases/newsroom/cf/itemdetail.cfm?item_id=8906&lang=en

Prerequisites

Owing to the large area of land and the range of products it delivers, the forest-based sector is subject to many environmental and industrial regulations, and with the new bioeconomy vision paradigm the level of demand is expected to increase even more. Regional authorities, policy-makers and stakeholder representatives need to be aware of and follow the policy processes influencing laws and regulations, and make an effort to influence and contribute to these changes early on.

3.3 Financial and material incentives

Active forest management by landowners needs suitable infrastructural and framework conditions. Investments made by forest owners to manage and maintain their forest (e.g., through thinning, harvesting and replanting) are costly and typically only pay back after a long time. This is the justification for a variety of public support schemes that are aimed specifically at improving the situation for forestry, but which should also have wider positive effects for society and should not interfere negatively with market competition. Grants, tax reductions and subsidised loan guarantees are powerful tools that can initiate favourable conditions and attract interest for wood mobilisation. They should be tailored to address several barriers and the specific needs of the regional forestry sector. Grants and tax schemes mostly fall under the responsibility of public actors, but private stakeholders such as companies, associations and NGOs can also initiate certain financial incentives (e.g., grants or prizes with a specific purpose).

M3.1 Forest access and infrastructure grants

Poorly developed access to the forest evidently represents a major barrier for forest management and timber harvesting. Any activity for developing the road infrastructure is therefore a key enabling measure for wood mobilisation. Targeted grant schemes for forest roads play a decisive role for wood mobilisation in many countries, as they facilitate the costly maintenance



and expansion of roads on private forest owners' land, which would otherwise be financially prohibitive, especially for smaller owners.

Measures include grants for *building new roads* to previously inaccessible forest areas, as well as *maintenance or upgrading of existing roads* so that they are not hampering the circulation of wood transport and harvesting machinery (e.g., roads which are too narrow or not suited for heavy timber transport). Forest road construction has to follow minimum technical criteria or

national standards for planning, taking into account weight carrying capacity, proper construction materials that ensure long-term stability, suitable curve angles and U-turns, adapted slope levels, sufficient work space for machines, designated spots for timber pre-processing (landing and loading areas), construction of related water courses (fords, ditches, culverts), and minimal impacts on ecologically sensitive areas. To sum up, the implementation of a multitude of measures in this category can contribute to the overall improvement of a region's forest road network.

Practice examples

The **Förderrichtlinie FORSTWEGR 2016** in Bavaria, Germany, is a grant scheme supporting forest road construction to activate forest owners. It opens or improves access to forests through proper planning, construction and maintenance of forest roads in Bavaria. The scheme is successful because it offers good financial incentives supported by the targeted provision of advice and guidance.

- Bayerisches Staatsministerium für Ernährung, Landwirtschaft und Forsten. Finanzielle Förderung beim Wegebau (FORSTWEGR). www.waldbesitzer-portal.bayern.de/o48722/index.php ; <http://archive.is/pViLH>

The **Forest Road Grant Scheme** in Ireland is available to private forest owners whose plantations are of an age within 5 years of thinning and have no road infrastructure in place prior to the grant aid. The grant covers up to 100% of the cost of road construction. It does not cover costs to acquire the planning permission to open a new entrance to a public road. The scheme has been quite successful in facilitating better access and hence timely thinning of many plantations which would not have been thinned without the grant support.

- Teagasc. Forest Roads Scheme. www.teagasc.ie/crops/forestry/grants/forest-roads-scheme ; <http://archive.is/Uat5O>

The **Feader Dispositif 125 A: Soutien à la desserte forestière** in France is a grant programme that improves forest access and wood extraction under affordable economic conditions. It is aimed at municipal roads on private land and forest access roads on private forest land, owned by individuals or by a common ownership. The grant is only available for new road-work; all recurrent maintenance work is excluded. The technical eligibility criteria are specific to each French region.

- ODR INRA. 125a Soutien à la desserte forestière. https://odr.inra.fr/intranet/carto/cartowiki/index.php/125a_Soutien_à_la_desserte_foresti%C3%A8re ; <http://archive.is/aylcy>

Prerequisites

This measure assumes that public funds, including national and European structural funds for rural development, are allocated to forest access improvement and the authorities need to be ready to administer the grant programmes. The related grant schemes vary in their specific conditions, which serve the particular priorities of a country or region. Most of the grant schemes allow for a significant share of up to 80% of the costs for new or improved road construction to be co-financed from public funds. The maintenance of existing roads is normally not co-financed, or at least only to a lesser extent.

To maximise the beneficial impact of the funded measures on the larger road network, these grants can be coordinated with regional plans to enhance forest accessibility, or even with targeted (spatial) plans for wood availability and mobilisation. Here the eligibility of, or the percentage of financial support for, a road construction measure depends not only on the type, but also on the location and level of priority of the road segment within the overall network. Furthermore, regional authorities, who are owners of public roads, can prioritise public investment in areas that have limited wood mobilisation to make forest more accessible for trucks and heavy machinery.

M3.2 Land ownership tax incentives

In addition to legal measures (see Section 3.2), public authorities can use tax instruments to limit forest fragmentation and support the grouping of owners for active management. To date, there are few examples of this kind of instrument. In most EU countries, ownership and transfer of land is associated with some form of taxation. Linking such taxes with conditions and criteria to support wood mobilisation has the potential to influence a large number of landowners and could become an effective lever in the long term. The following types are relevant:

- 1) *Tax increases for forest owners who do not provide evidence of active management, or vice versa - tax reductions for owners providing this proof - are quite common approaches. In most cases, an established forest management plan is considered as a guarantee of*

active management, although this does not indicate the main orientation of the management (e.g., protection or production).

- 2) *Tax exemptions or reductions for the transfer of forest property within the family* (sales to close relatives, inheritance or donation) are a means to foster continuity of forest ownership and management. It is an approach that prevents owners from harvesting all standing trees during the ownership transfer. This can

also encourage people with large amounts of capital to invest in forest management before transfer of capital.

- 3) *Tax on the potential income from forest harvesting* is an incentive that lets the owner choose whether to harvest or not, but collects a regular tax based on the average increment per hectare. Such a tax gives a clear signal about the economic potential of the forest.

Practice examples

The **DEFI acquisition/DEFI forêt** in France is an income tax reduction scheme for forest owners who purchase forest land parcels or undeveloped land to be afforested. It specifically targets smaller, fragmented forest property. The reduction is only eligible for up to 4 ha of acquired land and the total enlarged forest area has to reach a size larger than 4 ha. The owner is required to keep the area intact for 15 years and have a simple forest management plan in place. The reduction is also applicable for acquisitions of shares in common ownership (groupements forestiers, GF) or of capital in forest investment companies (sociétés d'épargne forestière, SEF).

- ▶ Foret.info. DEFI Acquisition. www.foret.info/guide-foret-privee,17,defi-acquisition.html ; <http://archive.is/VQMip>
- ▶ Impots.gouv. Titre 7: Réduction d'impôt accordée au titre des investissements forestiers. <http://archive.is/VbnDp>

The **transfer tax** in Finland is taxation on the purchase of forest property, amounting to 4% of the purchase price. Acquisitions of real property resulting from a gift, inheritance, bequest, partition or dissolution of joint ownership that is completely free of charge are exempt from this tax. Non-industrial private forest landowners (NIPF) have the option of a specific deduction of 50% of the procurement expense of a new forest area. The payable **income tax** on profits from selling forest

property is 28%. Under conditions of a 'generation transfer', sales between close relatives are exempt from this tax.

- ▶ Salakari M. Forest Taxation in Finland - a Review of the Systems Currently in Use 2006. METLA; 2006. www.metla.fi/hanke/3006/pdf/fore_tax_2006.pdf

The **area-based forest tax** was applied in Finland until the year 2005. Here the taxable amount was based on the area and average increment per hectare, set for particular forest regions, and also taking into account average stumpage prices. The value of the total annual increment constituted the annual forest income, which was taxed each year regardless of whether timber had been sold or not. Special tax relief related to this tax was put in place to promote favourable forest management systems, forest regeneration, tending of seedling stands, thinning, forest road constructions, and forest drainage, among others. When a forest land parcel had been improved beyond the average productivity level, the excess increment harvested was exempt from the income tax. This taxation system was considered to be complicated and not necessarily fair to all owners, and it has been replaced by a relatively neutral system based on actual stumpage revenues. There are discussions to reintroduce the area-based forest tax as a means to increase the mobilisation of timber.

- ▶ Ylitalo E. Forest Taxation in Finland - a Review of the Systems Currently in Use. METLA; 1998:11. http://www.metla.fi/hanke/3006/pdf/fore_tax.pdf

Prerequisites

The measures require the tax administration to have access to complete cadastral information about the owner of each forest property and a minimum of information about the size and type of forest, so that they can assess the site production potential of each single forest property or forest land parcel.

M3.3 Forest management grant and tax incentives

A large variety of public grant and tax reduction schemes exist which specifically enhance the conditions for viable forest management and have a positive mid- to long-term impact on increased wood mobilisation. These grants can be financed up to 100% by public authorities, or from a combination of local, national and European funds, e.g., EAFRD, ERDF or ESF.

The main types of grant support schemes aim at:

- The formation of forest owner associations, producer groups or local networks
- The formation of local networks of market actors, stakeholders and strategies
- Silvicultural improvement measures
- The afforestation of abandoned land
- The modernisation of harvesting equipment
- The adoption of nature conservation measures
- Training and demonstration

The main types of tax schemes are:

- Tax reductions for forest management service contracts
- Tax reductions for accomplished forestry activities
- Income tax exemptions on timber sales

Note that grant schemes for research and innovation are excluded here, but can be found in Section M4.1 'R&I funding'.

Practice examples

a) Grants for the formation of owner and stakeholder groups

The **Förderrichtlinie FORSTZUSR 2015** in Bavaria, Germany, supports the formation of private owner self-help institutions. Various services provided by forestry associations and mergers of associations are substantially co-financed. The eligible investments range from equipment and infrastructure to forest management service contracts, joint timber marketing and capacity building. The aim is to enhance the performance of associations, which leads in turn to more effective support and advice provided to small-scale private owners.

- Bayerisches Staatsministerium für Ernährung, Landwirtschaft und Forsten Finanzielle Förderung forstwirtschaftlicher Zusammenschlüsse (FORSTZUSR). www.waldbesitzer-portal.bayern.de/o48721/index.php ; <http://archive.is/UfqXf>

The **FEADER Dispositif 341 A** in France aims to anchor forestry within regional development by supporting the formation of stakeholder networks and a local development strategy for the forest-based sector. The admissible activities include training, facilitation, advice, feasibility and strategic studies. It facilitates a territorial forest charter and fosters new economic activities and ecosystem services. Actions must involve local private and public partners.

- MAAPRAT. FEADER Fonds Européen Agricole Pour Le Développement Rural. Guide Des Mesures Forestières. Ministère de l'Agriculture, de l'Alimentation, de la Pêche, de la Ruralité et de l'Aménagement du Territoire; 2012. <https://tinyurl.com/y79r88xk>

The **Rural Development Forest Owner Project** in Ireland provided grants for facilitators to develop producer groups, inventories and plans for the mobilisation of timber. Local discussion group committees directed the work of the facilitators. Grants varied in each county from six months to three years with varying levels of success. Discussion groups evolved into a commercial producer group and produced plans for timber mobilisation.

- Kilkenny Leader Partnership. Website. www.cklp.ie ; <http://archive.is/LgVfT>

b) Incentives for forestry work, harvesting and silvicultural improvement

The **Förderrichtlinie WALDFÖPR** in Bavaria offers financial support to forest owners for applying silvicultural measures to manage their forests in a sustainable and ecological way. These include cable crane systems (for protection forest in mountainous areas), natural regeneration, afforestation and reforestation, soil management, integrative forest management and forest conversion, among others. The measures have to be primarily silvicultural and clearly match the objectives of the scheme.

- Bayerisches Staatsministerium für Ernährung, Landwirtschaft und Forsten. Finanzielle Förderung der Bewirtschaftung des Waldes (WALDFÖPR). www.waldbesitzer-portal.bayern.de/o48719/index.php ; <http://archive.is/rW5QT>

The **FEADER Dispositif 122 A** in France aims at improving the quality of broadleaved and coniferous stands and supports improved silvicultural treatments, which include tree marking (elite trees, trees to be harvested, remaining trees), crop-strip clearing, pruning, thinning and protection against game browsing, among others. The treated area must be larger than 4 ha and warrant sustainable management according to national regulations.

The **FEADER Dispositif 221** in France provides grants for afforestation of abandoned agricultural land, to preserve biodiversity and landscapes and to increase wood availability. Only non-forested lands that have been cultivated for at least two consecutive years during the last five years are eligible. Admissible activities include elimination of existing vegetation, soil preparation, provision and planting of seedlings, plantation maintenance, and seedling protection through game and weed control.

- MAAPRAT. FEADER Fonds Européen Agricole Pour Le Développement Rural. Guide Des Mesures Forestières. Ministère de l'Agriculture, de l'Alimentation, de la Pêche, de la Ruralité et de l'Aménagement du Territoire; 2012. <https://tinyurl.com/y79r88xk>

Dynamic Bois is the national grant programme in France that aims specifically at increasing the mobilisation of wood and getting value from the forest. In the first grant phase in 2015, 24 projects were granted a total of 30 million euros to improve 22,400 ha of forest stands and mobilise 4 million m³ of wood, of which approximately half was carried out through the installation of modern wood boilers. The sub-programme Dynamelio aims at improving the quality of forest stands within an approved DYNAMIC project. Eligibility is restricted to low value forest areas of at least 4 ha, which are replaced by forest stands of higher value through plantation or natural regeneration. Improvement actions include elite tree marking, tree marking before thinning, individual cleaning and opening and maintenance of crop-strip clearing. The grant covers 40% of the treatment cost.

- ADEME. Approvisionnement En Bois Energie. Appel à Projets. Edition 2015; 2015. www.ademe.fr/sites/default/files/assets/documents/dynamic-bois-2016.pdf
- MEEM. AMI « DYNAMIC Bois » 2016: favoriser la mobilité du bois dans le respect de la gestion durable de la forêt. <https://tinyurl.com/ybnywhfc> ; <http://archive.is/fjNLY>

The **Woodland Improvement Scheme** is a grant scheme in Ireland for the marking and supervision of plantation thinning, offering up to 750 euros per hectare, mainly targeting broadleaved woodlands with small plots that are not economically viable. The grant is fully subscribed every year. Without this scheme, broadleaved plantations would not have been thinned.

- DAFM. Woodland Improvement Scheme; 2015. <https://tinyurl.com/y9x58bjr>

The **DEFI Contrat** is a tax reduction scheme in France on remunerations paid under a forest management contract (e.g., for services provided under a common ownership) by forest savings companies or by forestry experts. It grants a reduction rate of 18% and is accessible to forest enterprises with land of less than 25 ha that agree to take a commitment for sustainable forest management for 15 years.

- Foreo.fr. DEFI Contrat. <https://tinyurl.com/y7ngz87w> ; <http://archive.is/DuGdT>



The **DEFI Travaux** is a tax reduction scheme for expenses associated with completed forestry work in France. The tax reduction of 18% is accessible to owners of a forest area that constitutes a management unit of at least a 10 ha block or a 4 ha block belonging to a forest producer group (higher rate in that case). The property has to remain intact and be managed under a sustainability commitment for eight years. It also supports work for stand regeneration or improvement of, for example, infrastructures.

- Foret.info. DEFI Travaux forestiers. www.foret.info/guide-foret-privee,19,defi-travaux-forestiers.html ; <http://archive.is/hQK3u>

c) Grants for upgrade of equipment

The **FEADER Dispositif 123 B** in France offers grants for the modernisation of a wide range of harvesting equipment and the improved mechanisation of logging companies and forestry cooperatives with less than 10 employees and less than two million euros of annual turnover. The equipment must be new and comply with standards for security and low-impact on soils. It includes farm tractors, harvesters, harvesting heads, aerial cable logging equipment and horse logging equipment.

- MAAPRAT. FEADER Fonds Européen Agricole Pour Le Développement Rural. Guide Des Mesures Forestières. Ministère de l'Agriculture, de l'Alimentation, de la Pêche, de la Ruralité et de l'Aménagement du Territoire; 2012. <https://tinyurl.com/y79r88xk>

d) Grants for nature conservation

The **Förderrichtlinie VNPWaldR** in Bavaria, Germany, provides grant support for the adoption of nature conservation measures (e.g., to preserve coppice forests, deadwood sites, habitat trees or endangered species sites) or to agree not to utilise timber in special habitats. The measures have to be primarily silvicultural and the main aim has to be close-to-nature forest use.

- UMWELTdigital.de. Richtlinie über Zuwendungen nach dem Bayerischen Vertragsnaturschutzprogramm Wald (VNPWaldR 2015). <https://www.umweltdigital.de/nd/890374/vorschrift.html>

e) Grants for knowledge exchange

The **FEADER Dispositifs 111 A and 111 B** in France offer support for the dedicated provision of information to local actors through training and demonstration actions. The measures aim to improve knowledge about sustainable silviculture and innovative practices. They are accessible to educational institutions and organisations active in knowledge exchange. The grants cover the wages of trainers, costs for the organisation of events, development of pedagogic materials and tools and the establishment of facilities.

- MAAPRAT. FEADER Fonds Européen Agricole Pour Le Développement Rural. Guide Des Mesures Forestières. Ministère de l'Agriculture, de l'Alimentation, de la Pêche, de la Ruralité et de l'Aménagement du Territoire; 2012. <https://tinyurl.com/y79r88xk>

Prerequisites

All these grant schemes rely on the existence of bodies able to negotiate conditions and evaluate the relevance of proposed applications (also see Section M5.1) and require the willingness from policy makers to design such grant schemes to foster SFM and wood mobilisation.

Grant schemes or tax incentives require clear, transparent eligibility criteria that are accessible to the potential beneficiaries; i.e., forest owners and enterprises. Criteria can also be tailored to address specific priority target groups.

The specific objectives of the grants must be in line with the overall goals and priorities of the funding programmes and match the concrete needs of the majority of the targeted beneficiaries. They must contribute to societal benefit and not interfere negatively with markets. The measures proposed by the applicants must in turn match the supported goals and objectives and have a beneficial impact on SFM and wood mobilisation.

M3.4 Market development incentives

National and regional authorities have an interest in helping to stimulate the market demand

for wood and strengthen added value of forest-based industries. Another good way to increase wood mobilisation is to support industrial development through incentives designed to attract investments in wood processing and manufacturing (e.g., construction, furniture, pulp and paper), wood energy and biochemical processing. The commonly identified forms of incentives comprise:

- 1) Grants for machinery and equipment to support traditional companies in making the transition towards a bioeconomy, helping them adopt new standards and securing their competitiveness.
- 2) Grants to promote wood construction and conversion of non-wood construction leading to increased wood use.
- 3) Grants for promoting biomass energy markets for the substitution of fossil fuels.
- 4) Grants and tax reduction fostering innovation and competitiveness in the forest-based sector.

Note that the innovation-focused incentives are related to the R&I funding measure (see Section M5.4.1).



Practice examples

The **PIUS-Check** in NRW, Germany, is a tool to promote cleaner production in manufacturing industries delivered by the EFA+ Efficiency Agency in NRW. The EFA advises SMEs on integrated preventive environmental strategies to increase resource efficiency and reduce risks to humans and the environment, guiding them towards various available public grant schemes for cleaner production. The agency has implemented a large number of improvement checks in various wood industries in NRW.

► www.pius-info.de/en/index.html ; <https://tinyurl.com/ydy2q7m8> ; <http://archive.is/Blxny> ; <http://archive.is/GyQq1>

The **Holz Innovativ Programm** (HIP 2014-2020) in Baden-Württemberg, Germany, is a regional development programme of the Ministry for Rural Development and Consumer Protection co-financed by the EFRE. It aims to promote innovation and energy transition in regional forest-based industries. The main priorities are i) to establish regional cluster and network structures, ii) to foster applied research in wood use and iii) to promote model projects in wood constructions.

► www.proholzbw.de/fachliches/foerderung/ ; <http://archive.is/N3ufH>

The **Marktanreizprogramm (MAP)** has been Germany's central *market incentive programme* since 2008, distributing 300 million euros each year to expand the share of renewable energy within the heat market. It aims at consumers who intend to renew their heating system or build a new house, supporting a switch from fossil fuels to renewable energy solutions and reach significant carbon emission reductions. The two pillars are: i) subsidies for smaller investments in private households and companies (e.g., pellet and firewood ovens combined

with storage tanks, and ii) low-interest loans and repayment grants for large, commercial plants investing in renewable process heat, biomass heating plants or heat networks. Around 80,000 projects were granted, of which 28,000 have been biomass heating systems. During the last decade, the MAP was a major factor in the growing national demand for wood-based heating material, especially pellets and firewood.

► <https://tinyurl.com/y8zozhqq> ; <http://archive.is/wUdCh>

The **Countryside Productivity Scheme** in the UK is an EU funded state grant scheme (EAFRD) to support the purchase of machinery and equipment and is designed to increase the productivity of rural enterprises, including forestry. It is available to private woodland owners, representatives of woodland associations and small and medium sized forestry contractors. In its first phase until 2017, it offered small grants of between £2,500 and £35,000, or large grants of up to £1,000,000, which covered up to 40% of the cost of the proposal. The projects should enhance forestry potential or add value to forestry products.

► www.gov.uk/guidance/countryside-productivity-scheme ; <http://archive.is/S6Pvc>

Woodfuel East in Eastern England, UK, is a grant scheme established with EU, UK and private sector support to enhance local wood fuel supply chains. A total of £2.5 million was spent on 120 grant-aided projects including forest access work and on-farm wood fired boilers, as well as forest machinery and processors. The programme activated 9880 ha of unmanaged and undermanaged woodland and has brought an additional 114,600 green tonnes of timber as woodfuel to market annually.

► www.forestry.gov.uk/pdf/WFEAbridgedFinalProgressReportweb3.pdf



The **Biomass Energy Market Support Scheme** is a support programme in France managed by ADEME, the national energy control agency. It is part of the national 'Fond Chaleur' (Heat Fund), which dedicated 1.12 billion euros in 2009-2012 to renewable resources development. Up to 50% of investments in new heating plants set up by public or private organisations which produce at least a heat equivalent of 1000 tonnes of petrol per year are covered. An important condition for eligible projects is that supplies include wood biomass.

► ADEME. www.ademe.fr ; <https://tinyurl.com/lrfdz54> ; Wikipedia. https://fr.wikipedia.org/wiki/Fonds_Chaleur

The **Tax Credit for Energy Transition** in France targets individuals undertaking construction work in their home to improve energy consumption. It supports the forest-based sector with products like pellet boilers, fireplaces, wooden windows and wood-based insulation products are eligible.

► <https://www.impots.gouv.fr/portail/particulier/depenses-eligibles-au-cite>

Prerequisites

Countries that have committed to reducing fossil emissions often depend highly on wood biomass to reach their objectives. They tend to offer significant subsidies to support the development of wood-based markets and new processing plants with large processing capacities. For a smooth transition, the authorities need to make sure that this new processing capacity does not overuse locally available resources and disrupt the markets of regionally established companies.

3.4 Organisation and cooperation

An important set of measures to enhance wood mobilisation involves improvements to the organisational capacity of forest owners, forest enterprises and other companies in the wood supply chain. Organisational solutions are largely aimed at improving land ownership of small-scale structures, facilitating the cooperation of forest owners and stimulating markets for forest products.

M4.1 Structural improvement of land ownership

M4.1.1 Forest land consolidation

Forest land consolidation (FLC) is an effective land development instrument designed to overcome the fragmentation of small-scale private forest property through realignment of land parcels. Such land readjustments require long-term procedures, but they lead to decisive structural improvements and valorisation of private property and the activation of forest use with many positive regional economic effects. FLCs need to be implemented by a responsible consolidation authority through a regulated FLC procedure in close cooperation with local actors. Through precise surveying and thorough planning, dispersed land parcels are realigned to overcome the problem of fragmentation. A broad range of additional measures (e.g., road construction, silvicultural improvements and landscape interventions) can be included in an FLC to increase the benefits for SFM. An optimised consolidation of the property leads to a legal change of the land register and decisive improvements to the efficiency and competitiveness of forest enterprises.

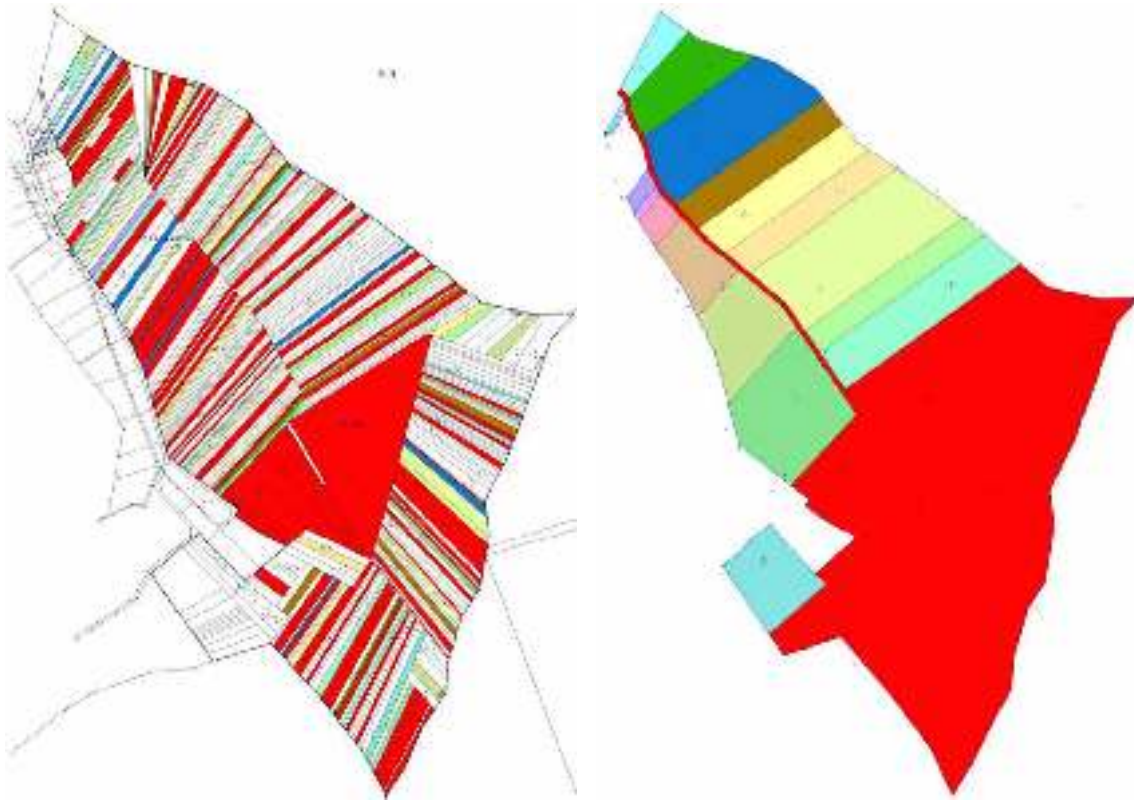


Figure 10: Private forest ownership map before and after a completed land consolidation. Example of an optimal realignment of a highly fragmented forest area during the FLC Biebertal in Hesse, Germany. The municipality of Biebertal (red area) consolidated communal forest land and acquired in addition over 400 small land parcels from 127 private owners. 30 private owners who did not sell their land (other colours) were consolidated according to different preferences for individual forest management (consolidation ratio 9:1). Lastly a forest management association was formed with 28 members and 23 hectares (Gläsmann 2012 ⁵⁴).

Land consolidations have been carried out extensively in agriculture, but are less known in forestry. FLC proceedings in Germany require several years for their full completion and are co-funded by 70-80% from public funds (national and EU). There is convincing evidence of the benefits of FLC, which can induce a major multiplier effect on regional value added and rural development, leading to a significant increase of wood mobilisation. In Germany, 26 FLC procedures have been assessed in a comprehensive cost-benefit study using a value added model with 35 impact categories. The resulting average impact value was calculated with 12,000 euros/ha and an average impact-cost ratio of 3,5, which underlines the effectiveness of the instrument ⁵³.

Land consolidation includes the following main types of measures:

- 1) The establishment of new public planning agencies responsible for the implementation of land consolidation actions.
- 2) The realignment of fragmented property through voluntary land parcel exchange among owners; also termed land swapping.
- 3) Special grouping procedures with shareholders: forest owners cede their land title to a legal body with joint ownership.

Further relevant measures related to land property can be found in Section 3.2, 'Regulatory and legal framework'.

Practice examples

Land swapping in Galicia, Spain, a major forest region with a high share of private and local community forests (98% of the total) which are highly fragmented (80% below 0.5 ha). Consolidation of management units through land swapping is an important tool to strengthen SFM in Galicia with the active support of the forest industries and the authorities, leading to higher profitability of forestry and a decrease in the risk of forest fires.

- ▶ Cogolludo M. Land swapping - a possible response to forest fragmentation. Case of Galicia. Presentation. 2009. www.unece.org/fileadmin/DAM/timber/meetings/COGOLLUDO_Land_swapping_SpanishexampleENG.pdf

FLC of community forests in NRW, Germany. Based on the unique legal framework of the Community Forest Act GWG in NRW (see Section M1.1 ‘Land ownership regulations’), this special consolidation action involves a legal merger of community forests and private owners to create a larger forest cooperative society. The intervention goes beyond the readjustment of land parcels owned by single individuals as is the case during a conventional consolidation process. Small-scale private owners can join the FLC to convert their fragmented property into shares of community property. The degree of integration during the merger, and the benefits for collaborative SFM, are thus enhanced compared to conventional land consolidations. Various supporting measures, such as road construction, silvicultural improvements or landscape interventions are included to generate additional sustainable impacts in the region.

- ▶ Kies & Peter 2017. SIMWOOD Pilot Project NRW Final Report. EFI, IWWH, BRA. www.simwood-project.eu; <https://tinyurl.com/yb8pnq73>

The **Sociétés d’aménagement foncier et d’établissement rural (SAFER)** are *rural development and settlement societies* in France. They are non-profit corporations with a mission to: i) energise agriculture and forest areas, ii) promote local development, iii) protect the environment, landscapes and natural resources, and iv) assure a transparent rural real estate market. They observe the rural land market and intervene by acquiring land through pre-emptive rights of sale (see Section M1.1 ‘Land ownership regulations’), which are then attributed to private or public owners for the purpose of improving the ownership structure of farms and forest holdings.

- ▶ SAFER. www.safer.fr; www.safer.fr/iso_album/safercra15_def__page.pdf; <http://archive.is/cSOEa>

FLC of jointly owned forests in Finland demonstrate clear benefits for forest stand structure and carbon storage. The creation of new jointly owned forests is regarded as an integral part of Finnish FLC projects. Consolidation of jointly owned forests under study has led to an increase in the average stand size of between 1.0-1.8 ha. The creation of jointly owned forests presents clear benefits compared with pure land consolidation through economies of scale. The value of the increased carbon storage in the studied area is approximately 750 000 euros, or 153 euros/ha. The results highlight the potential contribution of land consolidation to combat climate change.

- ▶ Kolis K. 2016. Jointly owned forests and forest land consolidation – increasing the stand size in fragmented areas. 2015;11(1):7-17. <https://journal.fi/njs/article/view/50830>
- ▶ Kolis K, Hiironen J, Riekkinen K, Vitikainen A. 2017. Forest land consolidation and its effect on climate. *Land Use Policy*. 61:536-542. doi:10.1016/j.landusepol.2016.12.004

Prerequisites

An explicit *legal basis and regulatory framework* for FLC procedures is required; also acting as a basis for granting permission to access public co-funding from national or European funds. Second, suitable *land registers and cadastres*, which allow authorities to locate private

forest land parcels, are an important prerequisite. Depending on the accuracy of available land records, considerable effort may be required for new surveys of land parcels. Third, a *critical mass of forest owners* needs to be in favour of carrying out an FLC: a lot of public information, consultation and individual negotiation with forest

owners is required before a successful FLC can be initiated. Once a sufficient majority is confirmed, the FLC can be initiated and forest owners who oppose the FLC will nevertheless be obliged to be included in the land consolidation, during which they will be compensated with land parcels of equal land value in another location.

M4.1.2 Joint forest ownership based on land shares

The main characteristic of this type of ownership is that the owners do not own a particular land parcel within a forest area, but an ideal share of the whole cooperative property, which can be understood as a share of a stock market. Based on this principle, community forests have existed for centuries and are still being managed today. The 'shareholder principle' has explicit advantages for forestry, because the activities do not have to be applied to small land parcels with multiple individual owners and can thus be planned and carried out more efficiently for larger management units. This approach generates interest among researchers and practitioners who are looking for new joint forest management solutions to overcome the structural deficits of small-scale private forests. Two main types are identified:

- 1) *Closed communities of joint owners* aiming to preserve the community land as a whole, which is the main goal of community forests. The transfer of shares between shareholders follows strict rules which prevent the land from being divided and 'outsiders' obtaining shares without the consent of the community.
- 2) *Open communities of joint owners*, which seek to increase the number of owners and the area of community land.

Practice examples

The **Groupement forestier** is a *forestry grouping* in France: a legal body formed by private land owners who agree to transfer their private property into shares in the jointly owned land. Four different types exist according to the objectives of afforestation, conservation, investment or transformation. It is the most advanced and efficient form of French forest cooperative ensuring continuity in forest management over time.

► www.foret.info/guide-foret-privee_46/le-groupe-ment-forestier.html ; <http://archive.is/GP5U2>

The **Waldgenossenschaft** is a *forest cooperative society* (FCS) in NRW, Germany. FCS are a type of jointly-owned community forest which have the legal status of a *public body by law*, but are still explicitly considered as private forest according to the Community Forest Act GWG in NRW (see Section M1.1 'Land ownership regulations'). FCS can be understood as 'bounded private forest', whereby the cooperative has the sole function of managing and administering the community assets, although it is not their owner. Currently, in NRW there are 270 FCS with circa 42,000 ha of community forest and an estimated 17,500 forest owners as shareholders. They also exist in other federal states, like Bavaria and Thuringia, although their legal status is less well defined.

► Kies & Peter 2017. SIMWOOD Pilot Project NRW Final Report. EFI, IWWH, BRA. www.simwood-project.eu ; <https://tinyurl.com/yb8pnq73>



The **Aigas Forest Community**

Woodland (Coille Coimhearsnachd Aigeis) in Scotland, UK, is a community run social enterprise, which has managed to develop a poorly maintained forest into a profitable enterprise that is being sensitively managed with a multi-functional and nature conservation vision. The 250 ha forest area was bought in 2015 by the community from the Forestry Commission. The arrival of community ownership, whereby the community has a real stake in the success of the forest enterprise, encourages new initiatives (including NTFP) and a significant increase in timber mobilisation from the previously under-managed site.

► www.aigasforest.org.uk ; <http://archive.is/rs8IT>

The **Bürgerwaldfond** is a Citizen Forest Fund in NRW, Germany. An investment company owns the forest and facilitates ‘non-forest owners’ to participate in forest investments. This is a novel, more recent model with which different legal forms are possible. It is not a conventional kind of investment fund, but serves the less material interests of owners with a more urban background.

► <https://de.wikipedia.org/wiki/Bürgerwald-Konzept> ; <http://archive.is/r4AuB>

Prerequisites

A legal framework that ensures the statutory existence of jointly owned forests is required. In many regions, traditional community forest rights are not compatible with modern civic or public law. If joint ownership is being increased, landowners must be willing to permanently cede their private property to a cooperative body and become a shareholder.

M4.2 Cooperation in forest management

Solutions for joint forest management and ways to activate small-scale private forest owners are key to unlocking underused forest land. Cooperation of forest owners in Europe takes place in a large variety of organisational arrangements with diverse definitions of ownership and forms of collaboration. Their common purpose is to group individual land owners into larger units or bodies to reach a viable scale for forest operations. Forest owner organisations are constituted according to national legislation, for example, the national forest act and corporate law or similar. Therefore, large differences exist between countries and regions that set the specific legal framework in which these organisations are allowed to operate. Three main classes can be distinguished according to their degree and purpose of organisation: joint forest management, cooperatives and joint timber marketing organisations.



M4.2.1 Joint forest management actions

This class comprises measures that require only basic cooperation among forest owners, who engage in this kind of agreement for the purpose of joint forest operations or similar activities, but usually without any commitment to a formal, institutionalised organisation, like an association. The activities can relate to simple services to support forest work or more extensive operations (e.g., harvesting, timber sales and grant applications). Private ownership rights

and duties are often not restricted, and in some cases may be transferred partially or in full. These joint forest management measures permit more open, flexible forms of cooperation and can generally be implemented more easily. The following main types of measures can be identified:

- 1) Joint actions initiated by *private* forest owners
- 2) Joint actions promoted and facilitated by *public* institutions

Practice examples

The **Waldpflegevertrag** is a *forest tending contract* in Germany. Defined forestry interventions and tasks are assigned to a third party, such as a forest entrepreneur or a forest owner association. Forest operations are bundled for many owners, but the cost to each owner is accounted for separately. The measure currently represents one successful option for forest owner activation in Bavaria and a number of other German federal states.

- Schaffner S. et al. Das Arbeitsfeld Waldpflegeverträge. LWF aktuell. 2009;70:30-33. www.lwf.bayern.de/mam/cms04/service/dateien/a70-forstliche-zusammenschluesse-web.pdf

The **PSG concerté** (Plan Simple de Gestion) in France is a *simplified management plan* for grouped agricultural or forest operations. It involves the joint management of a group of small woodlots of less than 10 ha each, delivering forest work such as planting or road maintenance, simple forest management plans and logging operations. It allows timber sales from a large number of owners to be bundled together.

- Foreo.fr <https://tinyurl.com/y9f6hqas> ; <http://archive.is/LwcBw>

The **Plan de développement de Massif** is a *regional forest development plan* in France. With the support of regional authorities, local stakeholders and experts coordinate an action plan for a territory with large unused

timber resources to reduce the negative impacts of property fragmentation, increase harvesting by marketing larger bundles of wood, establishing joint infrastructural developments and contributing to SFM. An evaluation of this instrument assessed 307 plans covering 1.8 million ha in France, which reached out to 5% of the 57,600 forest owners in these areas. The conclusion was that successful plans involved all actors (not just the main ones), including politicians, cooperatives and larger industries. While the plans had a significant impact on road and access improvement, they had limited impact on wood mobilisation as such. An exception was the Auvergne region where the increase in wood mobilisation was significant, yet still lower than 1m³/ha/year.

- Chabe-Ferret S, Sergent A. 2012. Evaluation de la contribution des Plans de Développement de Massifs Forestiers aux objectifs et enjeux de la politique forestière nationale. doi:10.13140/RG.2.1.46073845. <https://tinyurl.com/yb5q5cwk>

Wood Allotments is a scheme run by the Mersey community forest in North West England. Via a website, land parcels that need to be thinned are advertised to private individuals, who are willing to produce firewood for their own use for an affordable price. Trees are marked in advance by the landowner or by community forest staff members. Individuals harvest trees with hand tools and pay a small fee to the landowner.

- www.woodallotments.com ; <http://archive.is/LNacM>



Prerequisites

The legal framework has to be ensured. Proactive forest owners are needed to lead the initiative and help gain a critical mass of participants. Competent professionals must be available as advisors and service providers in the region.

M4.2.2 Cooperatives

This class includes organisations formed as collectives of individual private owners for the purpose of joint forest management. They are institutionalised permanently as legal bodies and are allowed to carry out operations and management decisions on behalf of their members. In many countries their establishment is promoted by associations and public agencies who seek to join and coordinate private forest owners and compensate for the disadvantages of small-scale ownership structures. As a member of a cooperative, an individual landowner participates in the cooperative work or benefits from the cooperative services provided to its members, while his or her land title and ownership rights remain fully intact. Engagement with the cooperative is to a large extent voluntary, and the forest owner can

decide to leave it at any time. A key aim is to foster a higher level of professionalism within the cooperative, by employing its own qualified staff for example, which can reduce its vulnerability towards forest-related challenges and reduce its dependency on public support. Different forms of forest owner associations and cooperatives have already existed for several decades in many EU member states. The main types are:

- 1) *Smaller cooperatives*, which are often initiated as social self-help institutions. Typically they rely on professional advice from the state forest service and, at least at the beginning, on governmental subsidies for staff and/or finance.
- 2) *Professional cooperatives*, which have developed into corporate actors that operate independently and provide services for their own members and external clients. Besides forestry and harvesting operations, such cooperatives are also active vendors and distributors of timber, capable of handling large volumes of stock. Professional cooperatives represent a reliable partner for the state forest service and the woodworking industries.

Practice examples

The **Forstbetriebsgemeinschaft** (FBG) is the typical *forest management association* in Germany. FBGs are the most established form of cooperatives in Germany and are key actors in the private forest sector. Their main purpose is to overcome the structural deficiencies of small-scale ownership through joint and more professional measures, which remains a challenge in many regions. Today, FBGs also frequently operate as independent service companies with support from their members. Besides the provision of advice, management activities and road construction in their members' forests, FBGs also carry out marketing of timber to wood industries, partly as distributors. They can receive advice and financial support for this purpose, such as for employing qualified forestry personnel. In Bavaria there are 136 FBG with more than 160,000 members managing a forest area of 1.2 million ha and producing a sold timber volume of over 4 million m³/year (especially spruce) in total (data for 2015). The majority of members own forest land of 2 to 5 ha.

- ▶ Borgstädt K. Forstliche Zusammenschlüsse in Deutschland. Waldwissen.net. 2004. <https://tinyurl.com/y9zxezvl>
- ▶ Aurenhammer P.K. 2017. Forest land-use governance and change through Forest Owner Associations. Actors' roles and preferences in Bavaria. Journal for Forest Policy and Economics (in print).

The **Cooperative forestière** is the French form of a *forest cooperative*. Adapted from agricultural cooperatives, its aim is to ensure the economic and social benefit of its members through a collaborative, democratic model. The membership is open and deliberate, so each member can obtain support from the cooperative. They can organise a range of activities from silviculture and road construction to harvesting and timber sales. Following a major consolidation process in recent decades, cooperatives are becoming one of the main operators in France.

- ▶ Coop de France. La Coopération Forestière. www.coop-defrance.coop/fr/38/foret-et-bois/; <http://archive.is/9rD2A>

The **Association syndicale de gestion forestière** is a *trade union for forest management* in France. The purpose is to develop a simple management plan on behalf of all the owners, and carry out forest management, equipment and marketing. As a cooperative, the associated property of individual owners remains intact. In the case of sale or inheritance, the new owner remains a member of the association. The scope is to execute common work to i) prevent natural disturbances, ii) exploit natural resources, iii) maintain water streams, roads and other networks, and iv) enhance the private property. There are two forms of the trade union: the *Association syndicale libre* (ASL) is a legal entity governed by private law and created with the unanimous consent of the forest owners, and the *Association syndicale autorisée* (ASA) is a public administrative body created following a public enquiry by one or several interested forest owners, a local authority or a group of local authorities. It has prerogatives to take actions on private land. See also the example of an ASA in Section M2.2.

- ▶ CNPF. <http://www.cnpf.fr/corse/n/le-role-des-associations-syndicales/n:855>; <http://archive.is/VUcuq>
- ▶ Legifrance.gouv.fr. Code forestier. Association syndicale de gestion forestière. <https://tinyurl.com/y8jukstx>; <http://archive.is/jraeP>

The **Zona de Intervenção Florestal (ZIF)** in Portugal is a joint *Forest Intervention Area* that assembles and organises small forest holders for forest management and protection. Please refer to the complete description in Section M2.2 '*Forest management regulations*'.

Three members of the **SIMWOOD** consortium represent forestry cooperatives:

Irish Wood Producers Ltd. in Ireland is a non-profit company managed by private forest owners to support almost 650 members with the sustainable management and development of their forest land. Starting out as a local discussion group, the company has developed a strong commercial element to deliver services to its members. The main

advantage of the group is the clustering of forest activities in local areas to secure contractors and to reach economy of scale for timber markets together.

► IWP. <https://irishwoodproducers.com> ; <http://archive.is/QVRmp>

Forêts et Bois de l'Est (FBE) is a professional cooperative of 4,000 private forest owners in North Eastern France, a main forestry actor in the region. FBE's range of activities include the forest management of about 75,000 ha of forest, silvicultural operations, logging, raw timber trade (approx. 280,000 tonnes/year) and wood chips (approx. 80,000 tonnes/year), management of storage facilities, and transport and delivery to end users. FBE holds shares in a subsidiary company specialising in forest machinery and energy wood harvesting.

► FBE. www.foretsetboisdelest.com ; <http://archive.is/U6vpb>

ARBOREA, Associação Agro-Florestal e Ambiental da Terra Fria, is a non-profit association of around 500 forest owners and producers in North-Eastern Portugal. It's main activities include technical support and forest extension, forest planning, communal forest administration and management, cadastral surveys, forest operations, forest surveillance and fire-fighting. The association is responsible for the management of two ZIF (Forest Intervention Zones, see Section M2.2.), one of 2142 ha and one of 5207 ha.

► ARBOREA. www.arborea.pt ; <http://archive.is/b5OED>

Further selected examples of forest cooperatives are:

Mancomunitat de Municipis Berguedans per a la Biomassa in Catalonia, Spain, is a biomass association of six municipalities which has signed a collaboration agreement with the Ministry of Agriculture for the joint management of around 16,000 ha of forest. The association acts as the main contractor and conducts the auctions for forest operations, logging and woodchip boilers. Having

gained economies of scale and flexibility, MMB can sell larger timber batches to local sawmills, negotiate better prices and offer better wages to their forest workers.

► MMB. www.mmbbiomassa.cat ; <http://archive.is/IDpHB>

Coillte Premium Partners in Ireland is an innovative partnership between the state forest enterprise Coillte and private forest owners, who can earn an annual, fixed income from their forests while retaining ownership of their land. Coillte own the harvesting rights to the crop and the landowner receives a lump sum payment when the crop has been clear-felled. The program is an incentive for landowners who have high quality, commercial forest crops for which afforestation grant payments have expired, and who face a long wait until their forest generates income from timber harvesting.

► www.coillte.ie ; www.coillte.ie/media/2017/04/Coillte-PremiumPartners-Brochure.pdf

Culm Woods is a membership association in South West England, UK, which organises fuelwood felling actions by engaging local volunteers. The idea is to bring small undermanaged woodlands into management by engaging both skilled and unskilled teams of volunteers to fell logs and extract fuelwood. All machinery is operated by certificated members and contractors, whereas all firewood goes to the membership. The members pay a small annual fee, carry out the forest work on designated days and obtain fuelwood. The association is covered by risk insurance and is thus allowed to work for forest trusts, commissions, and private woods.

► www.woodbiz.co.uk/fp.php?id=1469 ; <http://archive.is/9rSVh>

Axewoods in South West England, UK, is a small community cooperative with a membership of 40 private persons at the time of writing, who are mobilizing inactive woodland areas on private estates. The cooperative provides its members with woodfuel, enhances understanding of woodland ecology and collaborates for collective community



benefits. Much of the unmanaged woodland is not viable on a commercial basis due to poor access, steep slopes and the small size of holdings. Essentially the management operations are delivered by volunteers in return for the wood extracted. Small local grants have enabled the purchase of equipment, while cooperative membership subscriptions fund recurring expenses such as training and insurance.

► www.axewoods.org.uk ; <http://archive.is/BUtim>

Bosland in Flanders, Belgium is a co-owned forest management cooperative. It is a statutory partnership of several public forest owners and stakeholders, managing an area of about 22,000 ha of previously fragmented forest relicts. Co-owned models, where different types of forest owners collaborate and forest users participate, are still quite an exception in Belgium. The cooperative represents a new way of forest management that can generate more coherent delivery of multiple ecosystem services for a variety of stakeholders.

► Vagansbeke P, Gorissen L, Nevens F, Verheyen K. Towards co-ownership in forest management: Analysis of a pioneering case 'Bosland' (Flanders, Belgium) through transition lenses. *Forest Policy and Economics*. 2015;50:98-109. www.sciencedirect.com/science/article/pii/S1389934114001373

► www.bosland.be ; <http://archive.is/vufXt>

Södra is the largest forest-owner association in Sweden and an international forest industry group with over 3,400 employees. With around 51,000 private forest owners as members, about half of the forest land in the Southern Sweden region is united in the cooperative. Special training programmes provide support to private owners to help them increase their return from the forest and to increase productivity in the natural environment. The raw timber from felling is usually supplied to their own production facilities, as the company operates several major sawmills and pulp mills in Northern Europe. Today the company has also become a major producer of electricity, district heating, and solid bio-fuels.

► www.sodra.com/en ; <http://archive.is/rmbTq>

Metsä Group is a large Finnish forest industry group with around 9,300 employees, owned by the Metsäliitto Cooperative uniting around 104,000 forest owners. The group operates various pulp, paper and sawmills worldwide. In 2017, the group started up a next generation bioproduct mill, which will be a platform for the production of new bioproducts, including various lignin products, textile fibres and biocomposites.

► www.metsagroup.com/en ; <http://archive.is/pXgSb>



Prerequisites

The individual cooperative must have a minimum size of forested area and timber stock so that the marketable timber volume will be attractive for potential customers. The forest owners have to agree with the goals of the cooperative, which in turn needs to follow the rules and guidelines for SFM and public grants. The forest management strategy and work activities need to be decided unanimously by all participating members.

M4.2.3 Joint timber marketing

Joint timber marketing enables the bundling of larger sale volumes to reach viable economies of scale. By uniting and coordinating numerous suppliers of wood on a regional scale, the transaction costs of harvesting and transport are reduced and forest owners are able to negotiate more competitive, more stable, long-term prices for a given volume with the buyer. It's a win-win for both sides: professional marketing organisations are more suitable and reliable partners for larger wood processing industries than smaller associations, and they also have a better position in price negotiations. The main activities consist of the coordination of marketing, transport and distribution logistics, but sometimes they also include forestry operations such as planting and harvesting. The following types of measures can be identified:

- 1) *Joint timber marketing through an intermediary*, in most cases the state forest service who coordinates the purchase and sale of timber batches to larger buyers.
- 2) *Joint timber marketing organisations* are professional business entities, in most cases founded as independent trading companies, which are often owned by a number of private forest owners, forest owner associations and/or forest service companies or entrepreneurs. Some organisations have their own daughter companies specialising in forest machinery and harvesting equipment and logistics, provided as services for their members.

Practice examples

Ventes groupées de bois des forêts des collectivités in France are *grouped timber sales initiatives for communal forests*. The French forest service ONF bundles different timber batches from several communal forests and state forests. This allows the collective to offer larger timber batches of more uniform and specific quality and to establish supply contracts with wood processing industries.

- ONF Office National des Forêts. Ventes de Bois Des Forêts Publiques. Textes Essentiels.; 2008. <http://tinyurl.com/yap9kyfv>

The **Forstwirtschaftliche Vereinigung** (FWV or FV) is the typical form of *forest management federation* in Germany. It is an umbrella organisation uniting local forest management associations (FBG). Its main services include forest planning consultancy, joint purchase and supply of machinery, preparation of products to conform to market requirements, and coordinated marketing of timber. FWVs often have specialised practical knowledge in forest machinery, harvesting equipment and logistics. They also provide information for the associated FBGs and operate as political interest organisations. FWVs are allowed to recommend and advise their members in price negotiations. At least 20 FWVs can be identified in Germany. In Bavaria, seven larger FWVs were established on the level of administrative districts, covering almost the whole of Bavaria. They unite more than 136 FBGs with over 160,000 forest owners and 1.2 million ha of private forest. In other German federal states, the number and size of FWVs is smaller. A good example is the Forstwirtschaftliche Vereinigung Lüneburg GmbH in Lower Saxony, which supports 2,600 private owners with 58,000 ha of forest and organises the joint marketing of timber to local paper and wood industries.

- Borgstädt K. Forstliche Zusammenschlüsse in Deutschland. Waldwissen.net. 2004. <https://tinyurl.com/y9zxezvl>
- FVL Forstwirtschaftliche Vereinigung Lüneburg GmbH. Waldmärker. <http://waldmaerker.de/> ; <http://archive.is/dmjV9>

Gemeinsame Holzverkaufsgesellschaften in Germany are *joint timber trading companies*, which were founded in recent years by groups of several private and public forest owners to gain more volume for joint timber marketing. They are often owned by one or several FWVs or FBGs, and are a more suitable partner for larger wood users than the smaller associations. Acting as an intermediary between private forest owners and wood-based industries, they can play a key role in the wood supply chain. Owing to their size they can balance disadvantages of ownership (e.g., fragmentation), forest structures (productive conifer plantations vs. mixed forests) and build long-term trusting collaborations with the state forest administration. A good example is the EWH GmbH in the Eifel region of Germany, which was founded by a private forest owners' association to concentrate and sell the timber from more than 10,000 private forest owners, and to provide joint marketing and forest management services. EWH co-operates with the state forest service which counsels forest owners, whereas EWH is responsible for harvesting and timber marketing.

- ▶ EWH GmbH. www.ewh-bitburg.de ; <http://archive.is/78oSG>
- ▶ Wippel & von Hövel, 2015. Privatwald in RLP hin zu mehr Eigenständigkeit. AFZ 18/2015, 42-45. <https://tinyurl.com/y9yfqpjg>

The **Biomassehöfe** in Austria are *biomass trade centres*, which are well established local distribution hubs for the whole biomass supply chain, managing harvesting, processing, storage and sale to the end user. A good example is the Biomassehof Steiermark in the Styria region. The successful concept has been adopted widely in many European regions promoted by several EU projects.

- ▶ Waldverband Steiermark. Biomassehof. www.biomassehof-stmk.at ; <http://archive.is/MXh7m>
- ▶ SFI Slovenian Forestry Institute. Biomass Trade Centre 2. www.biomassradecentreii.eu ; <http://archive.is/ffpSur>

Biomass Salland is a forest owner collective in Overijssel, The Netherlands, which harvests local biomass and sells it to bioenergy suppliers. The collective includes an agricultural nature association (ANV), a landscape enterprise and other forest owners. The focus is on biomass from landscaping and forestry residues, which is not demanded by higher value markets, and thus can be used for wood chip production. A major objective is to maintain the cultural landscape and promote balanced, sustainable use of biomass.

- ▶ Biomass Salland. <http://www.biomassalland.nl> ; <http://archive.is/Pl08T>

The **Ward Forester** initiative in Devon, South West England, UK, encouraged woodland owners to form voluntary groupings of small woodlands ('wards') for joint harvesting and selling of timber by contractors. Private forestry consultants undertake the role of Ward Foresters to work a cluster of woodlands under different ownership, developing opportunities to introduce economies of scale and more attractive tender opportunities for forestry contractors through cross-ownership working. Project staff manages promotional activities and enquiries, records owner/woodland details, establishes wards and carries out a brokerage role between owners and foresters, often consisting of site visits and continued support.

- ▶ Forestry Commission. Ward Forester Initiative, 2012. <https://tinyurl.com/yccpxv4r>

Prerequisites

Local forest owners or forest owner associations need to have the professional capacity to commit to the long-term engagements required for joint marketing. Second, the available timber and conditions for harvesting on the forest land should not be too heterogeneous to allow for cost-efficient bundling of batches. Third, the legal framework needs to ensure clear rights and rules for joint timber marketing. For example, in Germany, the Federal Cartel Office prohibited the role of the public state forest service as an intermediary in joint timber marketing to ensure open market competition.

M4.3 Market development

Wood mobilisation can be supported further through measures that stimulate demand and markets for wood as a sustainable resource. These types of measures often have a broader scope and are aimed at enterprises in the wood-based value added chain, although they can also

lead to tangible benefits for forest enterprises as the initial supplier of the raw material.

M4.3.1 Certification and labelling

Certification and labelling are becoming more important as a means to providing better transparency to customers about the quality of a product and the conditions under which it is produced. Products (i.e., timber or biomass assortments) and production processes (i.e., management systems of forest enterprises) can be certified according to a defined standard for sustainable management. In a certification scheme, the compliance with a standard must be documented through a set of criteria, indicators and verifiers, and must be approved and confirmed on a regular basis through independent external audits.

- 1) Accredited certification schemes, e.g., FSC, PEFC, ISO, DIN
- 2) Self-proclaimed quality labels of producers, addressing, for example, regional origin or specific quality aspects

Practice examples

The **Grown in Britain Group Licensing Scheme** in UK brings unmanaged privately owned woodlands into productive and sustainable management by adopting a marketing brand. For example in Yorkshire and North East England, UK, the Grown in Britain forest and timber product certification scheme has been adopted at a co-operative group scheme level for forest owners and forest products across the region.

- ▶ www.growninbritain.org ; <http://archive.is/oNtzP>
- ▶ www.northwoods.org.uk ; <http://archive.is/EUWw9>

The **North Pennine Dales Woodfuel Project** in North East England, UK, is an initiative promoting woodfuel in an isolated rural area. It provides training and advice to woodfuel producers and suppliers to enhance quality assurance and achieve accreditation through a nationally recognised HETAS Quality Assured Fuels Scheme.

- ▶ www.northwoods.org.uk/projects/completed-projects/north-pennine-dales-woodfuel-project ; <http://archive.is/MKVPG>

The **National Forest Membership Scheme** in UK is a brand of the National Forest Company, a charitable enterprise promoting responsible management in partnership with local stakeholders from a 200 square mile woodland area which was established as compensation for large mining areas. It operates a membership scheme with which, for a small one-time fee, woodland businesses can use the National Forest brand to market their products to other businesses, visitors and the public.

- ▶ www.nationalforest.org/woodproductsandservices/index.php ; <http://archive.is/Quomot>

The **Bois Français** is a national timber label promoted by the Fédération Nationale du Bois (FNB) in France, which ensures that the wood itself, as well as the processing of it, are of French origin. The licence of use can be obtained by any French forest and wood-working enterprise after validation of a formal application to the federation.

- ▶ www.bois-francais.fr ; <http://archive.is/Oou7N>



Pino Soria Burgos is a quality certificate promoting regional wood from the Soria and Burgos region in Castilla y León, Spain. To date, 35 municipalities and nine sawmills have adopted the label and it represents around 110,000 ha of certified forest. The quality is certified by the CESEFOR foundation, an independent non-profit organisation.

► www.pinosoriaburgos.es ; <http://archive.is/ljkbE>

AllgäuHolz is a regional label promoted by the Holzforum Allgäu e.V., a regional network initiative of the forest-based sector located in Southern Germany. The label aims to broaden the visibility of forest products and transform products of regional origin which can be obtained by members of the Holzforum. It is based upon PEFC-certified forests and the full traceability of processed timber from regional sawmills.

► http://holzforum-allgaeu.de/holzforum/allgaeu/web.nsf/id/pa_fdihahfcq8.html ; <http://archive.is/oBtio>

Westerwälder Holzpellets is an innovative pellet producer in Rhineland-Palatinate, Germany, which uses the regional origin as a label for wood pellets. Based upon a combination of standard certificates for pellets and an additional CO₂ footprint calculation, the regional quality is marketed.

► www.ww-holzpellets.de ; <http://archive.is/yqDhe>



Prerequisites

To have an impact, certification schemes assume that the consumer has the capacity to choose between certified and non-certified products. If the product is scarce or consumers have a low level of awareness, they will make their decisions on the basis of price alone, selecting the cheaper products that are most readily available, and not making the effort to consider certified material. If consumers are aware of the benefits of the certified products, they will only purchase it if they trust the certification scheme. Untrusted labels will not benefit wood mobilisation and significant efforts may need to be made to ensure traceability. Other labels based on certification of origin will only be effective if the territories promoted are associated with specific attributes that are valued by local consumers.

M4.3.2 Investments in forest-based processing

The installation of wood and biomass processing plants close to forests in a given area are likely to increase the demand for wood. Initiatives that facilitate investments in regions where under-utilised forest resources are available are hence another measure to enhance wood mobilisation. A large range of incentives exists to invest in processing, depending on national policies and the level of development within the forest-based sector. In regions where under-developed processing plants still exist, support for their conversion may be an appropriate way to encourage investment, while, in other cases, actions to attract investment in new bio-based industries could be implemented, including the following:

- 1) Developing the non-harvested wood market; transforming the forest products chain so that other material such as deciduous tree species (hardwoods), stumps, tree crowns and tops can be processed.
- 2) Increasing the processing capacity of existing plants or facilitating the installation of new ones.
- 3) Increasing access to the resource for external processors by developing infrastructure for the wood sector, e.g., storage areas, transport routes or biomass processing terminals.
- 4) Promoting wood resources and bio-based industries to investors and attracting new investments.

Practice examples

France Bois Industries Entreprises

(FBIE) is a national council, a so-called *inter-profession nationale*, for forest-based industries in France. It unites various federations and unions representing the different industries which promote the French forest-based sector and foster more innovation. Wood mobilisation is one of FBIE's main priorities.

- ▶ <http://fbie.org/foret-bois-filiere-davenir-France> ; <http://archive.is/by1Tp>

Forinvest Business Angels is an investment association that was initiated by the Fédération Forestiers Privés de France (French Federation of Private Foresters). It brings together forest investors in order to develop investments in the French forest-based sector. Since its creation in 2010, its members have invested around six million euros in 23 companies. The association is open to any organisation or person willing to invest in the forest-based sector.

- ▶ <http://forinvest-ba.fr/> ; <http://archive.is/iOvYM>

Investment promotion aimed at attracting foreign direct investment in wood industries is a common approach, especially in South Eastern European countries. This region holds considerable underdeveloped forest resources and the wood industries are emerging anew in the post-socialist market economy.

- ▶ Invest Slovenia 2014. https://issuu.com/investslovenia.org/docs/spirit_woodprocessing_industry_web ; www.invest-slovenia.org/industries/wood-processing/ ; <http://archive.is/YRVs7>
- ▶ SARIO 2009. www.sario.sk/sites/default/files/content/files/woodprocessing_en.pdf
- ▶ FIPA Bosnia and Herzegovina 2011. www.fipa.gov.ba/doc/brosure/Wood%20industry.pdf
- ▶ European Investment Bank 2014. <https://tinyurl.com/yb4g8pvg>
- ▶ ID:WOOD project 2012-2014. www.idwood.eu ; <http://archive.is/6zZWR>

Xylofutur Action Collective 4D+ in France

is a regional competitiveness support programme for forest-based industries in the Aquitaine region and beyond, and is promoted by the regional cluster organisation Xylofutur. The programme is handled by an executive manager who guides industries to improve their processes and define appropriate investments that lead to increased competitiveness.

- ▶ <http://xylofutur.fr/actions-performances/4d-gagner-en-competitivite/> ; <http://archive.is/vnA6A>

Bio-based industries are developing new ways to produce food, feed, fuel, materials and products made from biomass and waste. Forest biomass will gain in importance as an essential resource for innovative products in textiles, health and hygiene, housing, transportation, packaging and other sectors in the future bioeconomy. As part of this new trend, established industries (e.g., pulp mills) are being converted into large-scale biochemical processing plants, so-called biorefineries, which can transform biomass into a range of high value materials. A stable supply of wood resources is key, and hence the measure can enhance wood mobilisation in territories which have historically relied on forest industries.

- ▶ Hetemäki 2011. Bioeconomy: What drives the development? Lecture. METLA. http://www.metla.fi/hanke/50168/pdf/hetemaki_espoo_150411.pdf
- ▶ BIC Bio-based Industries Consortium 2017. Bio-based Industries Success Stories. http://biconsortium.eu/sites/biconsortium.eu/files/downloads/BIC_Success_Stories_20170117-light.pdf

Prerequisites

The conversion and upgrading of existing processing plants assumes that they have the capacity, through investment and skills, to manage new technologies, which is difficult and sometimes unrealistic for small companies like local sawmills.

The decision to install new processing plants, and to provide public support for such an investment, requires good knowledge and consideration of available resources and the wider socio-economic context to avoid the creation of market disequilibrium. Subsidising a new organisation holds



the risk of local market disruption, which can jeopardise the activity of other processing mills, potentially even resulting in an overall decrease in wood mobilisation. Promotional campaigns to attract national and international investments require a high level of expertise and well-structured representative organisations to communicate the appropriate message and target appropriate funding.

M5.2 Knowledge exchange actions

M5.2.1 Regional initiatives and action plans

Various forms of regional initiatives involving dialogue and actions to support wood mobilisation can be identified in Europe. These initiatives bring together various actors to reach a specific common goal. Often their legal status permits them to access resources from national or regional authorities, such as staff or office infrastructure which has been assigned to their activity. Their success relies on the proactive commitment and creative spirit of their members and partners to develop meaningful initiatives that deliver tangible outcomes and regional impacts. For this purpose they facilitate the

development of strategic plans and collaborative projects with local stakeholders, which can obtain substantial support from national grant-giving bodies and other funding schemes. The following main types can be identified:

- 1) *Regional action plans* aiming at a specific goal in a given territory. These can range from specific forest-related topics (e.g., forest access, wood mobilisation or forest conversion) to broader goals that support, for example, economic or rural development, resource efficiency or climate change adaptation.
- 2) *Collaborative networks* or formal associations of companies and stakeholders that join forces to promote dialogue, overcome barriers related to wood mobilisation and markets through joint representation. Such networks exist locally, regionally, nationally or even internationally.
- 3) *Clusters* are institutional structures including researchers, industry and regional authorities that aim at a more strategic level of dialogue and cooperation, in particular to foster research and innovation.

Practice examples

The **Schema directeur de desserte forestière** is a *Road development action plan for forests* in France. It facilitates coordination between national and local road owners and land owners to prioritise public investment in road networks that currently restrict the access of trucks to the forest (e.g., through bridges, weight restrictions, curves, walls, etc.). The main objective is to make sure that appropriate roads exist and that the main obstacles are identified. These plans also aim to promote joint investment for forest owners by prioritising forest owners who are members of such an action plan when allocating investment grants.

- ▶ Millot Moyne 2002. La conception de schémas de desserte forestière: un outil de concertation pour les acteurs de l'espace forestier. Ingénieries no. special, 113-121. <https://tinyurl.com/ybz4zy4n>

The **Charte forestière de territoire** is a *Charter of forest lands* in France, in which all key actors in a given area including authorities, public bodies, stakeholders, companies and forest consumers are assembled to discuss the objectives and management options required to secure and improve sustainable forest management. It has been applied particularly in various regional associations of *départements* and *communes* across France. They follow a multifunctional vision of forest use and promote the development of the regional forest-based sector through various projects.

- ▶ FNCOFOR Communes forestières de France, 2010. Les chartes forestières de territoire (CFT) en 10 questions. <https://tinyurl.com/yd47rwo4> ; www.fncofor.fr

The **Bergwaldoffensive** (BWO) is the *Mountain forest initiative* in Bavaria, Germany. Its goal is to identify and implement measures that allow adaptation of alpine forests to climate change in line with the objectives of the Alpine Convention. It was initiated in 2008 by the government and is financed with about 2.5 million euros per year. It comprises a package of broad measures to encourage forest owners to preserve multifunctional mountain and protection

forests, especially in private and communally owned forests with fragmented property structures. Specific areas identified as having an elevated risk for degradation are selected as BWO projects, where measures for maintenance and adaptation are set in motion. These include planting and tending of adapted tree species, natural regeneration, logging with cable cranes or construction of new forest roads and skidding tracks. Local forest authorities are responsible for planning the measures together with forest owners, which increases their efficiency and reduces costs. Participation is an important part of the integrated programme: all stakeholders have the opportunity to contribute their ideas at every stage. A central factor for success is the 'BWO advisory board', founded in each project area, which typically consists of politicians, representatives of forest owners, local authorities and other organisations (e.g., hunters, farmers and conservationists). Further complementary actions by the BWO include access to adapted seed sources, information on mountain forest sites and research on the effects of climate change.

- ▶ www.bergwald-offensive.de ; www.stmelf.bayern.de/wald/forstpolitik/117563/index.php ; <http://archive.is/hoKEB>

The **Wald-Initiative Ostbayern** (*Forest Initiative Eastern Bavaria*, WIO) and the **Initiative Zukunftswald** (*Future Forest Initiative*, IZW) are other regional initiatives in Bavaria that are comparable to the BWO. They are based in other regions and have a slightly different focus, but follow in principle the same participatory approach of stakeholder engagement through regional 'roundtables'. A key focus is adaptation to climate change through conversion of spruce-dominated forest stands into more resilient mixed forest stands. The measures include afforestation, stand conversion, road construction and inclusion of small-scale private owners. Actions show an impact on harvesting activity and are also expected to secure wood mobilisation in the long term.

- ▶ www.stmelf.bayern.de/wald/forstpolitik/117563/index.php ; <https://tinyurl.com/yd8ec6ag> ; <http://archive.is/hoKEB>

Wood cluster initiatives and networks

are cooperation platforms within the forest-based industry sector. They are often embedded in a national or regional cluster policy and aim to enhance networking and collaboration between enterprises, research institutions and vocational education and training centres. They aim to include all stakeholders along the value chain, from forestry to sawmills, carpenters, wood construction, furniture, energy planners, architects and designers. Cluster actions also carry out comprehensive sectorial studies, foster regional networking and cooperation in R&I pilot projects, initiate expert roundtables and innovation workshops, enhance qualification and training programmes, develop information campaigns on specific topics and promote the forest-based industries through public relations, trade fairs and international relations. Depending on their setup, they rely partly on national funding as well as member fees from industries and competitive R&I funding from international programmes. A selection of examples from the many that are operating includes:

- ▶ Holzcluster Steiermark (Wood Cluster Styria) in Austria, www.holzcluster-steiermark.at ; <http://archive.is/EuDGp>
- ▶ Holzcluster Salzburg (Wood Cluster Salzburg) in Austria, www.holzcluster.at ; <http://archive.is/Xo1Gw>
- ▶ Cluster-Initiative Forst und Holz Bayern (Bavarian Forest and Wood Cluster Initiative) in Germany www.cluster-forstholzbayern.de ; www.forest-ry-wood-cluster-initiative-bavaria.de ; <http://archive.is/QxzJP>
- ▶ Clusterinitiative Forst und Holz Baden-Württemberg (Forest and wood cluster initiative Baden-Württemberg) in Germany www.cluster-forstholz-bw.de ; <http://archive.is/WNxNZ>
- ▶ Holzforum Allgäu e.V. (Wood Forum Allgäu) in Germany, <http://holzforum-allgaeu.de/> ; <http://archive.is/DPEBv>
- ▶ Xylofutur in Aquitaine, France, one of the French innovation clusters (pôle de compétitivité). <http://xylofutur.fr/> ; <http://archive.is/uMaiT>
- ▶ Bois & Vous (Wood & You), a regional network in Northern France, www.bois-et-vous.fr ; <http://archive.is/XxYzy>
- ▶ Slovenian Wood Industry Cluster, www.lesarski-grozd.si/en/ ; <http://archive.is/vxTr9>
- ▶ Croatian Wood Cluster, www.drwniklaster.hr ; <http://archive.is/rltWh>

Prerequisites

The regional authorities involved need to have sufficient influence to allocate incentives to organisations and networks that are engaged in territorial strategic planning, promotion and innovation. In large regions with many actors, the initiatives require extensive consultation and representatives of the main stakeholder groups should be involved. To establish a cluster, the challenge is particularly complex because R&D and training centres also need to be engaged. The main risk associated with this planning approach is that plans are developed that fail to involve a key group of stakeholders, leading to unbalanced decisions. Another risk in territorial planning and land use can occur through the unequal influence of the farming and forestry sectors resulting in a limited consideration of forestry issues. Other important components are regional policies and programmes (such as those for rural development and climate change mitigation) that can provide frameworks in which regional initiatives are embedded and access to suitable financial support schemes are facilitated.

M5.2.2 Promotion initiatives and campaigns

The forestry and wood industry is a traditional sector producing a well-established range of products. Other sectors which use other raw materials have gradually obtained larger market shares of products within classical wood domains such as packaging, furniture, housing, transport and energy. During the last few decades however, the concepts of environmental impact, green products and climate protection have entered the consumer debate. Since then the forest-based sector has seen initiatives to improve its public image and promote the healthy and environmentally friendly benefits of wood and the potentials for wider use and innovation in view of the future bioeconomy. This trend also includes communicating the progress made in certification and combatting illegal logging. Today various forms of promotion initiatives dedicated to wood can be found in Europe:

- 1) *Marketing organisations*, formed as a partnership by various industry federations or other bodies.
- 2) *Promotional campaigns* to improve the image of wood and foster a broader use in large consumer markets.
- 3) *Industry contests, awards and labels* to demonstrate best practice and innovative uses of wood.
- 4) *Art exhibitions or commissions* to raise public awareness or challenge perceptions of wood use.
- 5) *Conferences, forums and debates* to address the role of forest-based products in the delivery of benefits to society, e.g., water, air quality, food security, rural development, and climate change adaptation and mitigation.

Practice examples

ProHolz Austria is the national joint marketing platform of the Austrian forest-based sector. The main goal is to communicate broadly to the general public the advantages of wood, the raw and construction material, and give impulses to enlarge its use through, for example, the current major image campaign “Holz ist genial!” (*Wood is ingenious!*). The purpose is to improve the image of the material and collect and demonstrate best practice examples. Furthermore the platform provides comprehensive background information on wood uses for the general public and specific information for professionals, such as through a database of wood-related job opportunities and an online catalogue of wood construction components.

► www.proholz.at ; www.holzistgenial.at ; www.infoholz.at ; www.dataholz.com ; <http://archive.is/HViTs> ; <http://archive.is/Dlax3>

Woodvetia is a national promotional campaign for wood in Switzerland run by the Bundesamt für Umwelt (BAFU, Federal Ministry for the Environment). It presents the diversity of forest-based industries, products and benefits for society in an accessible way to the public. The campaign comprises a broad collection of films, events and articles. As a flagship event of the campaign, 19 wooden statues of well-known Swiss personalities were created by artists and exposed in various public places across the country.

► www.woodvetia.ch/de ; www.woodvetia.ch/fr

FBR France Bois Régions is a national network of the 22 French interprofessions regionals - regional bodies for the promotion of wood - gathering more than 400 representatives of all professional organisations in the forest-based sector. Their common goal is to promote forests and all uses of wood, strengthen the federation of professionals and enhance public communication about the various professional opportunities in the sector.

► <https://www.franceboisregions.fr> ; <http://archive.is/nCvQT>

Prize contests for architectural design of wood constructions are popular in many countries. They are awarded annually to innovative best practice construction projects and are a major communication instrument for the public promotion of the benefits of wood.

- Schweighofer Prize, Innovation prize for European forestry and wood industries. www.schweighofer-prize.org ; <http://archive.is/75W6F>
- Oberösterreichischer Holzbaupreis, Austria. www.holzbaupreis-ooe.at ; <http://archive.is/HjQKK>
- Holzbaupreis Steiermark, Austria. www.holzbaupreis-stmk.at ; <http://archive.is/imcvo>
- Wettbewerb Holzbau Plus, Germany. <https://tinyurl.com/hsnhhb6> ; <http://archive.is/hCgzF>
- Prix National de la Construction en Bois, France. www.prixnational-boisconstruction.org ; <http://archive.is/HMO5P>

Prerequisites

The organisations require sufficient funds to be able to organise major campaigns, which do not serve individual enterprises but the whole sector. To deliver a significant impact, mandatory contributions to these federative organisations are required provided this is legally assured. Typically, only regions with a structured forestry sector have the capacity to implement such actions effectively.

M5.2.3 Practical training and capacity building for forest owners

New forest owners are people who obtain ownership of forest land through inheritance, but are often disconnected from their land and have a poor knowledge of forest management. It is important to provide them access to a minimum level of knowledge through training, so that they can engage in forest management. There are

different communication channels according to the type of forest owner:

- 1) Forest owners who have inherited a piece of forest land but have a limited interest in active management require basic information and an appropriate advisor who can provide convincing advice on how to manage the forest or delegate it to an association or professional forester. Common communication channels include mail, special advertisements through associations or land sale organisations and informative websites dedicated to private owners (see Section M5.3.1).
- 2) Motivated forest owners who are already active in forest management may request hands-on training guidance and well-documented information that can be applied to their own cases and good advisors, guidelines, workshops or field visits that allow them to learn from experience.



Practice examples

The **Small Woods Association** is a national membership organisation in the UK which promotes sustainable woodland management and wood mobilisation by engaging with newcomers to woodland ownership in an accessible way: bringing them together with more experienced managers, providing training and networking opportunities, educational material and mentoring. Most of the members have not previously engaged with forest sector organisations and the association provides a means for other organisations to distribute useful information. The association's woodland owner support is entirely funded by subscriptions which makes it sustainable as long as it meets their needs and has the approval of members. Repeated member surveys have shown that the activities of the association are increasing the knowledge of members and their confidence in taking management decisions.

► www.smallwoods.org.uk ; <http://archive.is/ojBxW>

Good Woods was a project in the UK offering initial advice for unexperienced woodland owners provided by private forest companies. It was based on a partnership with B&Q (one of the UK's largest timber and timber products retailers) and the Sylva Foundation and was delivered by foresters from local partner organisations. This local connection was important as it facilitated contact with owners and the provision of advice on local markets, contacts and conditions. Good Woods provided 300 owners (12,000 hectares) with site visits and advice, as well as educational resources, management plan guidance and support for 30 community woodland groups.

► <https://sylva.org.uk/myforest/goodwoods> ; <http://archive.is/WAW7c>

The **Bayerische Waldbauernschule** is a *forest owners' school* in Bavaria, Germany. It is a private association founded in 1937 and is linked to forest owner and farmer associations and cooperatives with the Bavarian Forest Service. Teaching and administrative

staff are covered by public budgets. The objectives are to support the well-being and security of self-employed forest owners, strengthen the personal capacity of forest owners and improve their income situation. Private owners, community forest owners and associations can benefit from cost-effective theoretical and practical courses and training in, for example, silviculture, harvesting, transportation of wood and chainsaw courses. They also offer advanced training in specific topics of interest. The school has been a major promoter of knowledge and practical skills for private forest management for decades and over 35,000 people have participated in the courses until now.

► www.waldbauernschule.bayern.de ; <http://archive.is/vUXG9>

FOGEFOR 'Formation à la Gestion

FORestière' are associations established in every region of France which carry out forest owner training and are popular among small forest owners. The training deals mainly with the management of forest ownership (e.g., law, taxation, cadastre, economy and markets), as well as aspects of silviculture (e.g., reforestation, stand management and phytosanitary problems, etc). The courses comprise 18 training days held in one session per month in the classroom or in the field. FOGEFOR receives regional and national funds.

► www.maisondelaforet-sudouest.com/services/fogefor ; <http://archive.is/O74LC>

► www.foretpriveefrancaise.com/formations/index/n:102 ; <http://archive.is/BHXqe>

Talking Timber Events in Ireland are a series of promotional and marketing events directed at private forest owners. They are undertaken by Teagasc and also involve the Forest Service and the Irish Forestry and Forest Products' Association (IFFPA). They commenced in 2012 and over 2,000 forest owners have attended since the events began. They are held in different venues; each event includes an outdoor timber display about timber quality, a conference and an opportunity for networking, when forest owners can meet industry members.





Forest Owner Discussion Groups are local events initiated by Teagasc which facilitate peer learning and the collaboration of forest owners. One of the main causes of success is the bottom up approach led by local forest owners and supported by local Teagasc development officers. Twenty-six discussion groups were originally developed; some of these have developed commercial activities, while others have engaged actively in forest management and a number have merged to benefit from economy of scale.

- ▶ www.growtrade.ie/doyle-praises-talking-timber-events ; <http://archive.is/mKHvA> ;
- ▶ <https://tinyurl.com/yd4jneu8> ; <http://archive.is/8Tnid>
- ▶ <https://tinyurl.com/y9axy7lv>

The **RedFor project** in Spain has developed a set of online forestry training courses to promote rural development from local initiatives. The project has enrolled 793 students and granted more than 1,000 certificates of completion for the six different courses that are offered. The course topics include the wood market, forest biomass, high value hardwood plantations, cork management, forest certification and green procurement, and Non-wood forest products (NWFPs), including mushroom production.

- ▶ COSE. Redfor project. http://selvicultor.net/redfor/?page_id=303 ; <http://archive.is/jReEz>

Marteloscopes are demonstration sites established around Europe providing virtual tree selection exercises and serving as show-cases for field visits. The sites are one hectare, rectangular forest plots where all trees are numbered, mapped and recorded in order to train foresters. The ultimate goal is to improve decision-making capacity related to wood products and other services according to the specific management of a forest area. Using software and mobile devices, the demo concept provides direct feedback on silvicultural decisions and related ecological and economic effects during training. The EU project *Integrate+* popularised this approach and established a network that covers a wide range of European forest types displaying different stand characteristics and management goals that are representative for a given geographic region.

- ▶ Integrate+ project. www.integrateplus.org/Demo-Sites/What-is-a-Marteloscope.html ; <http://archive.is/5VDwR>
- ▶ Marteloscopes in Switzerland. www.waldbau-sylviculture.ch/94_martelo.php ; <http://archive.is/LcS6C>



Prerequisites

Practical advice and training require experienced forest experts with good knowledge of the social and ecological context to deliver the appropriate messages in an appropriate way that will encourage private forest owners to take action.

M5.2.4 Advanced training and capacity building for forest managers and decision-makers

Besides the training of forest owners, skilled experts in forestry and wood processing are required for the implementation of wood mobilisation actions which can deliver regional initiatives, optimise business models and make forest management systems and supply chains more resilient and more reactive to change and unpredictable events. Managers and decision-makers in the forest-based sector need to be well-educated experts who are able to identify and balance business opportunities with ecosystem constraints, analyse pros and cons of alternative management options, design guidelines for sustainable use at the forest stand, regional or national level and have access to the latest knowledge and technologies. Vocational education and training (VET), as well as higher education programmes, form the basis of a sustainable workforce and research capacity in the sector. The following three main groups are considered here:

- 1) Vocational education: various technical professions in forestry and wood industries.
- 2) Higher education: managerial and specialised professions.

- 3) Advanced training and professional development: continuous training for experts and employees.

Practice examples

Various infoportals promote the professions in forestry and wood industries to students and other potential employees or offer specific search directories for study programmes or jobs in the forest-based domain.

- ▶ CODIFAB, FBF, FBR. French portal about forestry and wood jobs. www.metiers-foret-bois.org; <http://archive.is/L7pgk>
- ▶ Waldwissen. Forestry professions in Germany. www.waldwissen.net/lernen/fortbildung/lwf_forst_beruf/index_DE; <http://archive.is/oYVVA>
- ▶ Meine Uni.de. German university portal, forestry study courses overview. www.meineuni.de/studium/forstwirtschaft/; <http://archive.is/p2Vdb>
- ▶ ProHolz Austria. promotion campaign for jobs in the wood sector. www.proholz.at/genialeholzjobs/; <http://archive.is/17X37>
- ▶ Forêt Suisse. Forestry initial and continued education. www.foretsuisse.ch/formation-initiale-et-continue.html; <http://archive.is/u5YZV>
- ▶ HolzJob. Wood industry jobs portal. www.holzjob.eu; <http://archive.is/oZQQV>

Prerequisites

Institutions for vocational and higher education are required in order to offer dedicated programmes for forestry and wood industries, as well as specialised institutions and programmes for advanced training and continued education.

M5.3 Information services and tools

M5.3.1 Infoportals and tools for private forest owners

Access to information and knowledge is key to increasing awareness and the understanding of the challenges and solutions associated with wood mobilisation. In a more interconnected world, internet-based information services and tools are rapidly gaining importance, and this is

also the case for forestry. The following types of infoportals can be considered:

- 1) National infoportals about forests and forestry in general
- 2) Infoportals and services aimed specifically at small-scale private owners
- 3) Learning content and training tools for private owners
- 4) Specific observatories

Practice examples

National portals about forests and forest owners deliver general information about forests, forest management and private forest ownership. They often provide comprehensive background information on forestry and the various functions of forests for society and the environment.

- ▶ Forêt Privée Française, France. www.foretpriveefrancaise.com; <http://archive.is/omOqZ>
- ▶ Forstwirtschaft in Deutschland, Germany. www.forstwirtschaft-in-deutschland.de; <http://archive.is/9ZmQZ>
- ▶ Forestry Commission, UK. www.forestry.gov.uk; <http://archive.is/ZTqj>
- ▶ Wald in Österreich, Austria. www.wald-in-oesterreich.at; <http://archive.is/hQ5f>
- ▶ ForêtSuisse / WaldSchweiz, Switzerland. www.foretsuisse.ch; www.waldschweiz.ch; <http://archive.is/mBxKR>; <http://archive.is/qMbND>

Private forest owner portals are specifically targeted at small-scale private landowners to help them obtain basic knowledge

about forest management and liaise with local foresters, associations and service providers. They provide guidance on forest management and practical knowledge about how to take action in order to value your own property. The websites also offer various online tools for forest management. A commonly used name among these portals is 'My Forest'. The information they provide includes all important aspects from legal and fiscal administration, forest harvesting and replanting, timber sales, land sales, forest protection, hunting and other forest uses. The online tools include mapping tools, search directories to identify local advisors or service providers (e.g., foresters, auditors and forest entrepreneurs), land or timber evaluation tools and training videos.

- ▶ My Forest, UK. <https://sylva.org.uk/myforest>; <http://archive.is/rniou>
- ▶ Forestry Commission England, 2009. So, you own a woodland? Brochure <https://www.forestry.gov.uk/pdf/so-you-own-a-woodland.pdf>



- ▶ Les Nouveaux Propriétaires Forestiers (The New Forest Owners), France. www.nouveaux-proprietairesforestiers.com; <http://archive.is/ZSLlw>
- ▶ Ma Forêt, France. www.maforet.fr; <http://archive.is/SLshM>
- ▶ KWF 2015. Informationsdienst Privatwald (Information Service Private Forest), Germany. www.info-privatwald.de; <http://archive.is/y4iuQ>
- ▶ Mein Wald, Germany. www.mein-wald.de; <http://archive.is/lGoZW>

Figure 11: Example of a French portal targeting new forest owners (start screen from www.nouveauxproprietairesforestiers.com)

Je Me Forme Pour Mes Bois (*'I train myself for my forest'*) is an open online guidebook for private forest owners in France, which provides a general introduction and basic knowledge about all aspects of forest management to people with no or very little background in forestry.

► www.jemeformepourmesbois.fr ; <http://archive.is/B8fGJ>

The **Forstbetriebstestnetz** is a *forest enterprise testing network* in Austria, Germany and Switzerland. The network undertakes regular monitoring of representative forest enterprises and their market situation, collecting economic data on a yearly basis and providing benchmarks and best practice guidance on competitive forest enterprise management.

► Bürgi P, Sekot W, Ermisch N, Pauli B, Möhring B, Toscani P. Forstbetrieblicher Kennzahlenvergleich Deutschland – Österreich – Schweiz. Schweizerische Zeitschrift für Forstwesen. 2016;167(2):73-81. doi:10.3188/szf.2016.0073

Prerequisites

General information that is useful for raising awareness and providing initial advice is usually publicly available. For more professional data, forest enterprises need to be willing to share their information. For small forests, simple online tools are sufficient to carry out basic management. More complex assessments require assistance by professionals with skills in forest ecology and economics to offer suitable decision support.

M5.3.2 Logistics systems

The logistics associated with the forestry-wood chain can present major barriers to wood mobilisation. Powerful information technologies have become available that can support the optimisation of supply chain logistics and significantly reduce the costs of wood mobilisation. Various specialised IT companies and forest consultancies - in particular large public and private forest companies - are developing specialised forest logistics systems and tools which make it possible to track each cut tree in real time on its journey from the forest to the processing plant. Today

the main challenge is to find territorial logistical options which can benefit local SMEs. The aim is to optimise supply chains by allowing strategic sharing of data without compromising the business interests of individual companies. The following types of logistical initiatives are of benefit to all market actors:

- 1) *Accurate maps* of forest road networks
- 2) *Dynamic transport logistics tools* to exchange wood storage and truck load data in the supply chain
- 3) *Risk monitoring and alert systems*, e.g., for forest fires or storms
- 4) *Environmental restrictions maps* of protected areas where harvesting and transport can be restricted

Practice examples

NavLog GmbH has been developing an up-to-date geodataset of forest roads and trails in Germany since 2005. The data contains detailed navigability information and is made accessible via a standardised WepMapService (WMS). The data assessment does not rely on photographic methods - as is usually the case with public road data providers - but on knowledge from local experts, such as forest owners and foresters, thus ensuring high data quality that is also continuously improving. So far 450,000 km of forest roads have been classified and around 500,000 points of descriptive information have been collected.

► www.navlog.de ; <http://archive.is/mr1Aq>

WoodChainManager is an application developed by the Slovenian Forestry Institute to help forest owners control and optimise harvesting. The tool enables a simple selection of technological models for the production of roundwood and green chip. It examines economic factors and the available technology throughout the entire forestry wood chain and supports the selection of machines with their mandatory or optional accessories/attachments which are required for all





operations, from felling to delivery to the end user. Visualisation of technological components required along the forestry wood chains and estimates of costs enable optimisation and easier understanding of otherwise very complex chains.

► <http://wcm.gozdis.si> ; <http://archive.is/Os55w>

ExploTIC is a data exchange standard for forest harvesting machines in Aquitaine, France. It allows productivity data to be gathered from any harvesting machine and to be shared between wood sellers and buyers. It contains data about harvesting outputs, wood stack localisation, optimisation of transport logistics and commercial data.

► <https://tinyurl.com/yd7ubx3f> ; <http://archive.is/v291M>

Corsica Fire Risk Map is a dynamic map service provided by the *Préfet de Corse*, which estimates the fire risk situation on a daily basis and provides information about restrictions on accessing or working in the forest as a result of fire risk.

► <http://195.221.141.5/Portail/corse.gouv.fr/> ; <http://archive.is/knprP>

European Protected Sites is a free map service provided by the European Environment Agency (EEA). More detailed maps are accessible to professionals under licence.

► www.eea.europa.eu/data-and-maps/explore-interactive-maps/european-protected-areas-1 ; <http://archive.is/HqF1C>

Prerequisites

Today, precise and tailored data products which are sold or distributed under license to their clients are the core business of various specialised IT providers in forestry. It is expected that through the European Commission's INSPIRE directive⁵⁵ more public open data services will become available and usable to support forest logistics.

M5.3.3 Market information services

Statistical information on regional forest resources and wood market trends are essential for strategic decision-making by both forest professionals and forest owners. National or regional information is mainly provided through standardised public reporting systems, such as forest inventories or official statistics. Specialised consulting companies offer more tailor-made information services. The following important types of market information systems can be distinguished:

- 1) *Forest resource information*: Typical background information on forest resources in a region describing the growing stock, growth rates, accessibility of resource and harvested volumes for important tree species.
- 2) *Forest products trade information*: Statistical market data on production, import and export, as well as domestic trade of the main forest product assortments.
- 3) *Price monitoring*: Regional market observations of price changes for sold timber per species and assortment, as well as for forest land.
- 4) *Market places, trading platforms*: Information exchange to facilitate contact between sellers and buyers of wood from private or public forests and to improve transparency in regional wood markets.

Practice examples

National Forest Inventories (NFIs) are large-scale forest monitoring systems. They are usually based on a national grid of permanent sample points which are assessed in periodic intervals to collect data on forest composition, growth, timber production and biodiversity. The outputs are typically presented as regional analyses and time series of the growing stock evolution, thus allowing forest managers and regional authorities to identify underused or overused species and locations. Publicly funded forest inventories are becoming more accessible through public portals. Advanced remote sensing technologies are being increasingly deployed to offer high resolution forest information. NFI outputs make it easier to understand wood mobilisation challenges, opportunities and sustainability aspects.

- ▶ ENFIN European National Forest Inventory Network. <http://enfin.info/>; <http://archive.is/vxoYK>
- ▶ IFN, France. <http://inventaire-forestier.ign.fr/>; <http://archive.is/k7oRO>; http://inventaire-forestier.ign.fr/IMG/pdf/161122_memento2016.pdf
- ▶ BWI, Germany. <https://bwi.info/>; <http://archive.is/5lFPz>; <https://tinyurl.com/yd97f9yh>

Forestmap, developed by AGRESTA in Spain, is a commercial online forest inventory tool. It combines LiDAR data, field sample plot databases and specific information provided by the user to calculate spatially explicit forest inventory information for any given forest area, which is delivered in the form of a downloadable PDF report and a group of SHP layers for the stand variables. Currently four Spanish provinces are fully covered, representing over 3 million ha of forest.

- ▶ AGRESTA Forestmap. <http://forestmap.es/en/>; www.agresta.org; <http://archive.is/918U>

Roundwood Production Forecast in Ireland is an online tool to map forest plantation resources and to forecast timber volumes of mature stands in the coming decade.

- ▶ DAFM. <https://publicapps.agriculture.gov.ie/gispublic/rp-fms/pages/workspace/public.jsp>; <http://archive.is/8vOMI>

Land marketing portals allow forest owners to advertise land parcels for sale online.

- ▶ Waldbörse in Thuringia, Germany. www.wald-boerse.de; <http://archive.is/5goA9>
- ▶ Forêt à vendre in Wallonia, Belgium. <http://foretavendre.be/>; <http://archive.is/TIUBx>

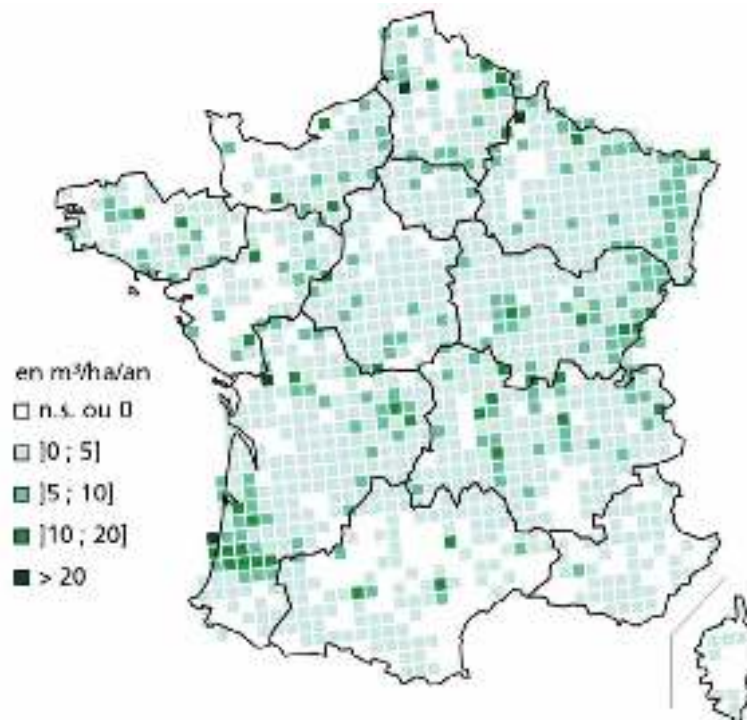


Figure 12: Forest harvesting intensity map of France. Harvesting from 2006-2014 in $\text{m}^3/\text{ha}/\text{year}$. Each raster quadrant represents a permanent sample plot of the French national forest inventory (IGN 2016 ⁵⁶). ▶

Wood market information portals

deliver prices, price indices and market trends on a quarterly or yearly basis.

- ▶ Wood Price Quarterly (WPQ), Ireland. www.itga.ie/public/WPQ-public.asp ; <http://archive.is/qoAqh>
- ▶ L'Observatoire Economique, France. <http://observatoire.franceboisforet.com/> ; <http://observatoire.franceboisforet.com/indicateur-prix-de-vente-bois-pied-2016/> ; <http://archive.is/UWuOK> ;
- ▶ Observatorio de Precios de la Madera, Spain. http://selvicultor.net/redfor?page_id=492 ; <http://archive.is/HBfMm>
- ▶ EFI Forest Products Price Information Portal. <http://fppi.efi.int/>

Timber online auction portals facilitate sales of roundwood and other assortments via the internet.

- ▶ IHB Holzbörse, Germany. www.ihb.de ; <http://archive.is/Pesh5>
- ▶ e-Timber Sales of the Forestry Commission England, UK. <http://www.forestry.gov.uk/auctions> ; <http://archive.is/omNk5>
- ▶ Timber Auctions, UK. www.timberauctions.co.uk ; <http://archive.is/7P6SR>

Open wood trading platforms promote local wood products and advertise management services.

- ▶ Coppice Products, UK. <http://coppice-products.co.uk> ; <http://archive.is/6tiSz>
- ▶ Woodlots, South East England, UK. www.woodnet.org.uk/woodlots/ ; <http://archive.is/AhkhH>
- ▶ Kuutio.fi (The cube), Finland. www.kuutio.fi ; <http://archive.is/2JRHM>

Prerequisites

The main challenge associated with these kinds of information services is to ensure continuity in the collection, analysis and presentation of data by regular follow-up and maintenance. It requires a well-organised network or organisation capable of financing the costs and continuously processing the large amounts of data and information updates without bias.

M5.3.4 Other specialised information systems

Further types of information systems can be identified as important sources of technical and practical knowledge that is useful for wood mobilisation:

- 1) Land ownership information systems and statistics
- 2) Decision support systems (DSS) for forest management
- 3) Global forest information systems



Practice examples

Land registers are becoming more accessible to the public, and hence also to the forest sector. Online portals of land registers and cadastres provide access to land ownership data including maps and aerial photos of property boundaries. The data is anonymous, because owners' names and addresses are in general confidential. Public forest services and forest professionals can be granted access to individual ownership data under certain conditions, which vary from country to country, depending on the national legal context. While such information is publicly accessible in some countries, it is restricted in others, and can only be obtained via an official request to municipal or regional authorities. For the purpose of wood mobilisation in identified areas, France allows companies to request cadastral data to approach a larger group of landowners and inform them about the economic potential of their land.

- ▶ Landmateriet, Sweden. www.lantmateriet.se/en; <http://archive.is/n5uTI>
- ▶ Geoportail.gouv, France. www.geoportail.gouv.fr/carte; <http://archive.is/v9ozY>
- ▶ Cadastre.gouv, France. <http://cadastre.gouv.fr>; <http://archive.is/Pd1QO>
- ▶ FEAGA, Spain. SigPac tool, user friendly forest cadastre. <http://sigpac.magrama.es/feaga/h5visor>; <http://archive.is/dL63o>

Statistical analyses of the rural land market carried out by land authorities or financial institutions aim at producing indicators for price and market dynamics at the regional and local level. This information allows conclusions to be drawn about market trends and new forest owner behaviour.³¹

- ▶ DGADR. Bolsa de Terras, Portugal. www.bolsanacionaldeterras.pt; www.bolsanacionaldeterras.pt/docbt/BNT-Eng.pdf; <http://archive.is/lYSTu>
- ▶ Caisse de Dépôts et Consignations (CDC), France. <https://tinyurl.com/y96t63ms>

Les outils FCBA dédié à l'exploitation forestière in France is an online toolbox for supporting optimised wood harvesting and mobilisation. The different tools can help companies estimate time and costs likely to

be spent harvesting forest resources under various specific conditions. The simulations can be specified according to, for example, various forest interventions, species groups and machinery setups. The toolbox also includes a cost optimisation and 3D tool to simulate cable logging systems.

- ▶ FCBA, outils approvisionnement. <http://outils-appro.fcba.fr/>; <http://archive.is/rE46A>

Decision support systems (DSS) offer a broad range of modelling and simulation tools developed by researchers to help forest managers anticipate and optimise their forest's wood production potential. These tools allow the user to better understand the forest growth potential and compare the pros and cons of different management options. A few examples are selected here. More DSS can be found in the ForestDSS wiki.

- ▶ FORMODELS register of forest growth models. www.efi-atlantic.efi.int/portal/databases/formodels; <http://archive.is/503uK>
- ▶ Capsis simulation platform for forest growth models. <http://capsis.cirad.fr>; <http://archive.is/Nm5eB>
- ▶ SIMANFOR simulator. www.simanfor.net; <http://archive.is/xqqZQ>
- ▶ Forest Research, UK. Tools and DSS. <https://www.forest-ry.gov.uk/fr/decisionsupport>; <http://archive.is/flXg9>
- ▶ FlorNext forest management simulator. <http://flornext.esa.ipb.pt/?langid=3>; <http://archive.is/pXyEg>
- ▶ S2Biom biomass toolset. <http://s2biom.alterra.wur.nl/>; <http://archive.is/C4WVi>
- ▶ ForestDSS wiki and community. www.forestdss.org; <http://archive.is/SS7mq>

Global forest information systems are set up by international forestry organisations. They provide global directories and other information on a European or global scale; for example information about resources, ownership, hazards and the ecosystem services provided by forests. A few key websites are listed here:

- ▶ EFI Information Services. www.efi.int/portal/virtual_library/information_services; <http://archive.is/l14hP>
- ▶ JRC forest website. <http://forest.jrc.ec.europa.eu>; <http://archive.is/mwUy>
- ▶ IUFRO Global Forest Information Service. www.gfis.net; <http://archive.is/cP2JX>
- ▶ FAO Forestry website. www.fao.org/forestry; <http://archive.is/sMGYI>





Prerequisites

Providing access to land ownership information is a political decision that requires a societal debate and legal approval. The design and delivery of useful DSS which are accessible to end users requires substantial technical expertise as well as capacity for dissemination and communication.

M5.4 Research & Innovation (R&I)

Research on forests and forest management covers a broad range of thematic fields, from ecosystem functioning, tree genetics and biodiversity to harvesting technology, enterprise management and socio-economics. Trees are slow growing (i.e., a tree that is mature after 10 years is considered a fast-growing species). As a result, forest research has to consider the long-term effects of management over a period of decades and in this respect it is quite different from other disciplines.

All thematic fields need to be integrated into the research to develop forest management systems that can ensure the provision of wood while striking a balance with an intact ecosystem in the long term. It should be noted that managed forests can deliver a wider range of benefits in terms of ecosystem functions than some other forms of land use, such as agriculture, where the impact from forestry on the land is often lower, due to the slower natural growth rates, the limited use of pesticides and fertilizers and the fact that harvesting rotation cycles encompass decades.

To overcome the barriers discussed in Section 2, both technological and organisational efforts are required. On the one hand, improved harvesting systems and supply logistics need to be developed and adopted by practitioners; on the other, changes in behaviour, organisation and



collaboration are required, meaning that new ways need to be found to engage and educate forest owners and enterprises.

Forest research will play an even more vital role to support this change: from development and testing of potential solutions for wood mobilisation to the wider dissemination and uptake by potential end users.

M5.4.1 R&I capacity

Research and innovation in forestry require strong institutional capacity with sufficient human resources. Well-educated researchers and practitioners have to develop the necessary knowledge and translate it into recommendations for decision-makers, from national authorities to forest managers. The following main types of institutions can be distinguished:

- 1) *Universities and scientific research institutes* engaged in fundamental research.
- 2) *Technical institutes and RTD centres* engaged in applied research, products certification and knowledge transfer.
- 3) *Industry*: As the forest-based sector is dominated by SMEs, most companies are too small to engage proactively in research and innovation. Also larger companies rarely have their own RTD departments and depend mostly on collaboration with institutes. Multi-actor approaches are therefore of special importance in forestry research and innovation.
- 4) *Intermediaries and transfer bodies*, including public agencies, centres or clusters, are active in technology transfer, innovation support and business development. Various examples are given in Section M5.2.



Practice examples

National research and technical institutes are key players in European forest research (both fundamental and applied research), and can have broad expertise in the full range of forestry topics from eco-system functioning to economics and social science. Here are a few examples for illustration:

- ▶ LUKE Institute of Natural Resources, Finland. www.luke.fi/en
- ▶ Skogforsk Forest research institute, Sweden. www.skogforsk.se/english
- ▶ INRA Institut National de la Recherche Agronomique, France, www.inra.fr
- ▶ CNRS Centre National de la Recherche Scientifique, France. www.cnrs.fr
- ▶ FCBA Institut Technique (Institute of Technology for Forestry, Cellulose, Wood & Furniture), France, www.fcba.fr
- ▶ Thünen-Institute, Germany. www.thuenen.de/en
- ▶ FR Forestry Research, UK. www.forestry.gov.uk/forestresearch

International networks in the forest-based sector are fostering research collaboration across borders and are bridging the gap between researchers, practitioners and policy-makers at the national and international level. Here is a short selection of European networks related to forestry:

- ▶ IUFRO, the International Union of Forest Research Organizations, counts about 700 member institutions worldwide. www.iufro.org/membership/members
- ▶ EFI European Forest Institute, a forestry network with around 115 member organisations in 37 countries. www.efi.int
- ▶ FTP Forest-based Sector Technology Platform, a European Technology Platform. www.forestplatform.org
- ▶ EUSTAFOR European State Forest Association, an association of 33 state forest companies in 22 countries. www.eustafor.eu
- ▶ CEPF Confederation of European Forest Owners, an association of 49 national forest owner organizations. www.cepf-eu.org
- ▶ InnovaWood, a wood research and training network with 50 members in 28 countries. www.innovawood.com
- ▶ BIC Bio-based Industries Consortium, a public-private partnership (PPP) with the EU. <http://biconsortium.eu>

Prerequisites

Europe has well-established research institutions in all domains, but many organisations are facing public budget cuts and restructuring, but not always for the better. While the national research capacities in forestry are in general not developed to the same level as they are in agriculture, it is important to secure and enhance public funding dedicated to the forest-based sector, covering both fundamental and applied research.

Established research institutions typically receive core funding for their administration, research facilities and scientific and managerial staff. This base funding needs continuity so that the organisations are in a position to compete for third-party funding from national or international research funding bodies.

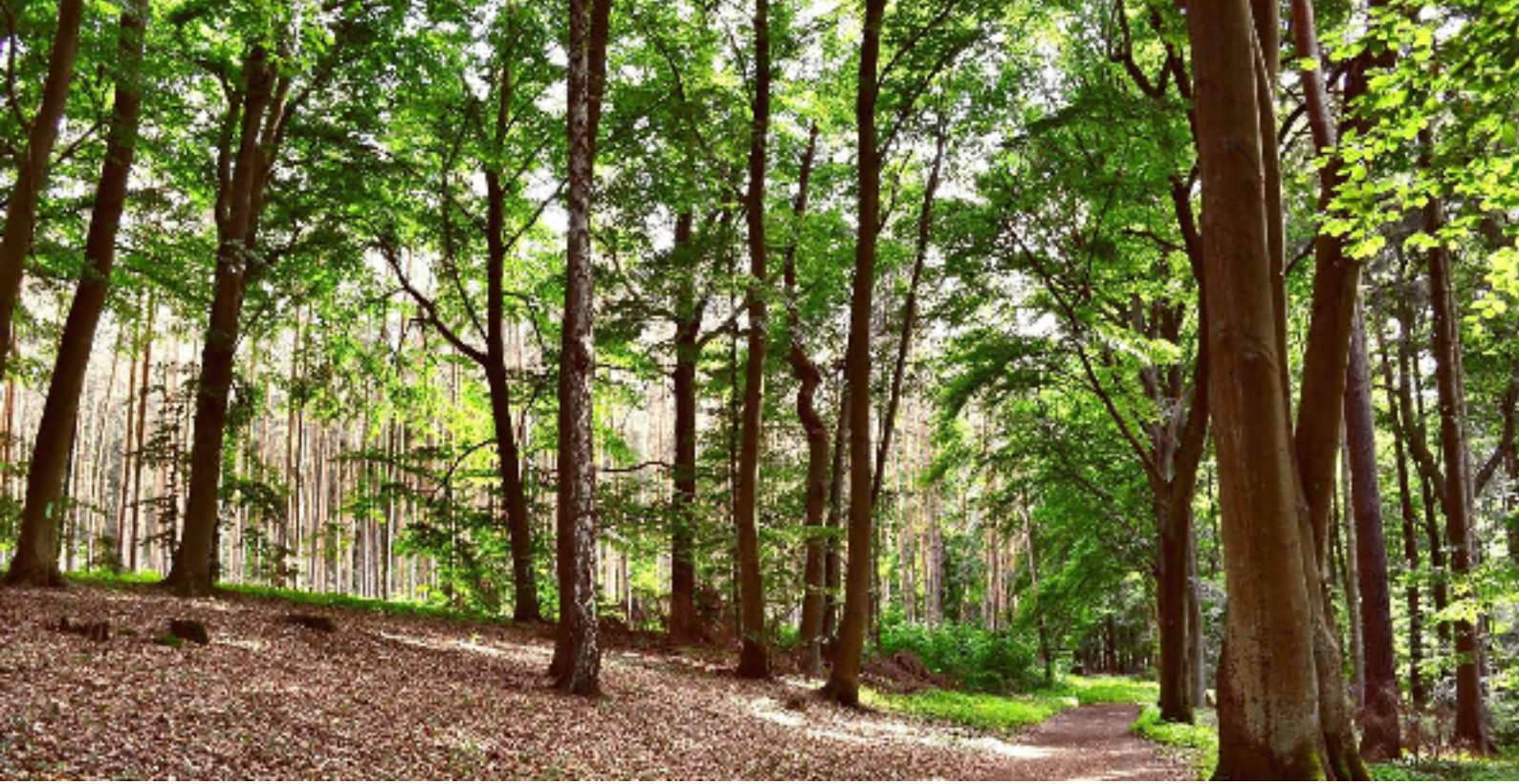
M5.4.2 R&I funding

Acquisition of co-financing is essential for any research institution to maintain a high, competitive level of research activity and visibility. The following types of funding sources are important:

- 1) *National funding programmes*
- 2) *European Commission framework programmes, e.g., FP7 and Horizon 2020*
- 3) *European regional structural funds (also see Section 1.2)*

In most cases, funds are granted for specific infrastructural and research projects. These usually need to pass a selection process by an independent committee of evaluators, which identifies the most suitable proposals in line with the objectives of the funding programme. Research projects follow a defined work plan and often involve teams from different research institutions. In general, the size and complexity of projects increases from the regional to the national and international level (longer projects, more partners from different countries).

The largest share of research is funded through national funding programmes which have in total much larger budgets at their disposal than most European funds. The latter are nevertheless complementing national funds, as they offer the opportunity to improve international collaboration and the visibility of the research.



Practice examples

The **Waldklimafonds** (Forest Climate Fund) is the main federal grant programme for the adaptation of forests to climate change in Germany. The main goals are to ensure and increase carbon storage through CO₂ fixation and substitution in forests and forest products. The fund supports RTD projects ranging from basic research to practical implementation. Since its inception, 41 collaborative projects with a total budget of 38 million euros have been granted from 2013 to 2019 (information as of 2016). A new grant phase was announced in 2017.

► www.waldklimafonds.de ; <http://archive.is/LXyPE>

The **Förderprogramm 'Nachwachsende Rohstoffe'** is the national grant scheme for renewable raw materials in Germany financed by the Ministry for Food and Agriculture. Its goal is to strengthen the further development of the bioeconomy and open new opportunities and perspectives for the raw materials industries especially in rural areas. The programme supports R&D projects and demonstrations in the following fields: sustainable production and supply of renewable resources, raw material and residue processing and recovery, bio-based products and energy carriers, crosscutting topics and societal dialogue. The current grant phase started in 2015 and has a budget of 61 million euros.

► www.fnr.de/projektfoerderung ; <http://archive.is/CgSE3>

The **Fonds stratégique de la forêt et du bois** (Strategic fund for forests and wood) in France is a major R&D initiative dedicated to the regional and national forest-based sector. It was launched in 2016 with a total budget of 14 million euros. In 2017, it was announced that the sum would increase to 28 million euros.

► <http://agriculture.gouv.fr/des-moyens-financiers-renforces-pour-la-filiere-foret-bois> ; <http://archive.is/f9959>

The **National Research Programme**

'Resource Wood' (NRP 66) in Switzerland aims to develop scientific principles and practical approaches for making wood, a renewable resource, more readily available and widely used. Researchers are collaborating with industry to develop innovative technologies and

services for the material, chemical and energetic use of wood, with a view to establishing sustainable approaches to life-cycle management. The NRP 66 had an overall budget of 18 million Swiss francs (around 15,5 million euros) for the period 2012 to 2017.

► <http://www.nfp66.ch/en> ; <http://archive.is/QxhyW>

Various **European research funding programmes** are financed by the European Commission and its Member States and aim to foster international excellence, collaboration and dissemination in the European research area. Over recent years, the number of explicit call opportunities related to forest and wood research has declined, because EU research policy is moving towards a more transdisciplinary and cross-sectoral approach to research. The forest research community has to position itself in this new context by enhancing its profile as a sustainable, regional-based sector and developing its interfaces with broader societal needs and global priorities (e.g., demographic change, industrial renewal, energy policy and climate change). However, there are also EU programmes that are specifically tailored to the forest-based sector; for example, the ForestValue network, which announced a new joint call in 2017 comprising 19 countries with a tentative budget of around 25 million euros.

► Horizon 2020. <https://ec.europa.eu/programmes/horizon2020/> ; <http://archive.is/8wq7b>

► ERANET COFUND. www.era-learn.eu/manuals-tools/p2p-in-h2020/background-information ; <http://archive.is/k4Ove>

► ForestValue network. <https://www.era-learn.eu/network-information/networks/forestvalue> ; <http://archive.is/wZFW1>

Prerequisites

Public authorities and funding agencies require the capacity to identify and develop relevant priorities for the sector and administer funds in an efficient and effective manner. While Europe has excellent researchers and institutions in all domains, research and innovation still mostly focuses on national contexts. Looking forward, more dissemination and interchange is needed between countries to integrate national research agendas and disseminate findings, in order to achieve broader societal impacts in Europe across the sector.



4

Lessons learnt from wood mobilisation initiatives and projects



4 Lessons learnt from wood mobilisation initiatives and projects

Mobilising more wood through the sustainable management of forests is a key factor for the emerging bioeconomy. It represents a major opportunity for Europe to reduce the negative impacts of traditional industries on our environment and develop a greener, more sustainable economy based on one of its most abundant renewable resources. To raise awareness of the challenges of wood mobilisation, this handbook has given a broad overview of barriers to wood mobilisation and corresponding measures capable of addressing these barriers.

SIMWOOD carried out a survey of barriers and wood mobilisation initiatives in 17 representative model regions across Europe. A simulation using the EFISCEN-space model with data from 11 regions representing 7.8 million ha assessed the available wood potentials. Engaging with local practitioners and stakeholders, a series of 22 pilot projects was carried out to test and evaluate various wood mobilisation measures under real conditions in the participating model regions. A common evaluation framework was applied to assess outputs, outcomes and plausible impacts



of the pilot projects. The following chapters summarise the main conclusions and recommendations from SIMWOOD's study of wood mobilisation initiatives and pilot projects in Europe ^{37,57,58}.

4.1 Under-utilised forest resources versus market barriers

4.1.1 Wood mobilisation can be increased, but sustainable levels of harvesting differ significantly between regions

Forests in EU Member States cover about 159 million ha, which is equal to 37% of the total EU land area and represents an increase of 7% since 1990. European forests are predominantly managed (85%) and available for wood supply. The EU is one of the main world producers of roundwood with 442 million m³ in 2014. Approximately 75% of the annual increment is harvested. About 50% of forests in the EU are privately owned, with fragmentation in several countries leading to a large number of small-scale owners. A significant proportion of EU forests is presently without active intervention or is under-utilised. Wood demand in the different regions of the EU is subject to many uncertainties and is difficult to forecast, as it depends on policy developments, as well as structural factors in the markets for roundwood, forest products and new emerging bioeconomy products. If historical harvesting levels are maintained, we can expect the harvested wood products pool to continue to grow for at least the next couple of decades. Theoretically, there is room to significantly increase harvesting levels within the scope of a sustainable, climate-smart policy framework ⁶.

European regions display a large diversity of forest ecosystems which differ considerably in forest area, forest history, species distribution, management regimes and practices, and hence growth of the resource. For example, the average increment in the seventeen SIMWOOD regions (see Section 6) ranges from 1.7 m³ per ha

and year in Nordeste, Portugal, to 14.6 in Bavaria, Germany. The harvest to increment ratio ranges from 25% in Catalonia, Spain, to almost 100% in Småland, Sweden, and Bavaria, Germany. The variation in growth potential and forest utilisation rates in the regions creates a range of starting points to develop wood mobilisation.

In countries with low mobilisation levels, harvesting could be increased significantly. In regions where wood has accumulated in the forest over decades, a temporary felling rate higher than 100% would not be an issue, provided that SFM criteria are implemented. In countries which already have high levels of mobilisation, there is still an opportunity to increase wood supply. Additional resources can be explored and mobilised (e.g., forest residues such as branches or stumps) provided that there is good scientific evidence that harvesting can be sustainably maintained in a given context.

4.1.2 Additional wood is not always accessible for harvesting due to multiple regional barriers

Simple statistical analyses of the state of Europe's forests ²⁹ often indicate that the potential mobilisation for the whole of Europe would be approximately 200 million m³. However, to estimate the potential more realistically, the role of regional constraints (barriers) needs to be considered. The SIMWOOD modelling results ⁵⁷ suggest that available wood might be lower than expected, given the role of barriers that diminish access to the resource. One of the wood mobilisation scenarios modelled in the analysis assumes that key barriers are overcome through training of private forest owners and increased support for more active management. This scenario shows higher levels of mobilisation, somewhat similar to the situation in public forests.

Based on the practices and harvesting behaviour of different owner groups in the model regions under study, the effort required to harvest more wood was ranked from 'easy', 'medium' to

‘difficult’ or ‘not available’. For example, if a large share of private ownership is highly fragmented, or if forest owner groups behave very differently (e.g., intensive harvesting vs. nature conservation as the main priority), it would be difficult to engage a larger number of owners through knowledge exchange and training.

The results of this simulation indicated that only a small proportion - i.e., 4% of the extra increment of forest - would be ‘easy’ to mobilise. Just 45% of the increment was judged to be ‘medium’ or ‘difficult’ to mobilise. A large proportion of the extra increment of 51% was judged to be ‘not available’ for mobilisation under current conditions. These findings reflect real social, economic and environmental constraints to management, mostly of broadleaved forests. Extrapolated to the European level, these results suggest that only about 60 million m³ could be mobilised with an easy to moderate effort. Mobilising more of the unused resource under current conditions would require considerably more effort.

The reasons why forests are not utilised to their full potential are manifold and differ between Europe’s forest regions. The main constraints (barriers) which were identified in SIMWOOD across many regions are not only technical, but also to a large extent socio-economic in nature. They include:

- Inefficient harvesting techniques and practices (B1.3)
- Poor road infrastructure to access forests or markets (B3.1)
- Lack of access to capital and other inputs (B3.3)
- Small-scale ownership and land fragmentation (B4.1.1)
- Lack of cooperation among forest owners (B4.2.1)
- Lack of cooperation in the supply chain (B4.2.2)
- Weak or lack of markets for wood / forest products (B4.3.1)
- Insufficient practical skills for forest management (B5.1.2)
- Insufficient forest management and silvicultural knowledge and planning (B5.1.3)
- Disinterest or opposition of forest owners for non-financial reasons (B5.2.1)

4.1.3 Growing wood markets need to become an opportunity for forest owners

From a global SFM perspective, current wood markets rarely function in an optimal way. The harvest, trade and use of wood resources are almost exclusively steered through price mechanisms and competition in the forest-based sector. Therefore their contribution to climate change mitigation and regional development are suboptimal and do not attain their full potential. Owing to insufficient insights into regional markets, it is difficult to predict the quality and quantity of raw material that can be mobilised in the short and long term, thus adding to the market barriers and insecurity felt by market actors. Forest owners, forest-based industries and timber traders need to address this issue collectively. Important aspects of the major market barriers are:

- Wood markets are complex and lack transparency. Depending on the product and segment, wood markets can be regional (e.g., 100 to 200 km radius from a processing plant) or, in the case of major species and assortments, they can be European or international.
- The multitude of stakeholders in the forest-based sector can be challenging, with different types of industries and many competing supply chains dominated by SMEs. Strong competition and price fluctuations are frequent and can lead to market disruptions, which do not feedback positively into forest management.
- Softwoods (i.e., wood from coniferous tree species such as spruce or pine) are the backbone of the wood processing industry. The market shows strong competition as mobilisation of softwood is high in many regions.
- Hardwoods (i.e., wood from deciduous tree species such as beech or oak) have only a low market demand, owing to insufficiently developed processing technologies (e.g., high stem diameters in over-aged forest



stands), but represent a large share of unused resources in many regions.

- Forest-based processing industries need to be assured that the quality and supply of raw material will be sustained into the future. Investments in wood-based industries, as well as in emerging biochemical industries, are hampered by inaccurate market data, and insecure future forecasts.

Positive market trends alone (e.g., a growing demand and higher prices) cannot unlock unused forest resources, because of the technical and social barriers that impede mobilisation. This is especially the case for small-scale private forest owners who together are responsible for large areas of unmanaged properties with high volumes of standing timber. On the other hand, low value wood (e.g., from thinning or forest residues) is not mobilised, because market prices are too low to meet the mobilisation costs. Forest owners cannot be easily persuaded to harvest more wood unless they expect to obtain at least some revenue from their forests.

Therefore forest owners and managers need to be empowered in their key role as supplier of the raw material that is wood. The prospects of an increase in demand for wood both from bioenergy and the emerging bioeconomy have to be transferred locally into real opportunities for forest owners. Solutions need to include reducing transaction costs and demonstrating viable and profitable forest use. A good understanding of the opportunistic behaviour of market actors (e.g., an owner's choice not to harvest or a buyer taking advantage of low prices) and of the long-term viability of forestry businesses is mandatory to orientate decisions that can support engagement and investments by all market players.

Access to forest management knowledge and improved market information is key to wood mobilisation. Enhanced management capacity and more transparent, reliable information about new market opportunities will help forest managers and owners to better anticipate income from timber sales, engage in cooperatives, and trigger increased wood mobilisation.



4.2 Activation and professionalisation of forest owners

4.2.1 Broader awareness is needed of the benefits of Sustainable Forest Management

Besides owners and professionals in the forest-based sector, most people do not have a good understanding of all the services that forests provide to the global ecosystem and society. A misleading understanding of forestry and the SFM concept, and a rather caricatured representation of forest harvesting in the media, can support the contradictory view that non-management is always the best option for the protection of forest. This view is unaffected by evidence that, in many cases, non-management of forests increases the risk of fires, windbreak, pests, invasive species and hence destabilises forest stands rather than protects them.

Any initiative that fosters science-based knowledge about forestry among citizens and political decision-makers is therefore a beneficial contribution to the development of the forest-based sector in rural areas. An important direction for future actions is to enhance public understanding about wood mobilisation.

The 16 million private forest owners across Europe should not be considered as a static and homogenous group. They are in fact a very heterogeneous and continuously changing pool of individuals with different motivations. While traditional landowners are still important, the number of new and urban forest owners is increasing. Most new forest owners have inherited their forest, but others have emerged as a result of large afforestation or privatisation programs. Forest owners who consider forestry a strategic investment and actively purchase land for this reason are still a minority in number, but can represent significant areas.

This means that every year a certain percentage of the forests are transferred to a new generation of private owners, who need to become familiarised

with their role in the management of forest property. Wood mobilisation initiatives such as advisory services have to take account of this trend and find new ways to engage with new forest owners (e.g., through targeted information campaigns and advisory mechanisms). This handbook describes a range of measures that were developed especially for the target group of new forest owners.

4.2.2 Forest owner access to useable knowledge is key

It is paramount that forest owners - especially small-scale private owners - become aware of their key role in SFM and the supply of wood resources. The basis for wood mobilisation is that forest owners obtain a better understanding of the economic, ecological and social benefits of managed forests. A substantial increase in mobilised wood from domestic resources will only be possible if landowners and enterprises engage more actively in the management of their forests and if the unmanaged forests of passive owners can be brought back into use.

Important basic knowledge relates to the benefits of and requirements for: i) regular management for forest growth and health, ii) establishing a management plan, iii) improved forest access, including access to steep terrains, iv) harvesting poorly tended or damaged forest stands (e.g., to sell biomass for energy) v) alternative thinning regimes and residue use (e.g., branches and stumps), and vi) combining wood and non-wood products as an option to increase viability.

More advanced, professional knowledge enables forest owners to improve administration and silvicultural planning, mitigate risks, modernise equipment and practical knowledge for harvesting and transport, and develop better opportunities for timber marketing. This is also relevant for forest service providers who carry out planning and harvesting on demand. They need to be up-to-date in the latest developments in machinery and efficient harvesting work flows to take full advantage of the available equipment and knowledge and skills in order to carry out harvesting,

including on difficult sites (e.g., on those with sensitive soils or on steep terrain).

The various knowledge and persuasion measures described in this handbook represent useful tools and services that have been successfully implemented in many regions to equip forest owners and managers with the necessary knowledge to take action. These include promotional campaigns, regional action plans and initiatives, practical training and infoportals dedicated to forest owners. A broader dissemination and uptake of such knowledge in the forest-based sector across Europe represents a main lever for increased wood mobilisation. This handbook has attempted to explain these challenges and opportunities in an understandable way to both professionals and non-professionals.

4.2.3 Continuous knowledge exchange and support actions to professionalise forest owners

The major levers for wood mobilisation are measures that convey basic and more advanced knowledge to forest owners and forest enterprises. Enhancing managerial and technological capacity of owners, managers and workers can reduce transaction costs and thus enable wood mobilisation of unused, less accessible forest resources. There are three main ways to engage forest owners and activate forest use:

- Professionalising forest owners who are already active or are likely to reinstate previous management activity
- Transferring the responsibility of forest management to professionals by those owners who want to keep their property and their forests in good condition, but cannot do it on their own and
- Taking action to transfer ownership of the forest property from owners who consider their forest to be a burden, to active managers

Ultimately, it is the decision of the individual forest owner or manager whether to be proactive and adopt these measures for his or her own

enterprise, or to delegate the management to another actor working on his or her behalf. However, sufficient advisory capacity and dissemination and advisory services need be put in place by public authorities, forest owner organisations and the forest industry to make this knowledge available and easily accessible to forest owners. Chapter 3 of this handbook details different forms of such advisory services and capacity building measures, which are suitable for replication more widely in forest regions of Europe.

Professionalisation of forest owners can also be achieved through more strategic forms of organisation and cooperation. Various types of institutions and actions are relevant here, including joint ownership, joint forest management, cooperatives and joint timber marketing. These are generally seen as effective measures ensuring forest operations and SFM are conducted on a viable scale. Such organisations are important actors in the development of innovative business models and supply chain solutions and can therefore have a decisive impact on wood mobilisation in the future. Fostering the professionalisation of forest owner associations, producer groups, cooperatives and other collaborative structures through dedicated training, advice and financial incentives represents a decisive set of solutions for improved sustainable wood mobilisation.

4.3 Research needs and policy recommendations

4.3.1 Major market barriers require long-term research and appropriate innovation strategies

Wood mobilisation measures can deliver lasting impacts. Regional barriers such as poor access, small-scale patterns of ownership, limited management capacity of owners or underdeveloped market demand (e.g., for hardwoods) are widespread and critical, but cannot be solved via short-term actions alone. In addition, the



knowledge barriers of actors along the whole supply chain (e.g., insufficient information about resources or lack of communication and collaboration between stakeholders) require diverse, but well-coordinated, policy actions and R&I initiatives to support appropriate decision-making at all levels and to close the gaps in the supply chain with more cooperation, training and innovation.

The main directions for policy development include:

- Legal frameworks and incentives ensuring and fostering wood mobilisation
- Improvement of ownership structures through joint management, cooperative models and land consolidation; improvement of cadastral and ownership information
- Regional governance and stakeholder participation promoting SFM and wood mobilisation, including advisory and extension services, regional initiatives and learning labs
- Cross-regional transfer tools and exchange of good practice and evaluations
- Coordination of national and international programmes

The main directions for further research and innovation include:

- Sustainable harvesting techniques, technologies and practices minimising ecological impacts on soils and forest dynamics
- Forest management and silviculture which considers adaptation to and mitigation of risks and climate change
- Forest owner behaviour and socio-economic drivers for wood mobilisation
- Market analyses and foresight to follow R&I development and bioeconomy trends in sectors such as energy, fuels, fibres and chemicals
- Advanced forest information technologies, smart logistics, industry 4.0 and decision support systems (DSS)
- Making economic and social use of non-wood forest products (NWFPs) and other ecosystem services of forests in addition to wood harvesting
- New wood-based products, especially from hardwoods (e.g., for construction, building, and new wood-fibre products)

4.3.2 Wood mobilisation measures need broader testing and evaluation

There is a major need to assess the effectiveness of identified measures through further experimental testing and case studies in their regional setting, which should always include a focused evaluation component. The SIMWOOD evaluation framework⁵⁸ (see also Annexes 6.3 and 6.4) proved to be a solid approach for the common assessment of inputs, outputs, outcomes and plausible impacts of pilot projects that have tested quite different measures in different regions. It is a methodology that can be extended into a suitable evaluation concept for a variety of promising measures, such as regional initiatives, projects, support instruments and funding programmes. Such evaluations are needed to provide more evidence for the efficiency and possible impacts of measures for wood mobilisation under certain conditions and their transferability to other contexts.

Until the time of writing, the evaluation of measures and initiatives for wood mobilisation has been inadequate and has not provided a sound basis for learning from experience, as shown by SIMWOOD's comprehensive literature review on the subject⁵⁹. Scientific progress in forest technology or forest governance is important, but without evaluation it does not provide evidence for the effectiveness of wood mobilisation measures implemented in a region.

The review showed that scientific papers tend to focus on identifying the constraints rather than proposing or evaluating solutions. Those offering technical solutions, including silvicultural and harvesting methods, rarely consider potential or actual adoption. Only consultancy reports focus on evaluating interventions, i.e., projects and policy tools which are intended to lead to increased harvesting and therefore require behaviour change. Such assessments mainly provide information related to outputs (e.g., number of actions, events or participants) rather than the tangible impact on wood mobilisation and they also fall short in identifying the causes of success or failure. Few evaluations are able to report on the impact that interventions have on the amount of wood harvested in a way that can be attributed unambiguously to a particular intervention. Most evaluations focus on the adoption of intermediary stages, such as the preparation of management plans and association membership. While these intermediary stages may also require behaviour change, they do not necessarily lead to increased harvesting.

The review recommends that future work in this area should make clear assumptions or hypotheses about the links between constraints, interventions and impacts. It concludes that:

- (1) there is a need to focus less on surveys of constraints and more on real-life interventions and their success or otherwise;
- (2) more could be learnt from the practical experience gained from such interventions, if evaluations were published in the scientific literature and qualitative methods were included, thus helping understand why stakeholders do or do not change behaviours and increase wood harvests;



- (3) successful interventions are multi-faceted, often combining incentives and advice, farming and forestry, and production and markets;
- (4) although experience can be shared effectively between regions, interventions need to be tailored to local social, biophysical and political conditions and developed in context.

4.3.3 Innovation in forestry supported by information technologies will be essential

Within the supply chain - from forest harvesting to processed and manufactured forest-based products - several kinds of data and knowledge gaps can be identified which reveal a need for improved information. Fragmented land ownership impedes systematic large scale data collection and planning; on the demand side, the current markets lack transparency, hampering information exchange and innovation in the forest value chain. The main fields of innovation associated with forest information and themes for further research include the following:

- **National Forest Inventories (NFI)** provide crucial baseline information on forest characteristics and growth. New satellite systems (e.g., Sentinel and LIDAR), drone applications and high resolution ground truth data can increase insights into regionally available biomass volumes and assortments. Latest remote sensing technologies, coupled with NFI-based modelling, will enhance their ability to provide information more rapidly at a more detailed spatial resolution and to provide more accurate long-term future projections. Spatial localisation of unused forest resources is a key information gap (e.g., regarding target tree species, defined assortments and timber quality). These developments need to go hand in hand with the mapping of technical and socioeconomic barriers and constraints. Data need to be very specific to the application scale and comparability between different scales needs to be improved. Further standardisation of NFIs throughout European countries is required to improve EU statistics on SFM and wood mobilisation.
- **Decision Support Systems (DSS)** can contribute to better planning and coordination of market actors. A major requirement for wood

mobilisation is the improvement of information flow along the supply chain. DSS and communication tools need to be developed to fill the gap between timber flows and regional markets. Planning and data sharing systems need to be enhanced to close these data gaps and provide relevant, tailor-made decision support for the various actors involved, especially forest enterprises, associations and other cooperatives representing small-scale owners. Clients in the forest-based sector request improved forest supply data, with more frequent data updates, for their businesses. Such tools could provide improved information about current levels of mobilisation and the accessible potential using modelled simulations of forest growth and harvest projections at the stand and landscape levels. They could also conduct cost-benefit analyses of different interventions, monitor price developments, evaluate indicators related to alternative management scenarios and sustainability, and make this information broadly accessible to market actors.

- **Forest logistics** are a major field of innovation. Advanced IT solutions are being developed that enable continuous information exchange at all stages in the supply chain, tracking timber flows from forest inventory and harvesting to processed wood products. Harvesting machines, transport trucks and processing machinery carry sensors and IT systems that connect them with clients through logistical platforms and provide accurate, real time data of the harvested timber and the processed products. Currently, this allows forest industries to optimise and add value to their operations. However, further innovation is on its way and will foster a broader market uptake. Adopting recent IT trends such as automation, big data or smart factories to advance forest logistics is a major direction for future research and innovation and is expected to provide key solutions for wood mobilisation.

Lastly, good visuals are important for effective communication. They provide insight into complex issues, stimulate discussion and encourage interactive exchange about the definition of

common goals (e.g. for strategic decisions about a given territory). Figure 13 is an good example of such a visual.

4.3.4 Multi-actor approaches can foster integrated solutions for wood mobilisation

Reaching out to forest owners and other stakeholders is more successful when it is embedded in collaborative regional initiatives both within and beyond the forest-based sector. Regional initiatives can have positive impacts on regional development and economy and can be developed in various forms (e.g. as networks, clusters, open forums or regional programmes, among others). Built on participatory processes and regional governance, such initiatives include a wide range of stakeholders (e.g., regional development, environmental groups, recreation) and therefore act as a solid basis for long-term strategic decision-making and implementation. Furthermore, to guarantee sustainability, a multitude of forest ecosystem functions and related services need to be integrated and ensured (e.g., ecological system integrity and non-wood forest products).

Each region has a specific subset of the various factors and conditions that restrict active management and harvesting by forest owners. Therefore, potential solutions need to integrate and adapt various measures and actors in an efficient and effective manner. Several SIMWOOD pilot projects give successful examples of such initiatives. This handbook provides a systematic framework to describe the variety of constraints (barriers) and offers a good starting point to identify suitable approaches (measures) to lift these barriers. The initiatives can combine regulations, financial incentives, organisational support and knowledge transfer actions, and can be linked to sustainable development programmes within a particular region or initiative. Integrated regional initiatives are another important solution to promoting enhanced wood mobilisation.

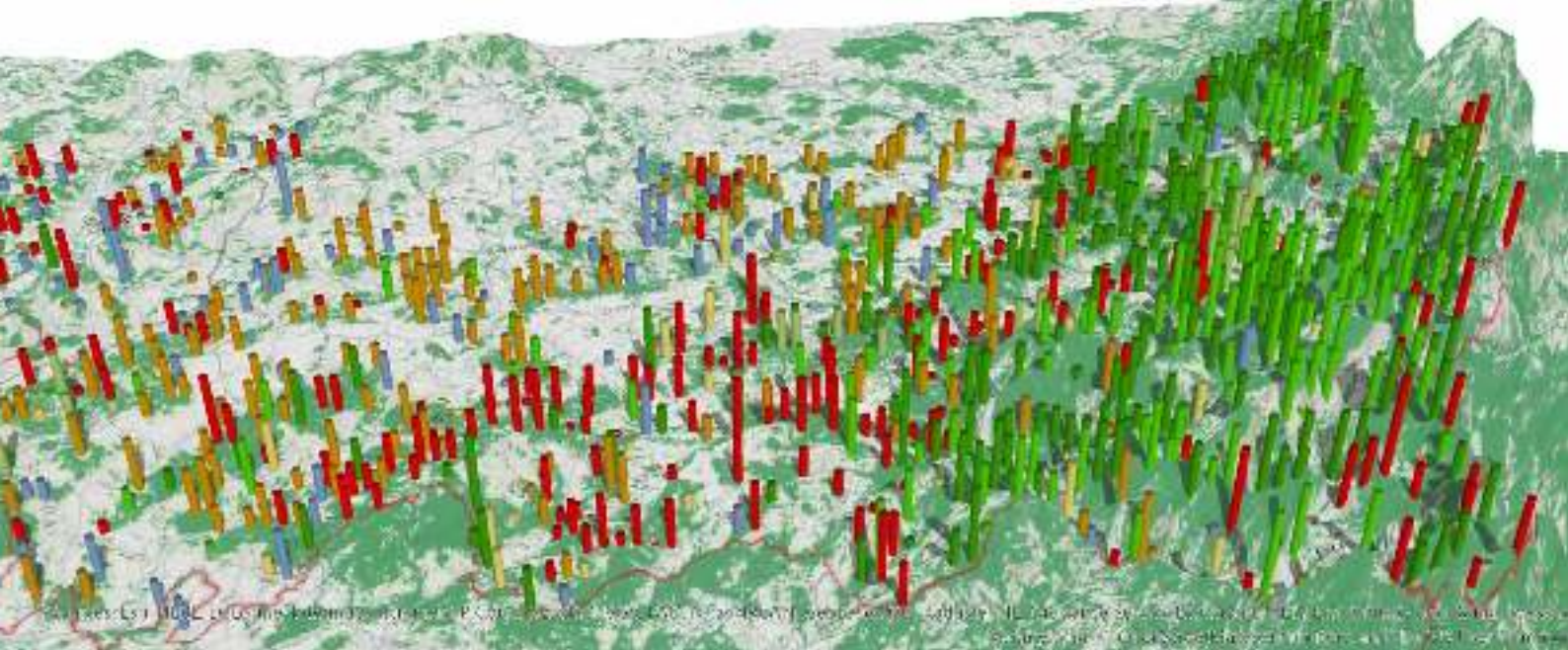


Figure 13: Map to facilitate visualisation of timber resources in a forest region. 3D view on the Vosges region in the Grand Est Département of France. The view looks north; on the right are the Vosges mountains. The height of a bar indicates the growing stock volume at each NFI plot. Colours indicate species (broadleaved: red, orange, blue; conifers: green shades). It indicates that the largest volumes of spruce and fir are available in the mountains, while beech and oak dominate the lowlands. Such datasets allow regional simulations including analyses by owner type, distance to road or slope class (Schelhaas, M.J. & G.J. Nabuurs. 2017, with contributions from C. Pupin, P. Ruch and A. Thivolle-Cazat. Raw data are from IGN.fr ⁵⁷).

4.3.5 Coordination of European and national programmes can ensure real impacts

Successful wood mobilisation initiatives engage the joint activities of individuals throughout regional wood supply chains to increase raw timber supplies from forest owners, and to work towards an enlarged, stabilised and sustainable wood production. They aim to solve a complex problem of relevance to the whole of Europe. Attempts to address single issues as part of local initiatives are meaningful to overcome local barriers, but on their own they cannot deliver sufficient Europe-wide impact. A strategic and continuous effort is required to reach out to as many land owners, enterprises and further stakeholders as possible, and to coordinate the outcomes at a larger scale and with a long-term perspective.

The SIMWOOD project developed and demonstrated a successful programme to coordinate and evaluate various pilot projects led by local stakeholders and assessed the results using a common evaluation framework and information system. This approach helped to make all results, lessons learnt and feedback from the project accessible to the local stakeholders, to raise awareness and to guide

their decision-making towards proactive forest use and wood mobilisation. The SIMWOOD project delivered considerable outcomes and impacts that will be especially beneficial for the development of European forestry initiatives in the future.

Local constraints, actors, their actions and related support programmes need to be interlinked and aligned with national and European policies and priorities and vice versa. To ensure such wider coordination and impacts, it is crucial for R&I actors to rely on tangible support from legal and financial instruments to further develop the measures and multiply their collaborative efforts across a large number of regions. European structural funds and transnational projects (e.g., ERANETS) along with international research programmes (e.g., Horizon 2020) are viewed as suitable mechanisms. Their future programmes need to be further tailored to the needs of the forest-based sector, aiming to support companies, associations and authorities in their efforts to identify and facilitate new investments. The programmes should include thematic priorities and instruments that support the further development and optimisation of smart, sustainable supply chains from forest harvesting through to the production of value added forest-based products and the broader communication and uptake of such integrated solutions in Europe.

5 References

1. Wolfslehner B, Linser S, Pülzl H, Bastrup-Birk A, Camia A, Marchetti M. *Forest Bioeconomy - a New Scope for Sustainability Indicators*. European Forest Institute; 2016. http://www.efi.int/files/attachments/publications/efi_fstp_4_2016.pdf.
2. Ronzon T, Lusse M, Klinkenberg M, et al. *Bioeconomy Report*. JRC; 2016:124. https://biobs.jrc.ec.europa.eu/sites/default/files/files/JRC_Bioeconomy_Report2016.pdf.
3. Mubareka S, Jonsson R, Rinaldi F, Azevedo J, de Rigo D, Sikkema R. Forest bio-based economy in Europe. In: San-Miguel-Ayanz et al. (eds.), *European Atlas of Forest Tree Species*. In: Luxembourg: Publication Office of the EU; 2016. <https://w3id.org/mtv/FISE-Comm/v01/e01a52d>.
4. Arnold T. A Bioeconomy for Europe. Using resources from land and sea for a post-petroleum economy. ThinkForest Forum. 2016. http://www.efi.int/files/images/thinkforest/bioeconomy/helsinki_07062016_thinkforest_tao7062016prespptxpresrev.pdf.
5. CEI-Bois. *Tackle Climate Change: Use Wood*; 2011. https://issuu.com/marlegno/docs/tackleclimatechange-use_wood.
6. Nabuurs G-J, Delacote P, Ellison D. *A New Role for Forests and the Forest Sector in the EU Post-2020 Climate Targets*. Joensuu: European Forest Institute; 2015. http://www.efi.int/files/attachments/publications/efi_fstp_2_2015.pdf.
7. FAO. *State of the World's Forests 2009*. Rome: Food and Agriculture Organization of the United Nations (FAO); 2009. <http://www.fao.org/docrep/011/i0350e/i0350e00.htm>.
8. Mantau U, Saal U, Prins K, et al. *EUwood - Real Potential for Changes in Growth and Use of EU Forests. Final Report*. Hamburg, Germany; 2010:160. <https://pdfs.semanticscholar.org/h817/ad12da993e9149593c7edfd5a912d7a213d7.pdf>. Accessed October 30, 2016.
9. Buongiorno J, Raunikar R, Zhu S. Consequences of increasing bioenergy demand on wood and forests: An application of the Global Forest Products Model. *Journal of Forest Economics*. 2011;17(2):214-229. doi:10.1016/j.jfe.2011.02.008.
10. UNECE-FAO, ed. *The European Forest Sector Outlook Study II: 2010-2030*. Geneva: United Nations Economic Commission for Europe & Food and Agriculture Organization of the United Nations; 2011. <http://www.fao.org/docrep/016/ap406e/ap406e00.pdf>.
11. INDUFOR. *Study on the Wood Raw Material Supply and Demand for the EU Wood-Processing Industries*. Helsinki; 2013. <http://ec.europa.eu/DocsRoom/documents/10017?locale=en>.
12. Muys B, Hetemäki L, Palahi M. Sustainable wood mobilization for EU renewable energy targets. *Biofuels, Bioproducts and Biorefining*. 2013;7(4):359-360. doi:10.1002/bbb.1421.
13. Junginger M, Goh CS, Faaij A, eds. *International Bioenergy Trade*. Vol 17. Dordrecht: Springer Netherlands; 2014. <http://link.springer.com/10.1007/978-94-007-6982-3>. Accessed October 31, 2016.
14. Bais ALS, Lauk C, Kastner T, Erb K. Global patterns and trends of wood harvest and use between 1990 and 2010. *Ecological Economics*. 2015;119:326-337. doi:10.1016/j.ecolecon.2015.09.011.
15. Galik CS, Abt RC. Sustainability guidelines and forest market response: an assessment of European Union pellet demand in the southeastern United States. *GCB Bioenergy*. 2016;8(3):658-669. doi:10.1111/gcbb.12273.
16. INDUFOR. *Outlook of Wood Biomass for Energy in the EU-28*. Helsinki; 2017. http://www.fern.org/sites/fern.org/files/8090%20Birdlife%20Europe%20Wood%20Energy%20Outlook%20FINAL%20230617_0.pdf.
17. EC European Commission. The CAP towards 2020: Meeting the food, natural resources and territorial challenges of the future. COM(2010) 672 final. 2010. <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex:52010DC0672>.
18. EC European Commission. Research and Innovation Infrastructures. EU Funding. Website. http://ec.europa.eu/research/infrastructures/index_en.cfm?pg=funding. Published 2017.
19. EC European Commission. A new EU Forest Strategy: for forests and the forest-based sector. COM (2013) 659 final. 2013. https://ec.europa.eu/agriculture/forest/strategy_en.
20. EC European Commission. Innovating for Sustainable Growth: A Bioeconomy for Europe. COM (2012) 60. 2012. http://ec.europa.eu/research/bioeconomy/pdf/official-strategy_en.pdf.
21. EP European Parliament. Renewable Energy Directive (RED). Directive 2009/28/EC. 2009. <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32009L0028>.
22. EC European Commission. Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. 1992. http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm.
23. EC European Commission. Our life insurance, our natural capital: an EU Biodiversity Strategy to 2020 (COM(2011) 244). 2011. http://ec.europa.eu/environment/nature/biodiversity/strategy/index_en.htm.
24. EC European Commission. Forest Law Enforcement, Governance and Trade (FLEGT). Proposal for an EU Action Plan. COM/2003/0251 final. 2003. http://ec.europa.eu/environment/forests/illegal_logging.htm.
25. EC European Commission. EUTR, Regulation No. 995/2010. 2010. http://ec.europa.eu/environment/forests/timber_regulation.htm.
26. MCPFE. Ministerial Conference on the Protection of Forests in Europe. Conference Proceedings. In: Ministry of Agriculture and Forestry, Helsinki, Finland; 1993. <http://www.foresteurope.org> ; http://www.foresteurope.org/docs/MC/MC_helsinki_resolutionH1.pdf.
27. Schmithüsen F, Hirsch F. *Private Forest Ownership in Europe*. Geneva: UNECE-FAO; 2010:118. <http://www.unece.org/fileadmin/DAM/timber/publications/SP-26.pdf>. Accessed January 4, 2017.
28. CEPF. The Voice of European private forest owners. Brochure. 2014. https://issuu.com/marlegno/docs/tackleclimatechange-use_wood.

29. Forest Europe. *State of Europe's Forests 2015*. Ministerial Conference on the Protection of Forests in Europe; 2015. <http://foresteurope.org/state-europes-forests-2015-report/>.
30. Hogl K, Pregernig M, Weiss G. What is new about new forest owners? A typology of private forest ownership in Austria. *Small-scale Forestry*. 2005;4(3):352-342. <https://link.springer.com/article/10.1007%2Fs11842-005-0020-y?LI=true>.
31. Živojinović, I, Weiss, G, Lidestav, G, et al. *COST Action FP1201 FACESMAP Country Reports, Joint Volume*. Vienna, Austria.: University of Natural Resources and Life Sciences, Vienna (BOKU); 2015;693. <http://www.eficeec.efi.int/portal/library/publications/reports/>.
32. Verkerk PJ, Levers C, Kuemmerle T, et al. Mapping wood production in European forests. *Forest Ecology and Management*. 2015;357:228-238. <http://www.sciencedirect.com/science/article/pii/S0378112715004302>.
33. Levers C, Verkerk PJ, Müller D, et al. Drivers of forest harvesting intensity patterns in Europe. *Forest Ecology and Management*. 2014;315:160-172. doi:10.1016/j.foreco.2013.12.030.
34. Forest Europe. Updated Pan-European Indicators for Sustainable Forest Management. 2015. http://www.foresteurope.org/sites/default/files/ELM_7MC_2_2015_2_Updated_Indicators.pdf.
35. Arias-Gonzales A, Gartzia-Bengoetxea N, eds. *Soil Degradation Risks in Planted Forests*. Eusko Jaurlaritzaren Argitalpen Zerbitzua; 2015. https://www.researchgate.net/profile/Nahia_Gartzia-Bengoetxea/publication/287759863_Soil_degradation_risks_in_planted_forests/links/5679236608ae2786c5535d8e/Soil-degradation-risks-in-planted-forests.pdf.
36. FAO. Towards a harmonized definition of non-wood forest products (NWFP). *Unasylva*. 1999;(198). <http://www.fao.org/forestry/nwfp/6388/en/>.
37. Ni Dubhain A. *State of Knowledge and Future Outlook on Regional Wood Mobilisation. SIMWOOD Report D2.1*. UCD University College Dublin, Ireland; 2014. www.simwood-project.eu.
38. Hetsch S. *Mobilizing Wood Resources: Can Europe's Forests Satisfy the Demand for Raw Material and Energy under Sustainable Forest Management? Workshop Proceedings*. Geneva, Switzerland: UNECE-FAO; 2007. www.unece.org/fileadmin/DAM/timber/docs/dp/dp-48.pdf.
39. Schwarzbauer P, Thoroe M, Boglio D, Becker G. *Prospects for the Market Supply of Wood and Other Forest Products from Areas with Fragmented Forest-Ownership Structures*. Vienna, Austria: BOKU; 2010. https://ec.europa.eu/agriculture/sites/agriculture/files/external-studies/2010/supply-wood/full_text_en.pdf.
40. Stern T, Weiss G, Bostrom C, Huber W, Koch SP, Schwarzbauer P. Identifying measures for wood mobilisation from fragmented forest ownerships based on case studies from eight European Regions. *Jahrbuch der ÖGA (Österreichische Gesellschaft für Agrarökonomie)*. 2013;22(1):19-28. <https://www.researchgate.net/publication/260980114>. Accessed August 22, 2017.
41. Standing Forestry Committee ad hoc Working Group II. *Mobilisation and Efficient Use of Wood and Wood Residues for Energy Generation*. Brussels; 2008;57 p. https://ec.europa.eu/agriculture/sites/agriculture/files/fore/publi/sfc_wgii_final_report_072008_en.pdf.
42. Kleinschmit von Lengefeld A. *EIP-AGRI Focus Group 20: Sustainable Mobilisation of Forest Biomass. Final Report.*; 2017. <https://ec.europa.eu/eip/agriculture/en/focus-groups/sustainable-mobilisation-forest-biomass>.
43. MCPFE, EC, UNECE-FAO. *Good Practice Guidance on the Sustainable Mobilisation of Wood in Europe*. Forest Europe, European Commission (EC), United Nations Economic Commission for Europe / Food and Agriculture Organization of the United Nations (UNECE/FAO); 2010. http://ec.europa.eu/agriculture/fore/publi/forest_brochure_en.pdf. Accessed March 1, 2016.
44. IGN Institut National de l'Information Géographique et Forestière. *Quelles Sont Les Ressources Exploitable? Analyse Spatiale et Temporelle.*; 2012. <http://inventaire-forestier.ign.fr/IMG/pdf/IF30.pdf>.
45. Forest Europe. *State of Europe's Forest (SOEF) 2011. Annex Reports.*; 2011. <https://www.unece.org/forests/fr/outputs/soef2011.html>.
46. EC European Commission. State and trend of fire danger for the period (map). 2016. <https://www.eea.europa.eu/data-and-maps/figures/state-and-trend-of-fire>.
47. Blombäck P, Poschen P, Lövgren M. *Employment Trends and Prospects in the European Forest Sector: A Study Prepared for the European Forest Sector Outlook Study (EFSOS)*. New York ; Geneva: United Nations; 2003. <https://www.unece.org/fileadmin/DAM/timber/publications/dp-29.pdf>.
48. Gaggermeier A. *Waldflurbereinigung in Bayern – eine akteurtheoretische Analyse*. Dissertation. 2014. <https://mediatum.ub.tum.de/doc/1221658/1221658.pdf>.
49. Weiss G, Gudurić I, Wolfslehner B. Review of forest owners' organizations in selected Eastern European countries. Forestry Policy and Institutions Working Paper No. 30. Rome. 2012. <http://www.fao.org/docrep/016/me171e/me171e00.pdf>. Accessed August 22, 2017.
50. FAO. *Public Perception of Forestry Industry and Environment. Proceedings of the FAO Advisory Committee on Paper and Wood Products. Item 8*. Shanghai, China; 2007. <http://www.fao.org/forestry/12715-02bb61b57cf6eeb4eb57c45078b496970.pdf>.
51. ECORYS. *Shaping Forest Communication in the European Union: Public Perceptions of Forests and Forestry*. Rotterdam; 2009. https://ec.europa.eu/agriculture/sites/agriculture/files/fore/publi/public-perception/report_en.pdf.
52. FTP. *Horizons - Vision 2030 for the European Forest-based Sector*. 2014. http://www.forestplatform.org/system/attachments/files/000/000/072/original/FTP_renewed_Vision_2030.pdf?1472814337.
53. Hinz A. Länderübergreifender Leistungsvergleich gemäß Art. 91d GG für Waldflurbereinigungsverfahren (in German). *ZfV*. 2013;6/2013:415-424. <http://geodaesie.info/zfv/heftbeitrag/2397>.
54. Gläsmann H. *Waldflurordnung. Aktivierung Der Forstwirtschaftlichen Bewirtschaftung Durch Bodenordnung Am Beispiel Des Flurbereinigungsverfahrens Biebertal Krumbacher Hecken. Vortrag Zum Symposium „Holzmobilisierung Im Kleinprivatwald, Am 13.09.2012*. Hessische Verwaltung für Bodenmanagement und Geoinformation; 2012.
55. EC European Commission. *INSPIRE - Infrastructure for spatial information in Europe*. <http://inspire.ec.europa.eu/>. Published 2017.
56. IGN Institut National de l'Information Géographique et Forestière. *Le Mémento Inventaire Forestier, Edition 2016. La Forêt En Ciffres et En Cartes.*; 2016. http://inventaire-forestier.ign.fr/IMG/pdf/161122_memento2016.pdf.

57. Kerr G, Schelhaas M-J, Nabuurs G-J. *Key Determinants and Integrated Regional Solutions of Current and Potential Future Mobilisation. SIMWOOD Synthesis Report D3.3*. FCRA, WUR; 2017:23 p + Annex 8o p. www.simwood-project.eu.
58. Vuellermoz M, Edwards D, Ambrose-Oji B, Kerr G, Ni Dhubhain A, Aurenhammer P, Azevedo J. *Regional Pilot Projects' Added-Value for Wood Mobilisation. SIMWOOD Synthesis Report D4.3*. FCBA, FCRA; 2017. www.simwood-project.eu.
59. Lawrence A. Do interventions to mobilise wood lead to wood mobilisation? A critical review of the links between policy and private forest owners' behaviour. *Forestry: An International Journal of Forest Research* (forthcoming 2018).

Photos:

Front cover: Rainer Sturm/pixelio.de; AK-DigiArt/Fotolia; Zsolnai Gergely/Fotolia; LWF; sebra/Fotolia; Reinhard Tiburzy/Fotolia

Page 3: Christophe Orazio

Page 7: Ben White; Hudson-Hintze/Unsplash; Heiko Hagemann

Pages 10–11: Pixelio

Page 14: Pixabay; Stephanie Hayes

Page 17: Pixabay

Page 18: Andrew Kitching

Page 21: Pixabay; Rawpixel Ltd.; snowgonzales/Fotolia

Page 27: France Bois Regions; France Bois Foret; Plan Rapproche

Page 28: Stephen Barnes/Fotolia

Page 30: Pixabay

Page 33: FCBA

Page 35: IEFC; Pixabay; Bertrand Nicolas/Fotolia

Page 39: FCBA

Page 40: EFIATLANTIC

Page 43: FCBA; Pixabay

Page 44: Stephanie Hayes

Page 45: EFIATLANTIC

Page 47: Pixabay

Pages 52–53: Nick Mc Carthy

Page 58: Pixabay

Page 59: IEFC

Page 61: IEFC

Page 64: Nick Mc Carthy

Page 68: IEFC

Page 70: EFIATLANTIC

Page 74: FCBA

Page 76: AGRESTA

Page 77: Pixabay

Page 80: IEFC

Page 82: Pixabay; FCBA

Pages 84–85: Stephanie Hayes

Page 87: Andreas Hermsdorf/pixelio.de; pexels; Atlanbois

Page 89: EFIATLANTIC; Pixabay; Nick Mc Carthy

Page 91: EFIATLANTIC

Page 94: Pixabay; Pascal Moulin/Fotolia

Page 95: Pixabay

Page 97: IEFC

Page 99: Sculpture Qode/Unsplash

Page 107: Pixabay

Page 109: IEFC; Nick Mc Carthy

Back cover: Pixabay

6 Annex

6.1 SIMWOOD project summary

The European wood mobilisation problem has been addressed in many studies, projects and initiatives. However the ongoing rather isolated initiatives are not likely to fill the gap between the future timber supply and demand. More than ever, innovative approaches to overcome the present barriers for wood mobilisation are required. The main barriers impeding widespread wood mobilisation in forestry are not only technical in nature, but to a large extent they are also socio-economic and are dependent on the motivation of a multitude of forest owners and other stakeholders. Therefore, the overall goal of the SIMWOOD project was to promote collaborative wood mobilisation in the context of multifunctional forest management across European forest regions. It developed a novel integrated approach by addressing the five domains in wood mobilisation - governance, ownership, management, harvesting and functions - all at the same time.

The projects aimed to mobilise a broad range of forest owners of which all types were considered, but a special focus was put on private owners, who represent a major opportunity to unlock currently unused wood production. Developing novel integrated wood mobilisation solutions (e.g., in the harvesting supply chain) will help overcome socio-economic and technical barriers. Multifunctional forest management needs to be promoted to integrate forest ecosystem functions and to balance economic, ecological and social impacts of the proposed wood mobilisation measures.

Wood mobilisation is more likely to be successful when it is embedded in collaborative regional initiatives within and beyond the forest-based sector. Therefore the project particularly targeted regional initiatives, participatory processes and the governance of the sustainable development of European forest dependent regions. Regional Learning Laboratories (RLL) were established as

an integral component of the engagement process with local stakeholders. Linked to existing initiatives in the region, these iterative forums took a first step towards collaborative learning. Guided by the project teams, the participants obtained fresh findings on the regions' specific status quo, opportunities and proposed solutions. The project's common methodology included three phases which were carried out simultaneously in all model regions:

- (1) Regional profiles of wood mobilisation challenges. A detailed analysis of the present situation in the model regions helped to identify barriers, opportunities and objectives. Potential solutions were developed together with involved stakeholders.
- (2) Regional mobilisation strategies and integrated evaluation. A critical review of the information gathered helped to discuss possible strategies in each model region and propose potential solutions for testing in local pilot projects. Modelling based on forest inventory data was used to investigate possible scenarios of regional wood mobilisation.
- (3) Feasibility and demonstration. A series of new pilot projects was implemented to test and evaluate the proposed tailor-made solutions for an increased sustainable wood mobilisation. With support from the researchers, the SME partners took over a role of kick-starters in their regions.

The relevant information and findings of the case studies are integrated in the SIMWOOD Information System, hosted by the European Commission Joint Research Centre (JRC). This pan-European monitoring and policy support system is targeting regional and European stakeholders. Forest owners, foresters and SMEs have obtained access to information and recommendations for their regions. European and national decision-makers will be able to evaluate the effect of national and EU programmes on wood mobilisation and follow regional developments. <http://simwood.efi.int/>
<https://simwood.jrc.ec.europa.eu/>

6.2 SIMWOOD pilot projects

Background

In SIMWOOD, a series of 22 pilot projects was planned and implemented to test and evaluate a range of wood mobilisation measures under real conditions in the participating model regions. Each of the pilot projects portrays a well-adapted solution to the regional barrier context. Collectively the projects represent a network of initiatives across Europe with an explicit focus on demonstration and engagement. Coordinated by the project for a period of 3 years, the pilot projects explored novel solutions, practices or tools, and evaluated their potential to contribute to increased and sustainable wood mobilisation.

The pilot projects can be grouped into the following four types:

1. Engagement of forest owners
2. Increased wood mobilisation for energy
3. Capacity building
4. Management for multifunctional forests

The evaluation followed a common methodology (see Annex 6.3) and the results, success stories and feedback from stakeholders are documented in the final pilot project reports. In addition, several focus studies were carried out to address specific knowledge gaps during the early stages of project implementation. All the pilot project reports are accessible through the SIMWOOD Information System portal (see also Annex 6.5).

No. Region, Title of pilot project, partners

- 01-1. Germany, Bavaria. Activation of forest owners to establish sustainable forest management and to adapt forest stands to the future climate. LWF Bayerische Landesanstalt für Wald und Forstwirtschaft and WIO Wald-Initiative Ostbayern.
- 01-2. Germany, Bavaria. Activation of forest owners to engage them in sustainable forest management with special emphasis on alpine forest-functions. LWF Bayerische Landesanstalt für Wald und Forstwirtschaft and BWO Bergwaldoffensive.
02. Germany, North Rhine-Westphalia. Forest land consolidation of community forests in NRW. EFI European Forest Institute, IWH Internationales Institut für Wald und Holz NRW, BRA Bezirksregierung Arnsberg.
03. France, Auvergne. Consolidated professional practical knowledge in steep terrain conditions as a way to broaden practitioners' wood mobilization horizon. FCBA Institut Technologique.
- 04-1. France, Grand Est. Improvement of silviculture schemes in poor limestone soils contexts. FCBA Institut Technologique and FBE Forêts et Bois de l'Est.
- 04-2. France, Grand Est. Increasing professional practical knowledge for enhanced environmental friendly logging operations on sensitive soils. FCBA Institut Technologique.
- 04-3. France, Grand Est. Promoting forest owners' interest in forest management through contact with foresters. FCBA Institut Technologique and FBE Forêts et Bois de l'Est.
05. UK, North East England. Bringing unmanaged privately owned woodlands into productive and sustainable management by adopting a marketing brand. FCRA Forestry Commission Research Agency and RDI Rural Development Initiatives.
06. UK, Scotland. Living Working Woods: the mobilisation of social, environmental and economic assets of undermanaged/underutilised woodlands. FCRA Forestry Commission Research Agency and SWA Small Woods Association.
- 07-1. Ireland. Mobilising additional wood fuel from conifer first thinning. UCD University College Dublin and VEON.
- 07-2. Ireland. Developing a new collaborative producer group and supply chains towards the mobilisation of timber. UCD University College Dublin and IWP Irish Wood Producers.
- 08-1. Castilla and León, Spain. Thinning intensity influence in tree growth and mushroom production in mixed forest. UVA Universidad de Valladolid and AGRESTA.
- 08-2. Castilla and León, Spain. Contrast of different early-thinning practices in natural regenerated young mixed forest in Urbión Model Forest. UVA Universidad de Valladolid and AGRESTA.



- 09-1. Catalonia, Spain. Establishing a protocol for collaborative, mutually agreed management in particularly sensitive forests that reconciles their high natural value with the mobilisation of wood. CREAM.
- 09-2. Catalonia, Spain. Mobilising the primary forest biomass and promoting the local consumption of woodchip from the planned forest management to help decrease the risk of fire. CREAM.
10. Nordeste, Portugal. A multiscale integrative approach for participative sustainable wood mobilisation. IPB Polytechnical Institute of Braganca and ForesFin.
11. Alentejo, Portugal. Increasing eucalyptus and maritime pine wood availability through management and afforestation. ISA Universidade Técnica de Lisboa.
- 12-1. Gelderland and Overijssel, The Netherlands. Improving wood harvesting logistics by a dedicated GIS-based biomass module. BTG Biomass Technology Group.
- 12-2. Gelderland and Overijssel, The Netherlands. Wood mobilisation in the Food Valley region. BTG Biomass Technology Group.
13. Slovenia. Improvement of forest owners' associations' capacities for mobilisation of wood from private forests. GIS Slovenian Forestry Institute and ZGS Slovenia Forest Service.
14. Småland, Sweden. Development of a more efficient and sustainable system for extraction of logging residuals from clear cutting areas for fuel purposes. ESS Energikontor Sydost and LNU Linnaeus University.
15. Lower Saxony, Germany. KWF Focus Days Small forests – What to do? Sustainable management of small forest areas. KWF Kuratorium für Waldarbeit und Forsttechnik.
16. Latvia. Innovative strategies and opportunities for increasing the use of wood logging residues in Latvia for energy utilities. Institute of Energy Systems and Environment, Riga Technical University.

6.3 SIMWOOD Evaluation Framework

Background

As part of the SIMWOOD project, an evaluation framework was developed that can be applied to any intervention seeking to mobilise wood, i.e., projects, programmes or ‘solutions’ comprising any combination of measures described in Section 3 above. It was designed initially to support the delivery of 22 pilot projects that tested a range of innovative wood mobilisation solutions. This exercise represented the first systematic attempt to understand the causes and consequences of wood mobilisation solutions in Europe⁵⁸.

The framework is designed to generate feedback from a range of project stakeholders by providing answers to three key questions:

- a) What changed as a result of the project, and for whom?
- b) Why? i.e., what caused these changes?
- c) What lessons have we learned? i.e., looking back, what should have we done differently, and what should we do differently in the future?

The responses then help us to:

- 1) **make judgements** about the effectiveness of each project in delivering its intended outcomes and impacts, as well as identifying any unintended consequences;
- 2) **learn lessons** about progress to date, and how the project objectives, approach, or activities should be adjusted to make it more effective into the future, and
- 3) **synthesise the findings** to show which types of solution are most effective at addressing particular barriers in particular contexts and how particular types of solutions should be implemented to make them as successful as possible.

Objective 1 is typically referred to as a ‘summative’ evaluation and can support strategic decisions about whether or not to continue funding a project, or extend it or transfer it elsewhere. Objective

2 is referred to as ‘formative’ evaluation; the focus is on learning by internal stakeholders to make numerous small adjustments as the project unfolds. Objective 3 is a ‘synthesis’ or ‘theory-driven’ evaluation, which enlarges the unit of analysis by looking across several projects to identify general patterns of effectiveness. This can be improved by ‘triangulating’ the findings with other studies.

Evaluation framework

The framework is based on a ‘logic model’ widely used in programme evaluation, which covers inputs, outputs, outcomes and impacts as follows:

- **Inputs:** the investments into the project, primarily of staff time and money.
- **Outputs:** the tangible deliverables of the project, e.g., demonstration events, guidance booklets, decision support systems, cooperative groups, equipment made accessible, etc.
- **Outcomes:** changes to knowledge, skills, attitudes, aspirations and practices of people who participate in the project and have access to its outputs. It covers the ‘mobilisation of people’ necessary for the ‘mobilisation of wood’.
- **Impacts:** changes to wood mobilisation and delivery of other ecosystem services, and changes to risks and uncertainties. It also includes unintended impacts.

Together, these categories were subdivided into ten criteria which represent a logical sequence of steps that project stakeholders are likely to follow as their project unfolds from its initial inputs through to ultimate impacts on wood mobilisation and other ecosystem services, including any side-effects. The criteria are summarised in Table 4. For each of the ten criteria, key evaluation questions and a list of additional questions and indicators were proposed to be selected or adapted for any given project or intervention according to its specific project objectives and approach and to the local context.

The evaluations focused on ‘outcomes’ and ‘impacts’. Evaluation of inputs and outputs alone is not considered sufficient for assessing the success of an intervention. In many cases, evaluating impacts was not possible given the timescale of the project and therefore it was more realistic to focus on outcomes (changes in knowledge,



skills, attitudes, aspirations, and practices); i.e., the ‘mobilisation of people’ that is necessary before the ‘mobilisation of wood’. It is still important to describe and quantify outputs to provide additional feedback (such as the barriers lifted by the project, and the number of participants). Estimates of the level of inputs to the project was also necessary to make claims about its overall cost effectiveness or the cost/benefit of specific components, such as a demonstration event.

Implementation

Each pilot project team was asked to prepare a pilot project description, which was updated regularly and included their evaluation plans. These descriptions were structured around three steps:

Step 1: Definition of priority target: a statement of the solution being tested (identifying the type of measures, or combination of measures, being used), the barriers it will address, and a brief ‘theory of change’ that shows how the solution will address the barriers and lead to sustainable wood mobilisation.

Step 2: Implementation (experimentation) activities: a description of intended inputs and outputs.

Step 3: Evaluation plans: description of intended outcomes and impacts listing the main evaluation

questions and indicators to be used, stating who will be asked to answer questions or assess the indicator and describing the methods to be used in order to answer these questions or assess the indicators.

The process of preparing and revising the project description and evaluation plans encouraged ongoing reflection within project teams, helped to keep the focus on intended goals rather than just activities and outputs. This reflection was complemented with feedback and data from project participants about inputs, outputs, outcomes and impacts, using the criteria in Table 4 to structure questions. The main methods to elicit feedback were:

- a) Semi-structured interviews, i.e., one-to-one meetings with stakeholders
- b) Participatory workshops
- c) Questionnaire surveys

Overall, pilot project leaders in SIMWOOD reported that they found the evaluation process helpful. In some cases, the direction and purpose of the project was substantially revised to accommodate stakeholder feedback generated through the evaluation process. The key findings from the evaluation of each pilot project, including a European synthesis, are summarised in the SIMWOOD Information System.

Table 4: SIMWOOD evaluation framework: criteria and key questions for stakeholders

	Criteria	Key questions
INPUTS	1. Investments: time, money, research base, materials, equipment, infrastructure, technology	<ul style="list-style-type: none"> • What investment has been made in the project? • How much time and money was spent delivering specific outputs (e.g., a demonstration event)?
	2. Activities & Resources: actions and events carried out, resources made available	<ul style="list-style-type: none"> • What activities or events have been carried out? • What new resources have been made available?
OUTPUTS	3. Barriers & Opportunities: barriers lifted, opportunities created, changes to the conditions under which forestry decisions are made	<ul style="list-style-type: none"> • What barriers have been lifted or new opportunities created? • What changes have been made to the context in which forestry decisions take place? • Which aspects of the project caused these changes?
	4. Participation: types and numbers of people or groups who participate in activities or have access to new resources	<ul style="list-style-type: none"> • How many people or groups participated in specific activities or events? • How many people or groups were given access to a new resource or service? • Which aspects of the activities (and how they were delivered) caused these changes?
	5. Reactions: feelings of participants about involvement in specific activities or in the project as a whole; i.e., satisfaction, relevance, acceptance of leaders	<ul style="list-style-type: none"> • How satisfied were participants with the activity or project, and why? • How relevant was it to them or their group, and why? • How effective and efficient was the activity or project in meeting its own objectives, and why?
OUTCOMES	6. Knowledge & Skills: changes in knowledge, skills and awareness resulting from the project	<ul style="list-style-type: none"> • Did participants learn any new knowledge or skills as a result of the project? • Which aspects of the project helped participants gain the above knowledge or skills?
	7. Attitudes & Aspirations: changes in attitudes, values, opinions, motivations, confidence and trust, changes in aspirations, intentions, plans and commitments resulting from the project	<ul style="list-style-type: none"> • Have participants' attitudes or confidence in wood mobilisation as a management priority changed? • Have participants' level of mutual understanding or trust changed as a result of the project? • Are participants planning to do anything new or differently as a result of the project? • Which aspects of the project caused participants to change their attitudes and aspirations?
	8. Practices: changes in practices, behaviour, procedures, policies and social organisation resulting from the project	<ul style="list-style-type: none"> • What have participants done differently as a result of the project? • How have procedures or policies changed as a result of the project? • How has the amount of collaboration between stakeholders changed as a result of the project? • Which aspects of the project caused participants to do these things?
IMPACTS	9. Wood mobilisation: changes in wood mobilisation resulting from the project	<ul style="list-style-type: none"> • Have participants changed the amount of wood mobilised as a result of the project? • Has the group or region changed the amount of wood mobilised as a result of the project? • Which aspects of the project caused participants to change the amount of wood mobilised?
	10. Ecosystem services: changes in the provision of other ecosystem services, risks and uncertainties and unintended impacts resulting from the project	<ul style="list-style-type: none"> • Have there been any changes in ecosystem services (stocks and flows) as a result of the project? • Have there been any changes in risks and uncertainties as a result of the project? • Have there been any unintended consequences of the project, both positive and negative? • Which aspects of the project caused these changes?

6.4 SIMWOOD Information System portal

The 'SIMWOOD Information System' is a web information service addressing issues regarding wood mobilisation in Europe. The main sources for the content of the SIMWOOD Information System are the SIMWOOD project and the partners of the SIMWOOD consortium. The components of the system include:

- A knowledge base of barriers impeding wood mobilisation along with corresponding measures capable of overcoming these barriers: related projects and measures from across Europe.

- Maps and graphs showing wood mobilisation initiatives, facts and figures and relevant web-sites on the topic.
- An interactive tool to assess the outputs of modelling exercises related to wood mobilisation scenarios in pilot regions.
- A newsfeed with the latest news and events in biomass mobilisation across the world.

The content of the SIMWOOD IS was developed by SIMWOOD partners during the SIMWOOD project. Interested users are invited to contribute by adding information about other measures to stimulate wood mobilisation.

Solutions for Sustainable Innovative Mobilisation of Wood in Europe

This knowledge base is a compilation of resources for practitioners, policy makers, forest administrations, forest owner associations, and other stakeholders.

Through this website you can:

- navigate and search our library of wood-mobilisation solutions
- check-out what resources are available in your country
- read the latest news on wood mobilization
- tell us what you know! Upload a project!

The SIMWOOD library is categorized by common barriers to wood mobilization identified in European countries, as well as the measures that have either been tested or are in the process of being tested to address those barriers.

Highly detailed information is available for seventeen model regions. You can interact with maps and graphs showing wood mobilisation initiatives, relevant websites, facts and figures as well as regional scenarios showing the outputs of modelling exercises in your country.

Much of the data and knowledge within this system was collected within the FP7 project SIMWOOD (Sustainable Innovative Mobilisation of Wood). For more on the FP7 project, visit the project homepage.

Quick Links

- SEARCH THE PROJECTS
- IN YOUR COUNTRY
- UPLOAD A PROJECT

<https://simwood.jrc.ec.europa.eu>

6.5 SIMWOOD partners

The SIMWOOD consortium is a partnership of 28 participating organisations which included 2 European research organisations, 13 national or regional research organisations, 11 small and medium-sized enterprises (SME) and 3 public bodies. The consortium represents 14 complementary European forest regions in 10 member countries with a high share of private ownership, notably the whole Western European sub-region.

No. Partner short and full name, country, website

1. LWF. Bayerische Landesanstalt für Wald und Forstwirtschaft des Bayerischen Staatsministerium für Ernährung, Landwirtschaft und Forsten. Bavaria, Germany. www.lwf.bayern.de
2. BAYFOR. Bavarian Research Alliance. Germany. www.bayfor.org
3. JRC. European Commission Joint Research Centre. Institute for Environment and Sustainability. <https://ec.europa.eu/jrc/en>
4. EFI. European Forest Institute. Finland. www.efi.int
5. UCD. University College Dublin. Ireland. www.ucd.ie
6. FR. Forest Research (the research agency of the UK Forestry Commission). United Kingdom. <https://www.forestry.gov.uk/forestresearch>
7. FCBA. Institut Technologique. France. www.fcba.fr
8. WUR. Wageningen Environmental Research. Wageningen University & Research. The Netherlands. www.wur.nl
9. IIWH. Internationales Institut für Wald und Holz NRW e.V. Germany. www.wald-zentrum.de
10. KWF. Kuratorium für Waldarbeit und Forsttechnik e.V. Germany. www.kwf-online.org
11. UVA. Instituto Universitario de Gestión Forestal Sostenible. Universidad de Valladolid. Spain. www.uva.es
12. CREAM. Centre de Recerca Ecològica i Aplicacions Forestals. Spain. www.cream.cat
13. IPB. Instituto Politécnico de Bragança. Centro de Investigação de Montanha. Portugal. www.ipb.pt
14. ISA. Universidade Técnica de Lisboa. Instituto Superior de Agronomia. Portugal. www.isa.utl.pt
15. LNU. Linnaeus University. Sweden. www.lnu.se
16. GIS. Slovenian Forestry Institute. Slovenia. www.gozdis.si
17. ZGS. Slovenia Forest Service. Slovenia. www.zgs.gov.si
18. BTG. Biomass Technology Group BV. The Netherlands. www.btgworld.com
19. Agresta S. COOP. Spain. www.agresta.org
20. ECM Ingeniería Ambiental SL. Spain. www.ecmingeneriaambiental.com
21. FBE. Forêts et Bois de l'Est. France. www.foretsetboisdelest.com
22. IWP. Irish Wood Producers Ltd. Ireland. <https://irishwoodproducers.com>
23. VEON. Ireland. www.veon.ie
24. ARBOREA. Associação Agro-Florestal e Ambiental da Terra Fria Transmontana. Portugal. www.arborea.pt
25. ForestFin. Florestas e Afins. Portugal. www.florestaseafins.com
26. ESS. Energikontor Sydost AB. Sweden. www.energikontorsydost.se
27. SWA. Small Woods Association. United Kingdom. www.smallwoods.org.uk
28. RDI. Rural Development Initiatives Ltd. United Kingdom. www.ruraldevelopment.org.uk

LWF Bavarian State Institute of Forestry

 Bavarian Research Alliance


E F I



 Forest Research

 Forestry Commission

FCBA
INSTITUT TECHNOLOGIQUE



 Wald-Zentrum



 **CREAF**

 **ipb** INSTITUTO POLITÉCNICO DE BRAGANÇA

 INSTITUTO SUPERIOR D AGRONOMIA
Universidade de Lisboa

Linnéuniversitetet 

 GOZDARSKI INŠTITUT SLOVENIJE
GOVORILNI JEZIKOVNI SLOVENIJE

 ZAVOD za GOZDOVE SLOVENIJE
Slovenia Forest Service

 agresta

 **ECM**

 Forest & Bois de l'Est

 Irish Wood Producers

 **btg**

 **VEON**

 **ARBORLA**

 **ForestFin**

 **energi kontor**
sydost

 **Small Woods**

 **rural development initiatives**



EUROPEAN FOREST INSTITUTE



This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 613762.