

Summary

The ALTERFOR project examines existing and alternative forest management models (FMMs and aFMMs) in ten case study areas (CSAs) in nine European countries, trying to understand how management models would affect provision of different ecosystem services (ES) in a perspective of decades. Alternatives to existing management are identified and will hopefully be used to enhance the provision of desired ecosystem services.

The implementation of aFMMs in each CSA is an important task for ALTERFOR. For this reason forest owners' guidelines are produced. The guidelines are country-specific and written in the national language. They give basic knowledge and instructions for silvicultural measures. They also give a short overview of the impacts on the forest ecosystem and summarizes problems and possibilities. The situation in each CSA differ, for example the structure of the owner and the owner's obligations and opportunities. In some CSA a few managers take all decisions, in other thousands of owners with different background and experience take decisions about their forestland. Depending on the situation in each CSA the style of the guidelines differs.

The guidelines and other information material are developed in co-operation with stakeholder's reference groups and non-academic partners in each CSA. In this way they are adapted to the local situation and in accordance with implementation in practice. The guidelines will be available online and in most cases also in printed material.

Next step in ALTERFOR is work with demonstration-sites. Demonstration-sites will illustrate the outcome of the aFMMs in the field. In most cases they are closely connected with the guidelines. The Demonstration-sites will be available in summer 2020 and documented in Deliverable D1.4.

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Abbreviations used

AFVS – Sousa Valley Forest Owners' Association, Portugal
ALTERFOR – Alternative Models and robust decision-making for future forest management
ASU – Aleksandras Stulginskis University, Lithuania
CSA – Case Study Area
FMM – Forest Management Model
aFMM – alternative Forest Management Model
KTU – Karadeniz Technical University, Turkey
ISA – Instituto Superior de Agronomia, Universidade de Lisboa, Portugal
MSG – Management Support Group
PA – Project Administrator
PC – Project Coordinator
SLU – Swedish University of Agricultural Sciences, Sweden
SC – Scientific Coordinator
TUM – Technische Universität München, Germany, Germany
UCD – National University of Ireland Dublin – University College Dublin , Ireland
UNIDP – University of Padova, Italy
WU – Wageningen University, The Netherlands
WP – Work Package
WPLs – Work Package Leader(s)
TUZVO – Technical University in Zvolen, Slovakia

1 General information about Guidelines presented in ALTERFOR

A main task for ALTERFOR is to investigate different ways to manage forest in ten case study areas (CSAs) in nine European countries. The most common and important currently used Forest Management Models (FMMs) were described in deliverable D1.1 and alternative forest management models (aFMMs) in D1.2.

Forest Management Models vary a lot between CSAs. The different models must be adapted to natural conditions such as climate and site properties and to ownership structure. Also, different management is used for different trees species and combinations of species. The social, technical and administrative situation varies between CSA. Different management is used to obtain various products or ecosystem services from the forest and the demand for products and services differ between CSA.

A changing climate will affect forestry in many ways. Also care for biodiversity and possibilities for social services such as recreation are important and will be more important in a close future. Existing FMMs might have served well until now, but an important task for ALTERFOR is implementation of alternative Forest Management Models (aFMM). The aFMMs are alternatives to replace or complement existing FMMs to increase one or more ecosystem services. The aFMMs are described and discussed in Deliverable D1.2.

To have any possibility to impact future use and management of forests, the aFMMs must be known and accepted by the managers and the forest owners. Therefore, ALTERFOR WP1 put a lot of effort in producing pedagogical **Guidelines**. Depending on the different situations in all the CSA the approach differs. The number of decision-makers differs a lot. E.g. in Sweden thousands of forest owners take decisions about the forest while e.g. in Ireland forest on the CSA are owned by the state company Coillte and all decisions about management are concentrated to few managers and in Turkey, the central institution (General Directorate of Forestry) and its local provincial agencies take the management decisions. Also, the forest legislation, tradition and practice in knowledge transfer differ between partners. As a result the guidelines differ between partners.

Another important part of the knowledge transfer about aFMMs are demonstration sites. They are closely connected to the guidelines. The demonstration sites will show silviculture techniques and the result of different aFMMs in the field. The work with demonstration sites continues during summer 2020 and will be documented in Deliverable D1.4.

In part 2 of this report the general ideas about work with knowledge transfer, guidelines and demonstration sites are documented for each partner/country. The information is collected from the partners in all case study areas. In part 2 the partners description of ideas behind and the work with guidelines are presented. It also includes some information about the demonstration sites that will be presented in Deliverable D1.4, as the guidelines often relates to demonstration sites.

In part 3 the guidelines are presented. They are written in the national languages as they are to be used in each case country.

2 Background to the design and a brief description of guidelines

Germany

In the two CSA in Germany there are three aFMMs. The first one, called “multifunctional forest” strives for providing a multitude of different ecosystem services on the same forest area. In order to achieve that, uneven-aged mixed stands are maintained where they exist; on other areas, the existing stands are transformed into such, which takes decades of consequently applied silvicultural measures. The second aFMM is called “production forest”. This is considered to be a very consequent way to maximize wood production by focusing on (i.e. maintaining and transforming into) even-aged conifer stands with production-optimal rotation times. This usually means shorter than traditional rotations and also implies harvesting the stands before their storm and bark beetle risk becomes highest. The third forest aFMM is called “setaside”, and it strives for maximizing biodiversity by stopping active forest management. From a silvicultural point of view this is quite simple, but for a forest owner it implies many consequences, especially legal ones (e.g. accountability in case of damages to neighbouring forests or recreationalist accidents), but also the question to what extent forest road networks are still required (e.g. for making emergency measures possible, or for enabling biodiversity inventories), and how these can be financed. As Germany has a long tradition of forestry and forest research, the guidelines are based not only on the simulation outcomes, but also on existing field plots that will be used as demonstration sites.

In Germany, there is a traditionally good contact between the public forest managers (state and municipal, from local to ministry level) and research institutes. By informing the federal state ministries for agriculture and forestry about the ALTERFOR guidelines, they will reliably reach state forest managers. As the forests owner unions (covering the majority of small and medium area private forest owners) are advised by the federal state authorities, the former will also become informed by way of the ministries. The Technical University of Munich has also good contacts to large private forest estate managers. They will in addition be directly made aware of the guidelines by us.

The information material will also be available at the homepage of the Chair for Forest Growth and Yield, Technical University of Munich.

Ireland

The aFMMs in Ireland were developed to be used in combination with each other to enable lower intensity forest management of blanket peat forest that improve financial values, biodiversity aspects, recreation potential, while reducing windthrow and long-term water quality impacts. The aFMMs focus on either production or biodiversity, but they are meant to be established on different types of blanket peat sites.

For production, the suggestion is to plant lodgepole pine, at a lower than normal stocking, or a mixture of Sitka spruce and downy birch. For biodiversity the advice is to plant low-stocked lodgepole pine in groups to promote development of native shrubs and trees in the open areas, or heavily thin lodgepole pine stands to an open forest stand. Biodiversity focused aFMMs also included an option

to restore blanket peat bogs to a natural condition where necessary measures are taken to rewet the site and allowing natural bog vegetation to recolonise.

The guidelines are quite detailed with the number of seedlings per hectare that should be planted but also when and how to do the measures. The target groups are forest owners with blanket peat stands who are interested in expanding the provision of ecosystem services from their forest and manage their forest without the use of fertiliser. These aFMMs were not exclusively developed for Coillte managers, but also for private forest owners with blanket peat forests. There is a degree of overlap between the management guidelines and demonstration sites, therefore they are presented in the same document.

Italy

The Italian aFMMs aim to increase recreation values and special habitats. The Italian guidelines will not be a traditional description of silvicultural operations but will give more information to help the manager to understand the message. They will include an historical background, information about forestry and public health, humans' perception of forest and the possibilities for multiple use of forest land.

The guidelines will be illustrated to help managers. For the Italian CSA the guidelines will be available via many channels including the university and the forest "company" ETIFORs homepages.

Lithuania

In Lithuania, three aFMM are of interest. One is "adaptive rotation periods". It is a controversial issue and in conflicts with the current legislation and tradition of many forest managers. Information will be disseminated in several ways to have a possibility to make a difference. Motives and results will be presented in different types of publications, conferences and seminars. The issue will also be raised in teaching and studied further in a PhD project. A second aFMM is "care for deciduous trees" which is important in a forestry dominated by coniferous species. To increase interest, brochures describing various steps in the management of deciduous trees will be produced. The third aFMM is "no management" to increase the areas of important habitats in Lithuania.

Information will be provided in many ways, publications, conferences and in teaching. Also for the aFMM, a PhD project is planned to increase knowledge and be a part of communication about forest management.

The guidelines delivered in this report are a compilation of short "stories" on advanced or alternative forest management. They are based on contributions from professional foresters and scientists who have accepted the ALTERFOR's initiative to share their know-how in a very simple but informative way.

The Netherlands

The aFMMs in the Netherlands span over a wide range of forest types and management regimes. Several models are designed to strengthen natural values and recreational values, others have as their primary goal to produce valuable timber and one model aims to increase the forest's diversity to make the forest stands better adapted to problems in a changing climate e.g forest health.

Information will be disseminated via one main website (<https://www.vbne.nl/klimaatslimbosennatuurbeheer/>). This website is commissioned by the Ministry of Agriculture, Nature Management and Food Quality, and is developed by the working group climate smart forest and nature management. Reference to the website: Lerink, B., Schelhaas, M.J., Boosten, M., Kremers, J., Den Ouden, J., Clerkx, S., Nabuurs, G.J. (2020). Gereedschapskist Klimaatslim Bos- en Natuurbeheer. Wageningen University & Research en Stichting Probos. The website aims at providing more knowledge and experience about climate smart forest and nature management, but also provides an overview of different possible forest management strategies, including the aFMMs developed for the Dutch case. The Dutch ALTERFOR team provides input to this website. The target groups/audience are Dutch forest and nature managers. The website is hosted by the VBNE (the Dutch Association for Forest and Nature Owners).

Portugal

Portugal has chosen eight different FMMs, both current and alternative, each aiming at different purposes. The first two FMMs correspond to the existing mixtures of eucalypt and maritime pine differing only by the species proportion, being very similar regarding management and ecosystem services provisioning. Chestnut stands target the increase of chestnut timber production in the CSA (currently negligible). Demand for eucalypt pulpwood drives most forest owners to choose this fast growth species, even though legislation has restricted new plantations, hence, adequate management models are needed. To meet the demand for other ecosystem-services aFMMs include pedunculate oak, pure maritime pine and cork oak stand level management. The riparian areas in the CSA were suggested to address conservation concerns.

Information on sustainable silvicultural practices for the management of these alternative and existing FMMs are meant to reach landowners and other stakeholders. In the case of the alternative FMMs, the information will include location of demonstration sites as well as contacts of the local forest owners association. Leaflets will be printed and available online on the local forest owners association webpage and social media. The participants in ALTERFOR workshops will get the information sent to them by e-mail.

Slovakia

Slovakia is working with two alternative Forest Management Models (aFMMs). One model is aiming to increase sustainability in forest ecosystems for forest areas which have lost some of the ecological values. The model includes more intensive overstorey thinnings, selective cuttings and target diameter cuttings. The second model is aiming for valuable timber production combined with low risks



and ecological stability. The model includes a more flexible lowest age for final felling than used today. The guidelines for the Slovakian aFMMs start with a description of today's situation and legislation of importance for alternative management. Arguments for changing the management to the alternative models are given. Different methods and operations to be used in the alternative models are described. The Guidelines also include a literature list for more information about the aFMMs. The long-term research plots were established in the field. Not only traditional ways of information and knowledge transfer will be used. With the help of modern simulation and visualization tools (tree growth simulator combined with virtual cave), it will be possible to demonstrate the alternatives and the possible outcome of them. The guidelines are written for foresters, forest owners, forest administration and planning specialists. Information material, visualization and guidelines will be administered and available at the dedicated website at the Technical University in Zvolen.

Sweden

In the Swedish CSA most of the forest is owned, and often also managed, by a large number of private forest owners, while other areas are managed by more professional foresters. The information materials are designed for a wide group of receivers, from experienced foresters to interested private forest owners. Two aFMMs are well-known in Sweden, mixed stands and exotic species and the guidelines compile existing information from different sources. The third aFMM, border zones is much discussed but information is still limited. Also for the 4th aFMM, selection cuttings there are a lot of international and national experience that are summarized and adapted to the situation in the CSA. The information and results from experiments in Sweden are few.

The material will be available at a homepage managed by the department of southern Swedish Forest Research Center, SLU and hopefully used in ordinary education, for different groups or forest owners as well as forest managers.

Turkey

For Turkey the main alternative FMM will be continuous cover forestry. Beech dominated stands with various age and size allocated for ecological and social values will be managed as "Continuous Cover Forestry" via creating uneven structure. Regeneration is only allowed in small areas, no clear-cutting is permitted. The standing volume should be maintained aiming for all ecosystem-services to be served at best. The guidelines provide the description about forest structure, forest management methods and silvicultural of the "continuous cover forestry". Relevant regulations, forest management plans including Continuous Cover Forestry will also be included and scientific articles provided. State forest enterprises are the main receivers of these material, since nearly all of the forests in Turkey is owned by those institutions. Forest management planning teams (whether state or private) are another important group, who we need to address this information. Forest managers and officials working for GDF (General Directorate of Forestry – Turkish forest service) are another important group. Finally, much of the work will be valuable for research and teaching. The information will be available at a homepage, as text and as pdf files to download. The homepage will be hosted either by Gölcük State Forest Enterprise or Karadeniz Technical University Faculty of Forestry.





3 Design and brief description of the guidelines and demonstration sites

Germany

aFMM	Guidelines Deliverable D1.3 May 2020	Demonstrations sites Deliverable D1.4 July 2020
<p>Production forest</p>	<p>Most forest areas in Germany are still coined by a century of mainly production oriented forestry. Since a few decades this is changing on forest areas belonging to the federal states (about 1/3 of Germany’s forest area) and municipalities; but on many private forest areas, especially larger estates, maximizing wood production with conifer species as the backbone remains most important.</p> <p>Under the challenge of climate change, stability plays an important role; this could be addressed by increasing the share of non-native species where applicable (Douglas fir), by strong an early thinnings, and/or shortened rotation periods.</p> <p>In our guidelines we try to sum up what can be learned for the production forest aFMMs from the ALTERFOR simulations and from our long-term research plots.</p>	<p>At our institute we manage a large network of long term growth and yield trials (~280 trials comprising ~800 plots). Among them, there are several long-term research sites/plots (most under survey for several decades at least) which are very useful for demonstrating key options and implications for production forest concepts. Among them (directly located in or in close vicinity to the Southern German case study) are the Norway spruce thinning and spacing trials Zusmarshausen 603, 604 and Fürstenfeldbruck 612. All of these trials comprise several very different treatment variants from no thinning at all up to consequent low density and almost solitary tree concepts. These experiments inform about the elasticity of the wood production in connection to stand density (i.e. a risk-determining trait).</p> <p>A good demonstration site is also the monospecific Douglas fir plot in the Douglas-fir/European beech growth series trial Krumbach 861. This plot is insofar very interesting as at allows to compare the productivity of Douglas fir with Norway spruce under comparable site conditions as well as the productivity of Douglas fir in monoculture with Douglas fir/European beech mixed stands. All plots are surveyed in five to eight year intervals. Fact sheets (including maps, diagrams, and tables documenting the development) are updated after each survey.</p>

<p>Multifunctional forest</p>	<p>Since a few decades, forest management in public forests (federal states, municipalities) undergoes a transition from even-aged conifer monocultures towards a multifunctional forestry with high shares of deciduous species. The final goal is to come to uneven-aged mixed stands on the long run that can be kept in that state. The German national forest inventory shows a general change of species shares in the younger age classes as a result of this trend. The idea behind these concepts is to provide a broad range of ecosystem services on the same forest area, production being important, but not automatically more important than other services.</p> <p>Given the extensive drought damages in the last years, politicians are now pushing for a significant acceleration and even more consequent conception of this transition process. Much under debate is the question, if or not non-native species should be included in such concepts or not.</p> <p>As for the previous concept, we summarize in our guidelines what can be learned from the ALTERFOR simulations and from our long-term research plots .</p>	<p>Concerning the multifunctional forest concept, we can contribute different long term trials/plots as demonstration sites, among them the mixed stand plot series Krumbach 816 which comprises mixed stands of European beech, Douglas fir and Norway spruce at different stages of development. This plot series provides a quantitative basis to a hotly debated issue (mixed stands of native species with the non-native Douglas fir). The mixed stand plot Laugna 315/2 comprising European beech, pedunculate oak, Norway spruce, Douglas fir, and European larch allows a direct comparison of the dynamics of a multi-mixture to the classic Norway spruce monoculture. The thinning and spacing pedunculate oak trial Illertissen 039 completes the picture. Oak is among the native deciduous species whose importance in Germany will probably strongly increase. This experiment informs us about the response of the species on initial spacing and thinning strength. All plots are surveyed in five to eight year intervals. Fact sheets (including maps, diagrams, and tables documenting the development) are updated after each survey.</p>
<p>Set aside</p>	<p>A demand regularly raised by nature protection NGOs is to stop forest management immediately on large forest areas. Often this seems to be connected with idealistic pictures of the visual impression of unmanaged forests. For most of the forest areas under debate this would mean, however, an abrupt switch from quite intensive management to self-thinning.</p> <p>Most of our long-term trials comprise untreated plots that serve as a reference. In the context of set aside FMMs, they can pro-</p>	<p>The above-mentioned thinning and spacing trials Zusmarshausen 603, 604, Fürstenfeldbruck 612, and Illertissen 039 all contain unmanaged reference plots which are ideal for demonstrating the dynamics of forests when silvicultural management is stopped. Fact sheets (including maps, diagrams, and tables documenting the development) are updated after each survey.</p>

	vide a realistic picture about the development of managed forests when management is shut down. In our guidelines, we summarize the relevant facts drawn from these plots, and the ALTERFOR simulations.	
General	All related material and contact details for additional information will be available on the website of the Chair for Forest Growth and Yield, Technische Universität München.	



Ireland

aFMM	Guidelines Deliverable D1.3 May 2020	Demonstrations sites Deliverable D1.4 July 2020
<p>Low-stocked lodgepole pine – fiber</p>	<p>Lodgepole pine planted for fibre production offers a low-intensity management option for blanket peat sites. Following clearfelling of the previous stand, the site is replanted using uniform spacing and a lower stocking than the regular 2,500 stems per hectare. Uniformity in spacing is important as this will ensure equal development of these trees destined to produce pulpwood. In practice, a density of 2,000, 1,800, or 1,600 stems per hectare can be used, with a 10% expected seedling mortality in the first 4 years. Differences in site productivity could determine the planting density, as well as what the Forest Service will approve for the site. Coillte have settled on planting 2,000 stems per hectare, and they have made it a company policy that low YC areas on blanket peat are now categorised for wood fibre production, rather than quality saw log production. The Forest Service have to accept the reforestation stocking at felling license application for wood fibre production.</p> <p>Following replanting, no management actions are required until clearfelling around age 50-60.</p>	<p>Located on the eastern edge of the Finnaun forest estate in Cloosh Valley Forest, Co. Galway, the demonstration site is 81.81 ha in size and composed of two adjacent stands. The stands are divided by a road, along which there are several wind turbines.</p> <p>The previous crop species was lodgepole pine and Sitka spruce, with a productivity of Sitka Spruce Yield Class (SS YC) 10 - 12 (YC 8 -10 for lodgepole pine). The main harvest assortment from the Sitka spruce was pallet wood, the crop did not yield any sawlog. New policies and best management practices has made fertilisation ineligible on this site, so planting lodgepole pine at a lower stocking was the best option. Alternatives considered were to retain the existing stand indefinitely, but the site was deemed productive enough to support a crop of low-stocked lodgepole pine.</p> <p>The previous crop was harvested full pole and extracted, with no following windrowing after. All the dead branches remained on ground, and planting took place in a brash free space. The site was planted in 2019, with a stocking of 2,000 stems per hectare, using lodgepole pine bare-root seedlings. The site is located on deep peat and has no special protection or designation. Coillte expects 10% seedling mortality within four years. This will leave 1,800 stems per hectare, which will ensure sufficient forest cover. Clearfell is expected at around 50 - 60 years. Some issues with using lower stockings is that the Forest Service has not issued clear guidelines on whether planting lower densities, such as 1,800 and 1,600 stems</p>

		per hectare, fulfil the requirements for bioenergy production or not, because the lower stockings are usually reserved to biodiversity and water protection management designations. Planting at lower stockings could result in higher maintenance costs to ensure forest cover.
Low-stocked lodgepole pine – biodiversity	<p>Lodgepole pine planted at 1,100 stems per hectare offers a cheap reforestation alternative that should be utilised to extract existing valuable timber on the site, or to transition the stand to a more natural, low-stocked forest, or both. This density is the lowest planting density approved by the Forest Service. Establishment of the stand should be done by creating an intimate mixture of planted group of trees, separated by open area. Normal planting density (i.e. 2,500 stems per hectare) should be used in the groups to allow more than half the site to effectively be open space. The exact planting pattern and size of groups should be varied until the best approach to promote regeneration of native plants, shrubs, and trees can be determined.</p> <p>Following planting, there should be no further management interventions. However, future naturally regenerating lodgepole pine should be removed if native trees and shrubs colonise the site. There may also be issues with rhododendron (<i>Rhododendron ponticum</i>) encroachment. If rhododendron is present in the area it will require management, and the best option might be to refrain from establishing this aFMM.</p>	No demonstration site for this aFMM exists in Ireland.
Low-stocked lodgepole pine – Nephin thin	A Nephin thin site can be established by heavily thinning an existing lodgepole pine dominated stand. Somewhere between 63-75% of trees should be thinned between age 26-50, and the around 450-600 stems per hectare should remain after the treatment. After the heavy thin, the stand should be	Located south of Bellacorrick and north of Newport, Co Mayo, the demonstration site is roughly 97 ha. The site comprises two stands that were afforested by double mould board ploughing of virgin blanket peat in 1977 and planted with south coastal lodgepole pine.

	<p>left to develop freely, and it is beneficial if the stand is on a fairly windfirm site. A potential concern is whether rhododendron encroachment hinder native ground vegetation establishment.</p> <p>The only costs are for felling, extraction, and transportation of the thinned trees. When these logs are sold, the transition to Nephin thin will likely result in a net profit. Management costs could be incurred for removing rhododendron. Natural regeneration of other tree species than lodgepole should be left on site.</p>	<p>Productivity of both sites are YC 10. The first thinnings were heavy and took place 2015 and 2017, at the ages of 38 and 40, respectively. Both stands had around 1,800 trees per hectare at the time of thinning, and the thinning operation uniformly removed 75% of the stems, leaving around 450 stems per hectare.</p> <p>This site was established as a transition area to wilderness where an increase in light would improve floral biodiversity on the site. However, this is very much a pilot project and opening the canopy and increased light has caused rhododendron to creep in. There were signs of lodgepole pine naturally regenerating, but those saplings performed poorly due to:</p> <ul style="list-style-type: none"> a) Heavy frost, resulting in frost heave where the roots are pushed up and exposed to the air and die; b) Weevil attacks killing saplings. <p>Thus, overall regeneration is not happening on the demonstration site. Some of the mature trees on site have snapped halfway up the stem, indicating the site is actually windblow stable.</p>
<p>Modified Kronoberg system – Sitka spruce and downy birch mixture</p>	<p>The Modified Kronoberg (MKB) aFMM is suitable for blanket peat sites with a peat depth of no more than 0.5 m. Peat depth is a major factor affecting site productivity and crop survival. The 0.5 m depth is based on the BOGFOR project, where Sitka spruce-birch mixtures were established on cutaway peat sites with a 0.3-0.6 m peat depth.</p> <p>Once suitable sites are found, the first step of MKB is to plant a mixture of 54% Sitka spruce and 46% downy birch in alternating rows, with some double rows of Sitka spruce, at 2 by 2 m spacing, resulting in 2,500 trees per hectare. After reforestation, three thinnings are applied at ages 21, 27, and 34, and the stand is eligible for clearfelling at age 40. The first</p>	<p>The test site was established in 2000 on previous industrial cutaway peat (milled peat, mainly <i>Phragmites</i>) and is thus an afforested site. The afforestation was a part of the BOGFOR project that investigated the potential to afforest decommissioned industrial cutaway peats. Although this site is not located on blanket peat, this demonstration site is the closest thing existing in Ireland.</p> <p>To date, no thinning has been done in the Sitka spruce and birch mixture, but the next thinning will remove one line of birch from centre of each bay with some selective thinning of larger birch (i.e. negative selection). The post-thin birch stocking should be maintained to ca 600 trees per hectare. Thinning of Sitka spruce should be delayed.</p>

	<p>thinning involves harvesting of the birch, and all the remaining birch and some of the Sitka spruce are harvested in the second thinning. The third thinning only removes some Sitka spruce trees, and all remaining Sitka spruce trees mature to clearfell.</p>	
<p>Bog restoration</p>	<p>Many of Ireland’s current forests were established on natural bog habitats that were drained prior to afforestation. After clearcutting, the site is not replanted with trees. Instead, site operations are done to fill in drains and installing dams on slopes to help the rewetting process. This allows natural bog vegetation to recolonise the site.</p> <p>Suitable sites for bog restoration involve areas with environmental policy designations (e.g. Natura 2000 sites), sites that have low productivity, and sites where certain <i>Sphagnum</i> mosses and other indicator plant species are already present. Management interventions might be necessary to remove regenerating trees on the site.</p>	<p>The Emlaghdauroe demonstration site is located on the southwestern slopes of Ben Gleninsky, on the southern edge of the Twelve Bens mountain range in the Connemara region of Co. Galway. The site is surrounded by the Twelve Bens/Garraun Special Area of Conservation (SAC) and the area with restored bog will be subsumed into the SAC once restoration has been shown to be successful. In total, the site is 90.3 ha in size and was restored as a part of the EU LIFE project LIFE02 NAT/Ire/8490, which restored around 2,000 ha of blanket bog in Ireland.</p> <p>Emlaghdauroe was partly chosen as a demonstration site since areas of montane heath habitat are relatively rare in Ireland. The site will serve as a good demonstration of how many similar conifer plantations in Connemara can be managed for environmental benefits. Recolonisation by regenerating blanket bog vegetation has been a relatively slow process, but recolonisation has taken place. <i>Juncus effusus</i> has developed extensively in sloping areas and/or areas subject to flushing by flowing surface waters. The other parts of the site are currently dominated by <i>Molinia caerulea</i> and the moss <i>Hypnum cupressiforme</i>.</p>

Italy

aFMM	Guidelines Deliverable D1.3 May 2020	Demonstrations sites Deliverable D1.4 July 2020
<p>Recreational and habitat selective management model</p>	<p>Lowland forests, especially when close to urban areas, can have a great importance for the delivery of a set of cultural ecosystem services benefiting local communities and users in general.</p> <p>The recreational and habitat selective management model is aimed at improving cultural services provided by the CSA forests, with particular regard to recreational opportunities, while at the same time maintaining and, where possible, enhancing, biodiversity and environmental values.</p> <p>The guidelines include management solutions going beyond pure silvicultural choices and operations, providing a broader perspective on the management of forest resources for the provision of cultural services. The document covers different topics/aspects:</p> <ol style="list-style-type: none"> 1. an introduction providing an historical overview on how the perception of forests and their cultural use have changed over Centuries. This includes a specific focus on cultural ecosystem services, in particular on: <ul style="list-style-type: none"> - effects of forests on human health and wellbeing, - social and cultural aspects linked to forests. 2. Forest features and people’s perception 3. Cultural ecosystem services and sustainable forest management 	<p>Two demo-site activities:</p> <ol style="list-style-type: none"> 1. Participatory planning activities for the aFMM have been developed in one forest site within the CSA (S. Stino di Livenza) on 16th November 2019. Multiple stakeholders interested in management of the local forest area for the provision of cultural ecosystem services have been invited to discuss in a participatory way future management solutions and actions about the S. Stino forest. Stakeholder involvement has been organized via Open Space Technology techniques and brought to the agreement and planning of short (1 year) objectives and actions under the responsibility of different actors. The Lowland Forest Association (AFP) will monitor the implementation of these actions and provide inputs for further developments in the future. A report summarizing the key-activities, findings and pictures of the activity has already been delivered in the past weeks. Information have been spread via Etifor and AFP websites and social media channels. 2. Thinning and selective harvesting operations in the “Bosco Sacile” area, a private-owned seminatural lowland oak-hornbeam forest entirely falling within the EU Natura 2000 network. Management solutions are intended to support the conservation of the site and its environmental values while, at the same time, creating favorable conditions for low impact activities, like environmental education, hiking and, in the medium-long term, green care initiatives. Information on the area are (or will be) provided directly at the

	<p>4. Operational aspects covering multiple issues, i.e.:</p> <ul style="list-style-type: none"> - zoning and infrastructure/facility development - management of trees, shrubs and understory vegetation - expected impacts and their management - communication and education <p>5. References and additional materials</p> <p>The document is complemented and enriched by pictures that help visualizing and understanding the messages delivered.</p>	<p>site as well as online, via the WOWnature platform (www.wownature.eu/areewow/bosco-sacile/) managed by Etifor as well as via online resources developed and managed by the forest owner with the support of Etifor.</p> <p>Note: field operations have been planned and organized, however, due to restrictive measures for the covid-19 outbreak in Italy they have not been implemented so far.</p>
<p>General</p>	<p>The guidelines will be made available via multiple channels, including UNIPD, Efitor and AFP websites as well as their social media tools.</p>	

Lithuania

aFMM	Guidelines Deliverable D1.3 May 2020	Demonstrations sites Deliverable D1.4 July 2020
<p>Adaptive rotation ages</p>	<p>Final forest harvesting in Lithuania is regulated by the minimal final cutting ages which are based on stand technical maturity for a dominant tree species and not depending on soil productivity. The aFMM is aimed to maximize forest rent and present net value (both options considered), applying rotation ages depending on soil types. All other forestry principles remain unchanged, including the age class method to estimate the annual harvesting volumes. Human efforts to mitigate climate change are accounted by various levels of forest yield timber price changes.</p> <p>Forestry in Lithuania is strongly dependent on command & control forest governance, need to follow numerous legal acts followed by strict control. Alternative rotation ages would mean automatically violation of numerous legal acts, thus, making any practical recommendations unrealistic to implement. More, the idea about changed rotation ages, even though it is considered as interesting, is rejected by majority of forestry stakeholders, usually explaining that it contradicts current legal forestry framework and has no chances to be accepted by unidentified “naturalists”. Therefore, as the guidelines we will consider the materials aimed to explain and scientifically substantiate the concept of adaptive rotation ages and demonstrate the impacts of aFMM on sustainability of forestry:</p> <ul style="list-style-type: none"> • Publication, discussing the scientific problem behind the rotation ages and using modelling results from WP3 to describe the impacts of adaptive rotation ages on sustainability of delivered ecosystem services, together with the study of responses of various stakeholders on making rotation ages more adaptive; • Materials from a series of national conferences, workshops, lectures, introducing adaptive rotation ages and their role on sustainable forest management. E.g. one lecture on the potential of adaptive rotation ages and their 	<p>As adaptive rotation ages contradict current legal Lithuanian forestry requirements, it is today impossible to establish physical demonstration sites. Demonstration of forest compartments, harvested at different age, would be rather meaningless. Therefore, we use “virtual demonstration sites”. As such we assume compilation of all materials introduced in the guidelines section. Additionally, we created visualizations, illustrating the development of forests and delivered ecosystem services over time assuming management under adaptive rotation ages and contrasting with current forest management approaches. Visualizations include information on the trends of forest characteristics and ecosystem services delivered under current and alternative forest management models, together with animated maps, displaying the information under focus at specific time points or intervals, used fir simulations in WP3. Materials on “demonstration sites” are supposed to be exposed together with the guidelines.</p>

	<p>impacts delivery of various ecosystem services is included into the course of Forest management planning (course code MEMMB011) and Forest management planning in areas under protection and designated for recreation (course code MEMMM019) at Vytautas Magnus university;</p> <ul style="list-style-type: none"> • Recommendations on adaptive rotation ages will be included in one phd dissertation and one master thesis, which are directly linked with the ALTERFOR; • Summaries of presentations and publications are made available on internet, e.g. at the portal of Lithuanian association of forest and land owners association forest.lt (e.g. https://forest.lt/go.php/lit/lvertintas-kompleksiskas-klimato-ir-kitu-streso-veiksniu-poveikis-miskui.-Teikiamos-rekomendacijos/6240/1) 	
<p>Care for deciduous</p>	<p>Lithuanian forestry has long been focused on growing coniferous forests. However, current forest management models may have some negative impact on some ES (biodiversity, cultural) in a long run, mostly due to decreased species diversity, dropping the share of broadleaves and increasing the volumes of spruce. This alternative forest management model is assumed to follow of current forestry legal requirements, however, in the case there are several options for forest management decision available, to prioritize the one which is expected to increase the share of deciduous trees in the stand at rotation age. Such decisions may be done during the whole rotation period – reforestation, thinnings, final harvesting.</p> <p>The guidelines will be based on the contributions from professional foresters sharing their experiences on forestry aspects, aimed at increasing the share of deciduous trees in the forest. The experiences will be delivered as short stories, written by different authors and illustrated with the photos. The examples of such stories are “how to establish productive black alder stands”, “how to grow oak forest” or “how to prevent regeneration areas from flooding by beavers”. The plan is also to go beyond the scope of this alternative forest management model, but also to collect the stories about all good forestry practices. The stories will be published as leaflets by</p>	<p>The short stories about best forestry practices are associated to certain forests owner/manager, estate, forest stand in the country. I.e. they are geolocated on the map and can be found in the field. Also, the contacts of professional foresters who provided their stories, are given for anyone interested in further details. Thus, there will be a network of “demonstration sites” developed, covering a wide range of good forestry practices.</p>

	<p>State Forest Enterprise (non-academic ALTERFOR partner) and distributed through the company network, however, they will also be made available on the web. Initial idea was to publish them at the websites of State Forest Enterprise and the Faculty of Forest and Ecology (ALTERFOR partners), however, recently the request was received from leading forestry portal in Lithuania forest. It on potential rubric on sharing best/alternative forestry practices.</p>	
<p>No management at potential habitats of European importance</p>	<p>This alternative forest management model was suggested by forestry stakeholders during the WP4 workshops. It assumes no management in potential habitats of European importance, which have been suggested recently by one research project basically in commercial forests without involving forestry stakeholders. The lists of potential habitats are available at www.geoportal.lt. The management regime in such forests was set to correspond the ALTERFOR's "No management" current FMM, no matter the characteristics of the stand nor current forestry practices.</p> <p>The guidelines for management at habitats of European importance are currently under development within the frames LIFE project Optimization of NATURA 2000 network management in Lithuania, LIFE-IP-PAF-NATURALIT, LIFE16 IPE/LT/016. Here, we concentrated on the evaluation of (most likely) no management on delivery of ecosystem services at the landscape level. The guidelines are first aimed to initiate discussion on the consequences of no management decision on commercial forests, allocated to this category without considering all sustainable forestry aspects and avoiding participation of all relevant stakeholders. Thus, the focus in the guidelines is on:</p> <ul style="list-style-type: none"> • Publication, discussing the impacts on additional no management restrictions of sustainability of forestry, emphasizing benefits to biodiversity enrichment, at the landscape level in a long run; • Materials from a series of national conferences, workshops, lectures, discussing the merits and demerits of additional segregative forest management restrictions; 	<p>The short stories about role and success of "no management" forestry will be communicated similarly as for "care for deciduous" case. More emphasis will be given to availability of such "demonstration sites" virtually, as current no management areas are usually associated with limited access.</p>

	<ul style="list-style-type: none"> • Recommendations on no management in forests will be included in one phd dissertation, which is directly linked with the ALTERFOR; • Summaries of presentations and publications are made available on internet; • Our findings will be shared with the mentioned above LIFE project, to improve the management guidelines to be developed; • Best examples of no management forestry, leading to case specific sustainable forestry objectives, will be elaborated similarly as for “care for deciduous”. 	
General	<p>The information will be available on the web, as text and as pdf files for download. Printed versions of short stories on best forestry practices will be also prepared and distributed. The homepage will be hosted by either Faculty of forests and Ecology of Vytautas Magnus university or State forest enterprise. There is preliminary agreement to publish the guidelines at forest.lt.</p>	<p>Maps, descriptions, results etc. will be at Faculty of forests and Ecology of Vytautas Magnus university or State forest enterprise</p>

The Netherlands

aFMM	Guidelines Deliverable D1.3 May 2020	Demonstrations sites Deliverable D1.4 July 2020
Nature oriented management	Nature oriented management as performed by professional forestry organisations	No demonstration sites necessary
Multifunctional management	Multifunctional management as performed by professional forestry organisations	No demonstration sites necessary
Recreation forest management	Recreation forest management focuses on the management of forests in such a way that they form an attractive landscape for recreational activities such as walking, hiking, biking, horse riding, etc. Limited final harvesting, harvesting takes place through selective tree felling.	An extreme example of these recreation forests are the now in the Netherlands in popularity increasing food forests, demonstration sites are currently under development. No other demonstration sites necessary as the Dutch sector is familiar with some of the famous examples of recreation forest management, such as the Amsterdam forest and the Vondelpark (urban forest areas).
High quality timber management	Management aimed at quality timber, including pruning, intensive thinning around high quality trees. In some areas, this is translated in the QD approach (Qualification Dimensification approach). This QC approach is an individual based tree approach, with origins in Germany, which is now being introduced in some forest areas in the south of the Netherlands.	One of the management strategies discussed on the website is the pruning of trees to improve the quality of the stems. A demonstration site is under development.
Biomass production	Biomass production is focused on the production of large quantities of timber. The website describes, o.a., short rotation production forests such as coppice of willow, poplar and alder trees.	One example of a demonstration site on the website is the Brabantse Delta (South of the Netherlands, province of Noord-Brabant), describing the potential to use areas for short rotation woody biomass production.

Climate+	<p>Climate smart forest management aims at improving diversity in terms of structure and species. The website describes different management strategies to reach more structure and species diversity, for example in ash forests and pine forests. In the Netherlands, the major part of ash trees are infected with the fungal disease called ash dieback. Some of the Dutch pine forests have experienced periods with too much thinnings, which led to “hollow” pine forests, which needs to be revitalized.</p>	<p>The website refers to several demonstration sites, such as the transformation of ash forests in Siddeburen (North of the Netherlands, province of Groningen) and Elspetherbosch in Elspeet (Center of the Netherlands, province of Gelderland)</p>
Nature+	<p>Management aimed at increased nature value. Although nature oriented management (see the aFMM above) is currently practiced by my professional forestry organizations, this Nature+ forest management approach focuses even more strongly on natural processes and the removal of exotic tree species.</p>	<p>On the website, references are made to several of the Dutch forest reserves, where natural processes can take place without human intervention and where harvesting is limited or postponed. These include the forest reserves Lheebroek (North of the Netherlands, province of Drenthe) and Pijpestrootje (Center of the Netherlands, province of Gelderland)</p>

Portugal

FMM and aFMM	Guidelines Deliverable D1.3 May 2020	Demonstrations sites Deliverable D1.4 July 2020
FMM 1 & FMM 2 Mixed eucalypt and maritime pine	<p>The Vale do Sousa case study area forest structure is representative of Portuguese forests in its Northwest region, which are mainly dominated by eucalypt and maritime pine stands, both pure and mixed. Two mixed FMMs were identified in the CSA, differing only by the species proportion, being very similar regarding management and ecosystem services provisioning.</p> <p>Although these were not considered as aFMMs, a leaflet was produced to inform stakeholders of the recommended silvicultural practices for the current areas, including also information on the main ecosystem services provided along one full rotation of both maritime pine and eucalypt.</p>	<p>For these current FMMs, a guideline was produced aiming to improve the stakeholders' knowledge on suitable management practices, but no demonstration sites will be installed.</p>
FMM 3 Pure chestnut	<p>As an alternative broadleaved forest species, chestnut stands were suggested targeting the provision of other ecosystem services, namely chestnut timber production in the CSA (currently negligible).</p> <p>The respective leaflet includes information on silvicultural practices calendar, species adaptation to local conditions, and the expected provision of ecosystem services throughout one rotation.</p>	<p>For this current FMM, a guideline was produced aiming to improve the stakeholders' knowledge on suitable management practices, but no demonstration sites will be installed.</p>
FMM 4 Pure eucalypt	<p>Recent legislation has restricted new plantations of eucalypt in the country, in areas where it has not been established in the past. However, demand for eucalypt pulpwood drives forest owners to choose this fast growth species, hence, adequate management models are needed.</p>	<p>For this current FMM, a guideline was produced aiming to improve the stakeholders' knowledge on suitable management practices, but no demonstration sites will be installed.</p>

	<p>The leaflet aims at informing landowners of the general species characteristics, recommended silvicultural practices calendar and the expected ecosystems services along a rotation.</p>	
<p>aFMM 5 Pure maritime pine</p>	<p>Although maritime pine is a native species, there is technical know-how to manage it and there is a strong internal demand for pine wood, a relatively small area is allocated to these stands within the CSA. To meet the stakeholders preferences, an alternative management model is suggested, focusing on the provision of other ecosystem services namely pine and resin production.</p> <p>The leaflet includes some species characteristics, highlighting the adjustments made to the current FMM, associated management practices calendar and expected ecosystem services provision along one rotation.</p>	<p>Two maritime pine forest owners were contacted: “Floresta Atlântica”, a private industrial forest owner (Lat: 41,117449, Lon: -8.374286), and João Seabra, a private forest owner (Lat: 41,044696, Lon: -8.390415). Final location and all practical implementation aspects are still being discussed.</p>
<p>aFMM 6 Pedunculate oak</p>	<p>This aFMM was suggested for abandoned agricultural lands, which would better suit the oak growth requirements. Rotations were shortened in an attempt to increase the stakeholders interest in this species. Pedunculate oak is suggested as an alternative broadleaved species to meet the demands of other ecosystem services, besides wood production.</p> <p>The leaflet introduces the species general characteristics, silvicultural practices calendar and ecosystem services provided over one rotation.</p>	<p>A local private owner, Cristina Silva, was contacted and is available to make a mixed oak species plot into a demonstration site (Lat: 41.141565, Lon: -8.351415). Practical implementation aspects are still being discussed.</p>
<p>aFMM 7 Cork oak</p>	<p>Cork oak is found as a spontaneous species in marginal areas of the CSA. It was suggested as an aFMM due to an increase in the demand of cork and the impacts of climate change. Further benefits may include increasing broadleaved species, productions diversification, as well as fire and diseases risks reduction.</p> <p>General characteristics of cork oak trees, recommended silvicultural practices and the expected provision of ES along a 90-years planning horizon are described in the leaflet.</p>	<p>A public administration stakeholder, Junta de Freguesia da Sobreira, is interested in establishing a cork oak plot in a recently burned public forest area (Lat: 41.118871, Lon: -8.391891). Implementation and other practical aspects are still being discussed.</p>

aFMM 8 Riparian species	<p>Riparian areas within the CSA were suggested to address conservation concerns.</p> <p>A leaflet was produced to inform landowners of the predominant species and the benefits of preserving these areas, including some of the qualitative information on the conservation and regulatory roles they play in forest ecosystems.</p>	<p>Although a guideline was produced, aiming to inform stakeholders on the riparian area importance and ES provision, no demonstration site installation was planned.</p>
General	<p>The leaflets are meant to provide information to landowners as well as other stakeholders. Thus, they include the location of the respective demonstration site as well as the contacts of the local forest owner's association (AFVS, the non-academic partner) where they can be further informed on relevant technical aspects.</p> <p>Leaflets will be printed and distributed by AFVS. They will also become available online in the AFVS webpage and the respective download link will be shared on CEF (ISA) webpage and social media. Additionally, the download link will also be sent via email to all the stakeholders and participants in the ALTERFOR workshops and to the regular recipients of the ALTERFOR Newsletters.</p>	<p>The forest owner's association of Vale do Sousa (AFVS) is making efforts to contact landowners and ensure the establishment of demonstration sites for the aFMMs. Plots selection and/or implementation is expected to be concluded in the summer of 2020.</p>

Slovakia

aFMM	Guidelines Deliverable D1.3 May 2020	Demonstrations sites Deliverable D1.4 July 2020
<p>Sustainable multifunctional management in partly uneven-aged mixed stands</p>	<p>The primary objective of forestry is a sustainability of the forest ecosystem in the area through promotion of its ecological stability. In areas where sustainability have been significantly weakened, the aim is to bring them back to a close to nature state as quickly as possible.</p> <p>The aim of the model is to build partly uneven-aged, close-to-nature mixed species stands. The main idea is to apply a selective cut, in the later stages of forest stand development in the formerly even aged stand. The intention is to maintain the permanent canopy cover and ensure a natural regeneration.</p> <p>As a result, continuous tree felling with target dimensions during the extended regeneration period is proposed. In younger life stages, the pre-commercial and commercial thinning aiming to maximal horizontal and vertical differentiation of stand structure are planned.</p> <p>In the first part, the Guidelines describe the short characteristics of the model and then move into the specific management measures that can be used to apply in the proposed alternative model. The second part of the Guidelines describes the importance of natural regeneration and the effort to reduce the proportion of secondary spruce stands outside their natural distribution. The third part focuses on ensuring the minimization of costs required by the application of this model with a focus on</p>	<p>At the case study area Podpoľanie we have several good examples of transformation to selective forest or permanent multi-layered forest stands. In most cases, these are Pro Silva objects with a well-defined target structure.</p> <p>For the application of this alternative model, a demonstration object was selected in the district of Mikulášska, FMU Hriňová, in stands No. 222, 223 and 224. The demonstration object consists of three research plots in different phases of transformation. The first two plots are in the transformation phase, the last plot is in the final phase. The tree species composition is dominated by spruce 70-100%. Occasionally beech and larch are represented. The age of forest stands is 65, 85 and 95 years respectively. The plot areas are 50 x 50 meters.</p> <p>The locality is also known from Travellab, but unfortunately most of the forest stands in the area were significantly disrupted by the wind calamity in 2018.</p> <p>Information about the demonstration object includes a description of the object, fotodocumentation, maps, as well as virtual visualization using the Sibyla growth simulator and subsequent 3D structures demonstration under Virtual Cave framework.</p>

	<p>qualified forestry personnel, the accessing of forest stands by forest roads and transport lines and the needs for more modern technological equipment, which may be to some extent disadvantage of applying this model in practice.</p>	
<p>Sustainable timber production in even-aged mixed species stands</p>	<p>Even aged mixed forest stands are the goal of a flexible age forest model. The main idea is to follow the classical concept of the forest of age classes but introducing more flexible rotation and regeneration periods limited by minimum allowable rotation ages. The expected impacts are balanced and maximized total volume production from larger areas, minimizing risks, improving ecological stability and preventing natural injurious agents, promoting species diversity and the nature of the tree species composition. The disadvantages of this model refer to increase the intensity of lobbying of timber traders for higher harvests responded by less responsible forest owners and possible deterioration of the some regulative and cultural services in the initial stages of implementation. The introduction of the concept of a minimum allowable rotation period (MARP) will give greater freedom to strategic planning decisions.</p> <p>The first part of the Guidelines sets out the minimum length of rotation periods and possible combinations of rotation and regeneration periods. The second part describes the procedures of the thinning and regeneration felling that ensure the achievement of the objectives set by the alternative model. The third part describes the possibilities of applying an alternative model with its advantages and disadvantages and its impact on individual forest owners and managers.</p>	<p>The spruce-dominated non-original forest stands at the case study area Podpoľanie were ideal for application of more flexible age-class model. In forest stands number 18 and 129, in the locality Snohy at the forest management unit Poľana, 8 research plots were established for research of increased variability of rotation periods in combination with different lengths of regeneration periods. There are four variants of rotation periods - very short, short, normal and extended rotation periods and two variants of regeneration periods - short and long regeneration period. The demonstration object will verify the possibilities of natural forest regeneration for various combinations of rotation periods and regeneration periods. The age of stand N. 129 is 70 years and the stand N. 18 is 90 years. In both forest stands are dominated by spruce (up to 95%), beech is rarely represented now (up to 5%), although according phytocoenological survey the site should be dominated by beech. The next generation of forest resulting from natural regeneration is expected to be dominated by beech.</p> <p>Research on forest management with a short rotation period is only at beginning to be implemented, so results are not yet visible directly in the field.</p> <p>Information about the demonstration object consists of a description of the object, photodocumentaries, maps as well as a visualization using the growth simulator Sibyla and subsequent 3D structures demonstration under the Virtual Cave framework.</p>

<p>General</p>	<p>Introductory of the Guidelines deal with the evaluation of valid forestry legislation in Slovakia and focuses on the possibilities of planning management measures. The following is a description of the reasons for the creation of specific alternative models (conceptions) and the possibility of their application in practice. Both alternative models are described in detail in the next text. This guide is completed with a list of used and recommended literature, from which the interested person can learn more about the issue.</p> <p>Information will be available on the home page http://gis.tuzvo.sk/ALTERFOR-sk/ as text and pdf files for download. Where possible, other materials, reports, compilations, articles will also be available in pdf format. Visualizations of individual demonstration objects will also be available. The homepage is hosted by the Technical University in Zvolen, Department of Forest Resource Planning and Informatics.</p>	<p>Maps, descriptions, results will also be available on the homepage http://gis.tuzvo.sk/ALTERFOR-sk/</p>
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Sweden

aFMM	Guidelines Deliverable D1.3 May 2020	Demonstrations sites Deliverable D1.4 July 2020
<p>Introduced tree species, in particular Douglas fir, Hybrid larch and Sitka spruce</p>	<p>The forests in Sweden are dominated by a few tree species, mainly Scots pine, spruce and birch. One way of meeting the need for increasing demand for biomass and at the same time mitigating the effects of climate change could be to use introduced tree species with other qualities than the native ones and in the case study area in Sweden we have chosen Hybrid larch, Douglas fir and Sitka spruce.</p> <p>In our guidelines we make short presentations of the different tree species regarding, biology, morphology, wood properties, production etc. We also present several reports and articles for further studies.</p>	<p>The tree species trial in Asa research park is part of a larger series of trials that now belongs to SLU's long-term trial which means that it will be measured and controlled for the future. In Asa, there are two trials planted on sites with various site conditions. The most accessible site and the one we firstly will use as a demonstration site is the one called "block 1 Sågvägen". In that area we have six introduced tree species and two native. The roads at the research park are open and there are no road barriers.</p> <p>The experiment was planted in 1994 and 2500 seedling per ha was planted. The plots for each tree species is 40 x 40 m, marked and easy to find. The information of the demonstration site includes maps, instructions how to get there, historical facts, description of the site and results such as volume production and survival.</p>
<p>Boarder zones</p>	<p>Border zones are found around the landscape, areas between woods and fields, the land along the streams and ditches are all different examples of border zones. Those areas constitute transitions between forest and arable land and forest and water and are highly valuable for biodiversity.</p> <p>In order for a border zone to make the best use, it needs to be serviced through various measures. Different border zones need different care.</p>	<p>In Asa we have some good examples on border zones that can be used as demonstration sites. Unfortunately there are yet few, if any, experimental trials. The border zones in Asa are transition between forest and field or forest and water. We will describe these areas and the measures that is suitable for these particular border zones. Maps and description how to get there will also be provided</p>



	<p>In our guidelines for border zones we describe how these measures could be accomplished, which animals or vegetation that will benefit from it etc. We will also guide the reader to further reading by giving examples on literature in the subject</p>	
<p>Mixed forest spruce - birch</p>	<p>The forest in the case study area Kronoberg is dominated by spruce, but there is an increasing interest in using more birch.</p> <p>The guideline summarise existing knowledge about mixed spruce-birch forest and invite the reader to visit some field experiments/demonstration sites.</p> <p>Part one takes up knowledge of mixed forests with birch spruce; regeneration, management, volume production, fauna and flora. Part two describes an existing method with birch as a shelter above spruce during the first decades. The method is well established but as it is difficult to mechanize, larger forest owners rarely use the method. Part three describes mixture of spruce and birch during a full rotation. The method is less common but results from field experiments are presented.</p> <p>The guideline ends with literature list, mainly Swedish “popular scientific” texts but also some scientific articles. There are also links to films/videos about mixed stands.</p>	<p>Asa/Brudahall</p> <p>The demonstration site is located at Asa Research station, approx. 45 km north of Växjö. The experiment is established as comparison between plots with 100% spruce, 80% spruce - 20 % birch, 50% spruce - 50% birch.</p> <p>The plots are approx. 0,1 ha and it is easy to find and to identify different treatments in the field. By winter 2020 the stand was 35 years and dominant height 21 m.</p> <p>Maps are available together with description of the stand and the treatments.</p> <p>Results are available from establishing the experiment 1998 until last measurement winter 2019/2020.</p>
<p>Selection systems or alternative to clear-felling systems</p>	<p>There is a large interest and an intensive debate about other forest management systems than clear-felling systems in Sweden. Close to nature forestry, selection systems, target diameter cuttings, “forestry without clear-fellings” - many names and terms are used today.</p>	<p>Forest research have just recently started to establish research and demonstration plots to study other forest methods than clearfelling systems. Therefore, the demosites are very young and mainly show effect of first cuttings. Two or three such new experiments/demosites in the case study area are identified and will be documented.</p>

	<p>There is a great lack of knowledge in Sweden and many methods with different names are mentioned. The guidelines start with a broad overview of “forestry without clear-fellings” and list the advantages and disadvantages with different methods. The uncertainty and missing knowledge about different the method are highlighted as well as expected benefits.</p> <p>In the guidelines there are references to both published compilation of facts (in Swedish) and to relevant scientific articles esp. from the Nordic countries.</p>	
General	<p>The information will be available at a homepage, as text and as pdf files to download. As much as possible of other material, reports, compilations, articles will also be available as pdf files. The homepage will be hosted by either Southern Swedish Forest Research Centre or Asa experimental forest, both belonging to SLU.</p>	<p>Maps, descriptions, results etc. will be at SLU homepage, either Southern Swedish Forest Research Centre and Asa Experimental Forest</p>

Turkey

aFMM	Guidelines Deliverable D1.3 May 2020	Demonstrations sites Deliverable D1.4 July 2020
<p>Continuous Cover Forestry – CCF</p>	<p>Especially the beech dominated stands with various aged/sized trees created as part of either mismanagement or social conflicts necessitates “Continuous Cover Forestry” to manage created uneven structure. Besides, the forest service gets difficulty in regenerating uneven like structure of beech-dominated forests in addition to providing primarily ecological and socio-cultural forest values to the society in the same area. Moreover, the practices of CCF coincide with the ecological needs of beech trees. In this alternative FMM, regeneration is allowed in small areas thus, risks are minimized, standing volume maintained (no clear cut or in small areas) thus creating good provision of ecosystem services.</p> <p>In our guidelines; the description, structure, forest management methods and silvicultural of the “continuous cover forestry” is provided. Besides, the candidate stands eligible for CCF are evaluated for our CSA Gölcük as an attachment. Besides, guidelines contain requirements and recommendations from relevant regulations, forest management plans and scientific articles.</p>	<p>Since the CCF is a very new concept for the Gölcük forests, there was no sample or previously conducted research within the CSA. Therefore, after communicating with Sakarya Regional Directorate of forestry, it is decided to allocating a whole compartment for “Continuous Cover Forestry”. It is also important, especially to show its transition from even-aged to uneven-aged management system.</p> <p>Different sample plots, with a size of 1000 m2, will be taken in the early May in the compartment and the first cuttings will be done in the summer within the demo sites. The interventions within the demo sites will be recorded documented and monitored.</p> <p>We will share the inventory, intervention results and other related information for the Continuous Cover Forestry. Maps and description how to get there will also be provided.</p>
<p>General</p>	<p>The information will be available at a homepage, as text and as pdf files to download. As much as possible of other material, reports, compilations, articles will also be available as pdf files. The homepage will be hosted by Gölcük State Forest Enterprise and Karadeniz Technical University Faculty of Forestry.</p>	<p>Maps, descriptions, results etc. will be available at Gölcük State Forest Enterprise and Karadeniz Technical University Faculty of Forestry homepage.</p>

Annex I Guidelines

Germany

Ireland

Italy

Lithuania

The Netherlands

Portugal

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