

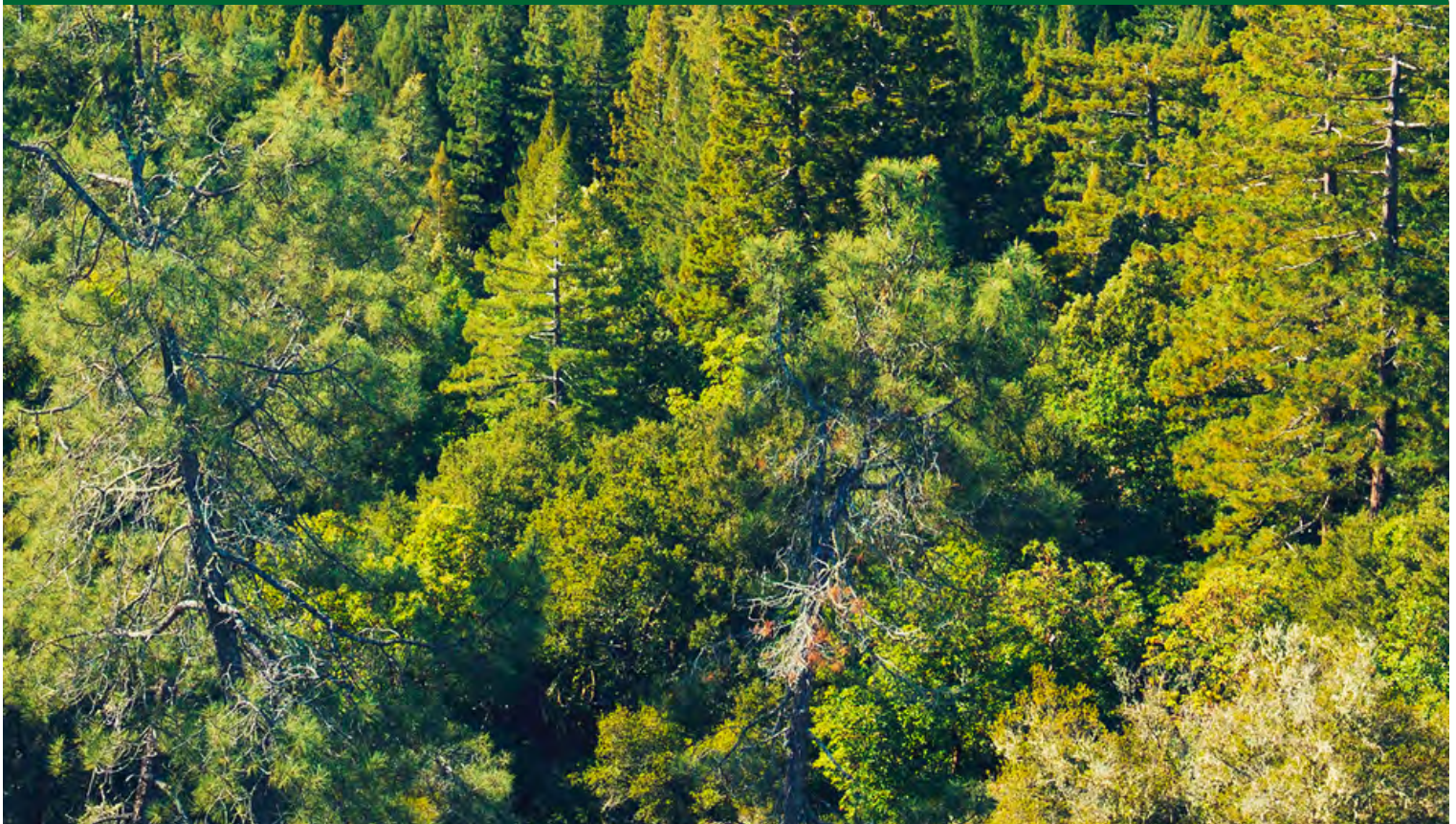


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No 2
2022

Overview of current rules and legislations for deployment of improved FRM

Planted Forests Report



Deliverable D4.2

Overview of current rules and legislations for deployment of improved FRM

B4EST

Adaptive BREEDING for productive,
sustainable and resilient FORESTS under
climate change

Cestas, France



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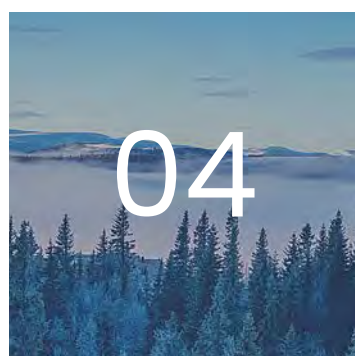


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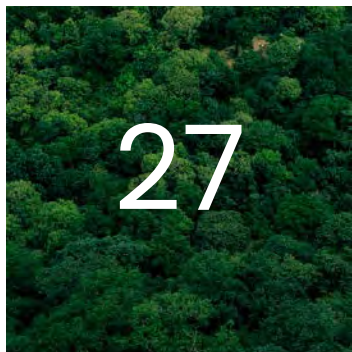
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Annex 1. Survey on Forest Reproductive Material in European countries – legal framework, guidelines & recommendations



1 – SUMMARY

The aim of this deliverable was to identify possible legislative and regulation obstacles, and opportunities for implementing transnational use of improved forest reproductive material (FRM) based on biological and economical drivers. The work of the deliverable has been organized under Task 4.5 and focused on identifying national or EU-level regulations, legislation, certifications, and levels of stakeholder acceptance, affecting the practical implementation of new deployment recommendations through two earlier surveys of stakeholders and experts at national and EU levels.

An overview of the most relevant rules and regulations concerning the deployment of improved FRM in Europe are presented here, including relevant international and Pan-European guidelines and recommendations for the use of FRM. These directive and regulations only deal with the requirements for marketing FRM within EU or globally. This report also covers conventions and international agreements concerning the conservation of biological diversity and the sustainable and fair use of genetic resources, as well as national and international regulations which may have an indirect effect on the use of FRM, like nature conservation, landscape functions, land use etc.

The effects of regulations and policies and their perception within the forestry sector was investigated by a joint analysis of two stakeholder surveys: the GenTree survey on “the conservation and sustainable use of FGR”, and the B4EST survey on “adaptive tree breeding for productive, sustainable and resilient forests under climate change”, carried out 2017 and 2020, respectively. The results showed that there is an overall preference for using native/local FRM and that the use of non-local and exotic material is widely discouraged. The report finally provides an overview of the Swedish and Finnish Scots pine Planter's guide which is an already existing decision support web tool for the use of improved FRM in the two countries.

The main conclusions were:

- a)** that there is still large variation in the regulations that affect the use of FRM in Europe and that there are several national and international regulations, that even though not directly addressing the use of FRM, still seem to have large effect on it,
- b)** that often national and regional policies promote the use of native/local FRMs and discourages the use of non-local and exotic material (thus prevents assisted migration),
- c)** that there is a need to adopt and reinforce common adaptation and mitigation measures (e.g. common regulations), promoting the use of (improved) FRM across borders/regions to support adaptation to climate change,
- d)** and that decision support tools to choose the optimal FRM (such as Planters Guide), that take into account regional and national regulations concerning biodiversity or other environmental aspects, should be developed further for other regions and tree species.

2 – INTRODUCTION



The aim of this deliverable is to identify possible legislative and regulation obstacles, and opportunities for implementing trans-national use of improved forest reproductive material (FRM) based on biological and economical drivers. The deliverable is prepared under Task 4.5 that should identify national or EU-level regulations, legislation, certifications, and levels of stakeholder acceptance, affecting the practical implementation of new deployment recommendations through a consultation of stakeholders and experts at national and EU levels.

In chapters 3.1 to 3.5 the most relevant rules and regulations concerning the deployment of improved FRM are listed for different levels. In this report the rules and regulations have not been further described or analyzed, because this has been done recently in a number of published reports, such as the EUFORGEN report on “Use and transfer of forest reproductive material in Europe in the context of climate change” (Konnert et al., 2015). Also links to the relevant documents are given as footnotes.

In chapter 3.6 some relevant international guidelines and recommendations are listed and in chapter 3.7 other aspects that may affect the use of improved FRM are discussed.

For the work with the consultation of stakeholders and experts presented in chapter 4, it was decided to use the results of a survey that was carried out within the GenTree project during 2016 and 2017, because it covered almost completely the type of information that was needed for this report, it covered almost all of Europe, its response rate was high and it was carried out recently. An additional survey, with a subset of questions from the GenTree survey, was sent out to countries that are of special interest for B4EST, but from which little or no response was received in the GenTree project. The outcomes of this survey are discussed in chapter 4.

Chapter 5 gives an overview of already existing decision support tools for the use of improved FRM in Europe.

In chapter 6, the effects of the regulations and their perception within the forestry sector on the practical implementation of new deployment recommendations are discussed.

3 – REGULATIONS, POLICIES AND GUIDELINES

3.1 European regulations

Council Directive 1999/105/EC on the marketing of forest reproductive material.¹

Commission Regulations (EC) No 1597/2002² laying down detailed rules for the application of Council Directive 1999/105/EC as regards the format of national lists of the basic material of forest reproductive material

These directive and regulations only deal with the requirements for marketing forest reproductive material within the EU, to guarantee the quality of the material, for those species mentioned in the annex of the directive. They do not provide any requirements or guidelines for the use of forest reproductive material and the choice of suitable species and/or provenance.

¹ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31999L0105&from=EN>

² <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32002R1597&from=EN>

3.2 Other International regulations and policies

OECD

- OECD scheme for the certification of forest reproductive material moving in international trade³
- OECD forest seed and plant scheme: rules and regulations⁴

As for the EU-regulations the OECD regulations only deal with the requirements for marketing forest reproductive material, but here on a global level. In fact, the EU directive and regulations are based on those of the OECD. Thus, the OECD regulations do not provide any requirements or guidelines for the use of forest reproductive material and the choice of suitable species and/or provenance.

Convention on Biological Diversity (CBD)⁵

The Convention on Biological Diversity entered into force on 29 December 1993. The CBD is one of the international agreements that have been ratified by nearly all countries of the world. The CBD has three main objectives: (1) the conservation of biological diversity; (2) the sustainable use of the components of biological diversity; and (3) the fair and equitable sharing of the benefits arising out of the utilization of genetic resources. The CBD recognizes that countries have sovereign rights over their own biological resources and assigns them the responsibility for conserving biological diversity.

It also urges countries to use the biological resources in a sustainable manner and highlights specifically the importance of genetic resources. Countries are also urged to enhance technical and scientific cooperation, training and information exchange on the conservation and sustainable use of biological diversity.

The Nagoya Protocol on Access and Benefit Sharing (ABS) ⁶

In 2010, COP-10 adopted a legally binding agreement called the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization. This agreement entered into force on 12 October 2014. The aim of the Nagoya Protocol is to ensure that accessing and utilizing genetic resources is undertaken in a legal way and with the prior agreement of the holders of the genetic material. The access and mutually agreed terms (MAT) of sharing the benefits from the use of the genetic material should also be agreed by both parties (the owners and the users) prior to any form of exploitation. The Nagoya Protocol makes it obligatory for the Parties to implement appropriate legislative, administrative or policy measures, and set up operational administrative structures and procedures for providing access to genetic resources and for agreeing the terms of sharing the benefits. However, the protocol does not impose any ABS arrangements for the use of genetic resources for production purposes, such as buying seeds and growing seedlings for forestry purposes.

The FAO Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources ⁷

The FAO Global Plan of Action (GPA) for the Conservation, Sustainable Use and Development of Forest Genetic Resources (FGR), was adopted by the FAO Conference at its 38th session in June 2013. This Global Plan of Action identifies 27 strategic priorities grouped into four areas:

- 
- 1** improving the availability of, and access to, information on FGR;
 - 2** conservation of FGR (in situ and ex situ);
 - 3** sustainable use, development and management of FGR;
 - 4** policies, institutions and capacity-building.

³ <https://www.oecd.org/agriculture/forest/>

⁴ <https://www.oecd.org/agriculture/forest/documents/forest-scheme-rules-and-regulations.pdf>

⁵ <https://www.cbd.int/>

⁶ <https://www.cbd.int/abs/>

⁷ <http://www.fao.org/3/a-i3849e.pdf>

The respectively long term goals of these four areas are:

- 1** Improve the availability and accessibility of knowledge and information on species and their genetic diversity, forest ecosystems and related traditional knowledge, to facilitate and enable decision making on sustainable use and management of FGR and to enhance their contribution to solving serious global problems such as food shortage, land and water degradation, the effects of climate change, and increased demand for various forest products and services.
- 2** Maintain genetic diversity and the evolutionary processes of forest species by better implementing and harmonizing measures to conserve FGR, both in situ and ex situ, including through regional cooperation and networking.
- 3** Enhance the sustainable use, development and management of FGR as a key contribution to environmental sustainability, food security and poverty alleviation.
- 4** Establish and review relevant policies and legal frameworks in order to integrate major issues related to sustainable FGR management and to strengthen institutional and human capacity to achieve successful medium- and long-term planning of the forestry sector in member countries, as well as for the long-term sustainable use, management and conservation of FGR.

The Global Plan of Action is voluntary and non-binding and should not be interpreted or implemented in contradiction with existing national legislation and international agreements where applicable. Implementation of the Global Plan of Action will strengthen the sustainability of the management of FGR while contributing towards the Millennium Development Goals, the post-2015 agenda and the Aichi Biodiversity Targets.



3.3 National regulations

In 2012 EUFORGEN carried out a survey on the legal framework, guidelines and recommendations concerning Forest Reproductive Material in European countries at national level. In total 23 countries responded to this survey. Annex 1 is a table initiated by EUFORGEN that shows the outcome of the survey per country. The table is a draft version because so far it has not been finalized or published by EUFORGEN.

The survey reveals that the national regulations vary much per country. In many countries the national regulations include regulations concerning the use of the right provenances and provenance and/or species transfers. This may include regulations concerning the use of non-native tree species (see chapter 3.4). Several countries have also some additional administrative limitations or requirements as regards to the international regulations. These are often concerning the list of species (number of species added), or further limitations to the use of material in the category "source identified". Many countries have also specific requirements concerning minimal diversity criteria, such as a minimum number of trees to be collected in seed stands, a minimum number of clones or trees per clone to be included in seed orchards (or the number of clones or trees seed is to be harvested from per seed lot) or concerning the number of clones to be included in clone mixtures. These minimum requirements vary a lot between countries and also between species within countries. Some countries have national or regional regulations regarding subsidies that may affect the use of FRM. Subsidies are only provided when the forest reproductive material used complies with the national regulations or recommendations. In a few countries forest owners may be compensated after failure of reforestation. Such compensation is only applicable when appropriate reproductive material has been used.

3.4 Regulations considering non-native tree species



Already since the 19th century non-native tree species were introduced to European forestry, with various results. A number of species, mainly from the northern America have been very successful and are now more or less common practice, especially in central and Western Europe, and are of significant importance for the whole forestry sector. The five most used non-native commercial tree species in Europe are: Black locust (*Robinia pseudoacacia*), Eucalyptus / gum tree (*Eucalyptus* sp.), Sitka spruce (*Picea sitchensis*), Douglas fir (*Pseudotsuga menziesii*) and Lodgepole pine (*Pinus contorta* var. *latifolia*). However, since the end of the last century the use of non-native tree species in European forestry has been more and more criticized. They are now predominantly looked upon to as invasive species that may threaten the distribution and regeneration of native species, and thus changing the natural ecosystems, or as not fitting into the landscape, like Sitka spruce in the UK and Ireland. There are several regulations that deal especially with non-native species:

- Council Decision 2008/971/EC on the equivalence of forest reproductive material produced in third countries.⁸
- REGULATION (EU) No 1143/2014 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species. (None of the five most used species mentioned above occurs on the list of invasive species)⁹

Concerning non-native tree species there has been a cost action FP1403 - Non-native tree species for European forests - experiences, risks and opportunities (NNEXT, 2014 - 2018). The NNEXT report on "Non-Native Tree Species for European Forests: Experiences, Risks and Opportunities. Country Reports" (Hasenauer et al., 2017) reveals that the perception of the use of non-native tree species varies very much per country, and in some cases also per species. The Flanders part of Belgium has probably the strictest legislation concerning the use of non-native tree species, even aiming for a strong reduction of the already area planted. Several other countries allow the use of non-native species with restrictions concerning regions, planted area, origin and/or species. Few countries have no restrictions at all.



Douglas fir is an example of a non-native tree species that has become a very much desired in European forestry, for reasons of both wood production and resilience in a changing climate (Spiecker et al., 2019). It was introduced to Europe already during the early 19th century. Presently it covers more than 800 000 ha of forests in Europe. However, this is still only 0,40% of the European forest area.

⁸ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008D0971&from=EN>

⁹ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R1143&from=EN>

3.5 Regulations with an indirect effect

There are regulations related not directly to FRM, but to forestry in a broader sense, nature conservation, landscape functions, land use etc. that may affect the use of improved FRM. In fact the GenTree survey (see chapter 4) revealed that, at least in some countries, these regulations may have a larger impact on the use of improved FRM than the direct regulations (GenTree Deliverable D5.4). These include both national and international regulations. For example, Nature 2000 seems to have quite some impact on the use of FRM.

Another example, for Sweden, is that on agricultural land one may plant trees, but after 20 years the land will be considered no longer agricultural land but as forest. As a result of this short rotation (< 20 years) forest tree plantations with species such as hybrid aspen or poplar may be favorable for a landowner.



3.6 Guidelines and recommendations

FOREST EUROPE¹⁰

FOREST EUROPE (the Ministerial Conference on the Protection of Forests in Europe) is the pan-European voluntary high-level political process for intergovernmental dialogue and cooperation on forest policies in Europe. FOREST EUROPE develops common strategies for its 47 signatories (46 European countries and the European Union) on how to protect and sustainably manage their forests. Several of FOREST EUROPE's resolutions also affect the use of FRM, the most important ones being:

- Strasbourg Resolution S2 (1990)¹¹ The conservation of forest genetic resources. : 1) the use of genetically-improved materials is of great importance for afforestation and restocking, in particular where this is for the purpose of the production of timber and 2) countries are requested to keep records, at least for public forests, of the exact identity of the reproduction materials used for planting and regeneration.
- Helsinki Resolution H1 (1993)¹² General Guidelines for the Sustainable Management of Forests in Europe: In the management of existing forests and the development of new forests, the chosen tree species should be well suited to local conditions and be capable of tolerating climatic and other stresses, such as insects and diseases, and potential climate changes, throughout the growing period. Genetic selection, which is commonly practiced in Europe, should not favor performance traits at the expense of adaptive ones, except in particular cultures where intensive care may protect them against damage. (from General Guideline 8). Native species and local provenances should be preferred where appropriate. The use of species, provenances, varieties or ecotypes outside their natural range should be discouraged where their introduction would endanger important/valuable indigenous ecosystems, flora and fauna. Introduced species may be used when their potential negative impacts have been assessed and evaluated over sufficient time, and where they provide more benefits than do indigenous ones in terms of wood production and other functions. Whenever introduced species are used to replace local ecosystems, sufficient action should be taken at the same time to conserve native flora and fauna. (from General Guideline 9)

OECD Guidelines on the Production of Forest Reproductive Materials:¹³

During its 2012 Annual Meeting the OECD Forest Seed and Plant Scheme approved the Guidelines on the Production of Forest Reproductive Materials. These guidelines primarily focus on production procedures of forest reproductive materials for moderate climate zones. They will be revised at a later stage to include procedures that are typical to tropical countries. The application of these guidelines is not obligatory, but they provide guidance on the implementation of procedures. They are particularly useful for new member countries, or countries in the process of developing a national certification system for forest reproductive materials.

¹⁰ <https://foresteurope.org/>

¹¹ https://www.foresteurope.org/docs/MC/strasbourg_resolution_s2.pdf

¹² https://www.foresteurope.org/docs/MC/MC_helsinki_resolutionH1.pdf

¹³ <https://www.oecd.org/agriculture/forest/documents/oecd-guidelines-on-the-production-of-forest-reproductive-materials.pdf>

3.7 Other aspects

One important aspect may also still be the higher price of improved FRM. According to the EUFORGEN report on use and transfer of forest reproductive material in Europe in the context of climate change (Konnert et al., 2015) many forest owners think of FRM as a cost to be minimized rather than as an investment for which they should be seeking better returns and that lack of knowledge, market forces and trade mechanisms often work against the use of high-quality FRM (in terms of both genetic and physiological quality). On the other hand, at several countries the use of improved FRM is stimulated by linking funding via forest subsidies with the use of recommended FRM.

Konnert et al. (2015) state that, at that time, the EU directive on the production and marketing of FRM within the European Community, as well as many national legislations do not take account of climate change. In order to secure the correct use of FRM, some Member States have included in their national laws recommendations to forest owners on the use of FRM.

«...at several countries the use of improved FRM is stimulated by linking funding via forest subsidies with the use of recommended FRM »

In other countries forest administrations make recommendations for the use of provenances in different regions. They mostly rely on the concept of provenance regions, which are areas within which reproductive material can be transferred with little risk of being poorly adapted to their new location. Provenance recommendations often have the role of a decision support and forest owners are not obliged to follow them. However, they can be binding in some countries under subsidiary schemes. The EUFORGEN report gives an overview of national provenance recommendations and support tools.

Konnert et al. (2015) also state that although FRM is increasingly traded across borders the national recommendations rarely offer help in deciding where the imported material should be used. Therefore transfer recommendations should have a pan-European perspective and should also include climate change considerations.

4 – PERCEPTION OF REGULATIONS AND POLICIES

This chapter analyses the perception on regulation and policy influencing the sustainable use and management of Forest Reproductive Material (FRM), aiming to generate new knowledge on improvement of forest genetic resources (FGR). The outcomes presented are based on the joint analysis of two stakeholder surveys: a) the GenTree¹⁴ survey on “the conservation and sustainable use of FGR” (GenTree, 2020), and b) the B4EST survey on “adaptive tree breeding for productive, sustainable and resilient forests under climate change”, carried out in 28 European countries¹⁵ collectively. Although the investigations had different focus, they used common survey methods and involved similar target groups (more details below).

The GenTree survey was conducted online using the Survey Monkey platform, from October 2016 until February 2017 and addressed forest managers, forest owners, tree breeders, tree nursery or seed harvesting/processing companies, industry and policymakers. The survey was advertised by posting announcements online and using social media accounts by the project partners. The questionnaire targeted 26 countries¹⁶, obtaining a total number of 334 responses. Responses classified with “unknown” country and “international”, as well as the responses collected from Russia and responses from the industry were not included in this joint analysis as not relevant for the report purposes. The total amount of responses extracted from the GenTree survey as pertinent for this analysis was 292.

The B4EST survey was meant to complement the results from the GenTree project and to increase the robustness of the overall outcomes by collecting additional responses from countries that had only low coverage in GenTree. It aimed to highlight the opinions and expectations of different forest sector stakeholders on policy aspects related to the sustainable use of FGR for the advancement of improved FRM. The survey focused on collecting responses from Estonia, Latvia, Lithuania, Portugal, England, Sweden, and United Kingdom (i.e. countries that in the GenTree survey were missing responses or with a very low rate, but were considered relevant for the B4EST goals). The stakeholder groups involved are the same as the GenTree survey, except for the industry category being not relevant for the B4EST project. A set of questions were designed as general questions for all stakeholders, and more specific ones posed only to a particular group. The content of the questions was the same as in the GenTree survey, whereas the design was modified for few questions.¹⁷ The online survey was carried out using Survey Monkey, from April until May 2020. The survey was promoted via email or social media by the B4EST project partners, and reminders were also delivered.

¹⁴GenTree is the acronym for the project: “Optimizing the management and sustainable use of forest genetic resources in Europe”, a Horizon2020 project (GA no. 676876), running from March 2016 - Feb2020.

¹⁵Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Macedonia, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovenia, Spain, Sweden, United Kingdom (combined GenTree and B4EST datasets).

¹⁶Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Macedonia, Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovenia, Spain, Sweden, United Kingdom.

¹⁷For those questions the form was modified from yes/no to a positive and negative scale-rating option in the B4EST survey.

The combined reach of the surveys included 28 European countries with a total amount of 335 responses analyzed (including 292 and 43 survey responses from GenTree and B4EST, respectively). The amount of responses varied among countries and stakeholder groups (see combined data in Table 1). In the joint analysis only a specific subset of questions was extracted from the GenTree survey as considered relevant for the B4EST project. Those responses were translated (when submitted in different language than English), and the project data sets combined, as the questions structure and content were the same; the only difference was that in the B4EST survey, some questions were sent to a wider group of stakeholders.

A threshold was applied to restrict the analysis to policies that received sufficient numbers of responses (equal or major to 5) at the European level. Policies that were mentioned less often were not considered in the analysis of the overall policy perception. The analysis of policy perception by stakeholder group as well as regional interpretations are shown only for the three most mentioned policies per country and stakeholder group to avoid misleading results. A qualitative approach was utilized to select and interpret responses to open-ended questions based on the relevance of the topics mentioned, necessary to be in line with the objectives of the survey.

An overview of the number of survey responses per stakeholder group are illustrated in Figure 1.

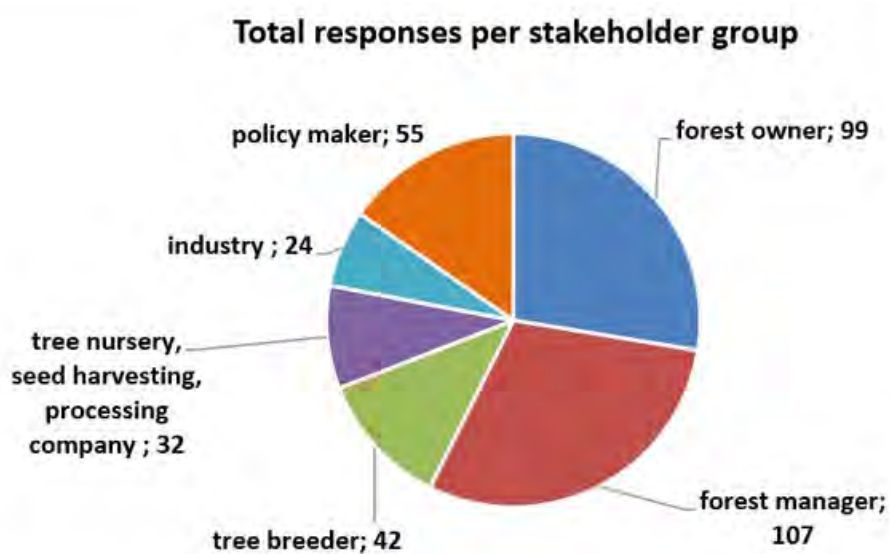


Figure 1: Composition of survey responses per stakeholder group. Data extracted from the GenTree and B4EST surveys. Responses from industry were not analyzed in this report.

A more detailed description of the composition of GenTree and B4EST surveys' responses by country and stakeholder group is presented in Table 1.

Table 1: Survey responses per country and stakeholder groups.
Data extracted from the GenTree and B4EST datasets.

Country	Tot responses	Forest owner	Forest manager	Tree breeder	Tree nursery*	Policy maker
Austria	44	19	21	1	0	3
Belgium	8	2	2	0	2	2
Bosnia	1	0	0	1	0	0
Bulgaria	3	0	0	1	1	1
Croatia	2	0	0	1	0	1
Denmark	3	0	1	1	1	0
Estonia	2	1	0	1	0	0
Finland	9	2	3	1	0	3
France	79	32	26	7	2	12
Germany	26	5	14	2	3	2
Greece	1	0	0	0	0	1
Hungary	3	0	0	1	0	2
Iceland	5	1	1	1	1	1
Ireland	0	0	0	0	0	0
Italy	17	0	7	1	7	2
Latvia	12	9	0	2	0	1
Lithuania	7	3	3	1	0	0
Macedonia	1	0	0	0	0	1
Netherlands	2	0	0	0	1	1
Norway	49	10	18	4	7	10
Poland	4	0	0	3	0	1
Portugal	9	1	3	2	0	3
Romania	10	3	2	2	1	2
Serbia	3	0	0	2	0	1
Slovenia	5	2	1	1	1	0
Spain	12	6	2	2	1	1
Sweden	12	1	2	2	4	3
UK	6	2	1	2	0	1
All countries	335	99	107	42	32	55

*Tree nursery, seed harvesting and processing company.

4.1 Policy perception by stakeholder group

Respondents were asked to indicate the most relevant policies or regulations with an impact on the work related to sustainable use and management of FRM. The policies and legislations selected in this study are considered to have a direct and/or indirect effect on the sustainable use of FRM. The selected answers were clustered based on the thematic context and ranked according to the frequency of mentioning. Forestry law and nature conservation

¹⁸ The forestry law cluster includes national and regional laws related to forest management such as a national forest act or forest strategy, state forest law, regional forest regulation etc.

¹⁹

legislation clusters are indicated as the most relevant ones, followed by Council Directive 105/99/EC and related FRM law.²⁰ Forest subsidies and agricultural and rural policy were mentioned less frequently. Other policies/legislations were occasionally listed, including for example hunting regulations, certification standards, urbanization and infrastructure laws. Those were not considered relevant for the purposes of this study.

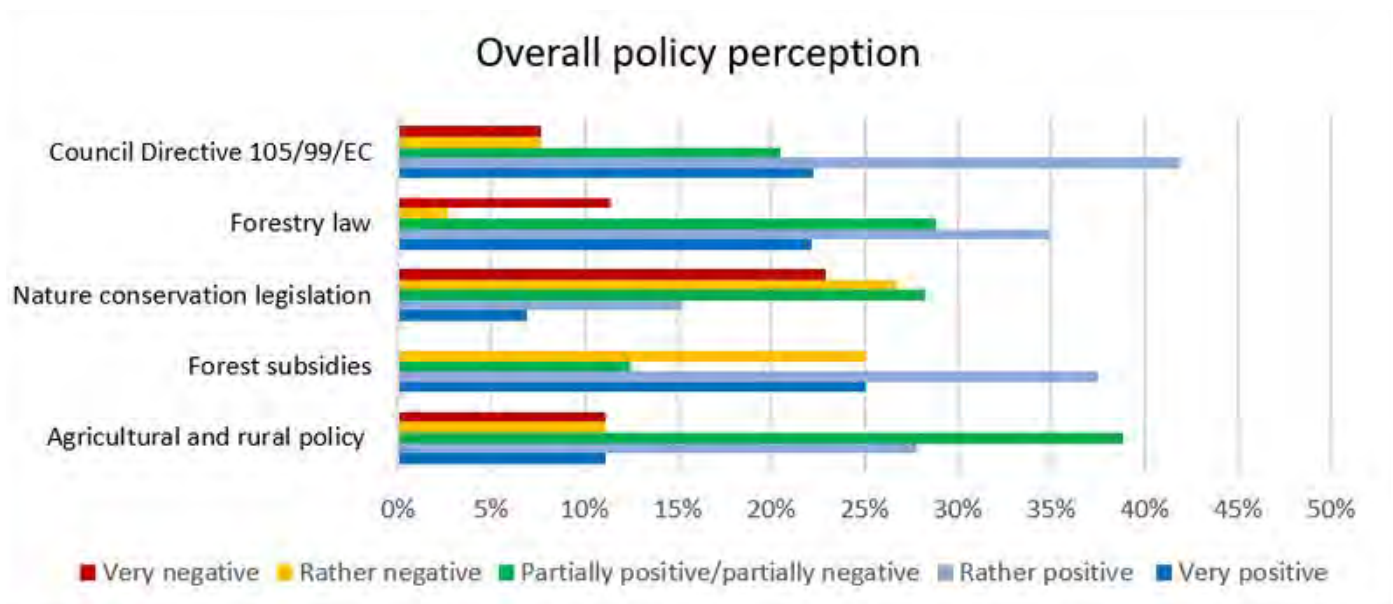


Figure 1: Overall policies perception reported for the most relevant policy/legislation of this study. Data expressed as relative values and extracted from B4EST and GenTree surveys.

In another question, respondents were asked to classify their perceptions for each policy/legislation previously indicated, using a positive and negative scale (see outcomes in Figure 2). Rather positive perception is reported of Council Directive 105/99/EC and related FRM law and forestry law (approx. 40% of relative share). Nature conservation reports the highest “very negative” perception among the main policy clusters (with a relative value of 22%), while overall, in this cluster “partially positive/negative” and “rather negative” observations were dominant. Forest subsidies were perceived “rather positively”, and agricultural and rural policy “partially positive and negative” (relative values of 38% and 37% respectively).

¹⁹ Nature conservation legislation includes acts and regulations related to nature conservation and environmental matters in the country of interest, e.g. Habitat and Bird Directive, Nature 2000 framework, national biodiversity act, nature conservation act, environmental code/act etc.

²⁰ Council Directive 105/99/EC and related FRM law includes the Council Directive 105/1999/EC and related FRM laws and policies at the international, national and regional level e.g. national legislation/act on the trade of FRM, Nagoya protocol, national act/law on seed and reproductive material, national rules on the use of local FGR, OECD schemes, etc.

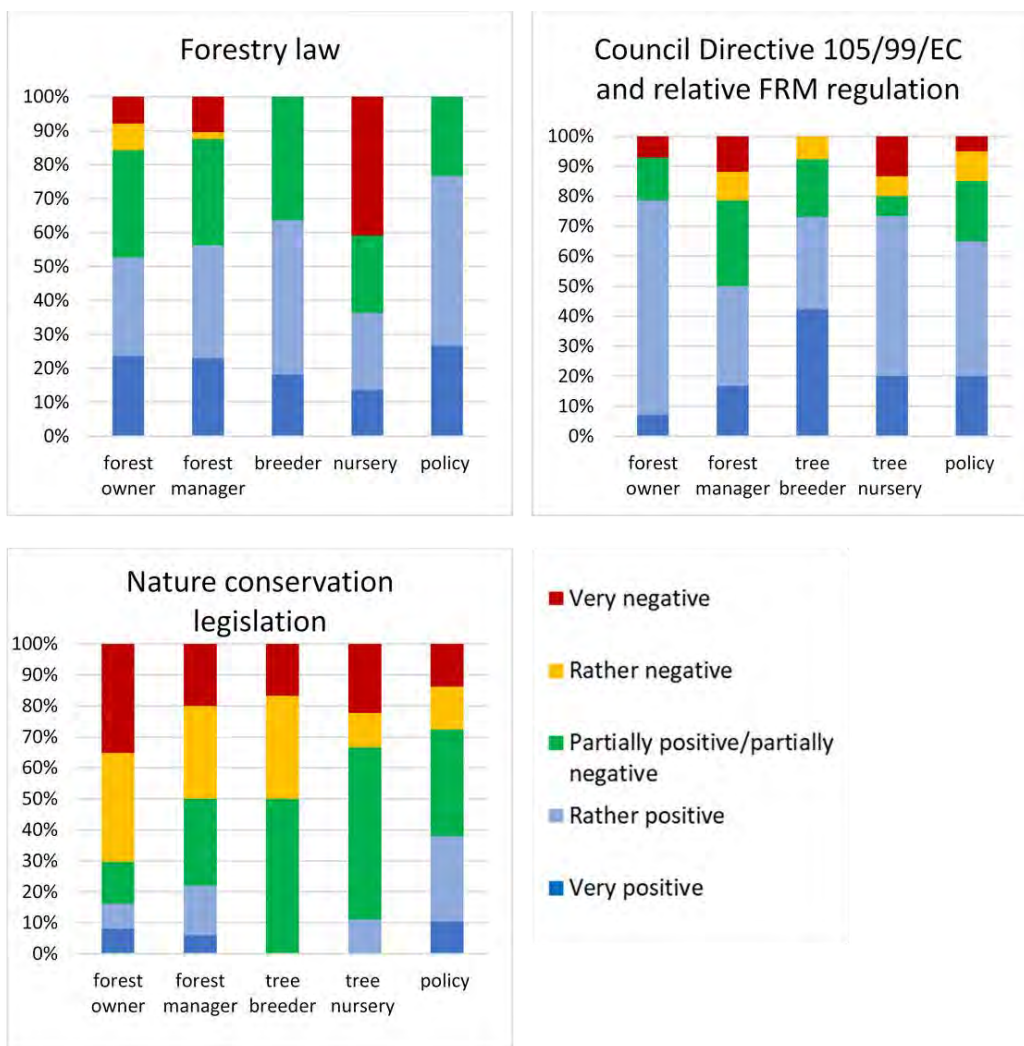


Figure 2: Stakeholder groups perception for the three most mentioned policy and legislation clusters. Data expressed as relative values and extracted from B4EST and GenTree surveys.

A detailed overview of the stakeholder group perceptions for the earlier mentioned three most relevant clusters: forestry law, nature conservation legislation and Council Directive 105/99/EC, is presented in Figure 3. The perception by nurseries differed noticeably from other groups, reporting the highest “very negative” perception for the forestry law policy (relative rate 41%). Meanwhile policy makers, breeders, owners and managers expressed a generally positive opinion for the forestry law cluster. A positive perception of the Council Directive 105/99/EC was predominately expressed by forest owners (more 90% relative value), followed by breeders and the nursery sector (both approx. 70% relative value). A considerable share of negative perceptions for this cluster (more than 10%) was expressed by tree nursery respondents. The perceptions on the nature conservation cluster vary among stakeholder groups; owners, managers and breeders expressed negative views, with relative values equal or major to the 50% relative rate. A more positive perception of for the nature conservation cluster characterized policy and tree nursery groups (approx. 70% relative rate). Policy makers and forest owners showed very contrasting perceptions, dominated by positive and partially positive/negative classes for policy makers and by negative ones for forest owners.

The next question posed in the survey assessed the impact of policies (e.g. regulations and subsidies) on the respondents' work, compared to other factors (e.g. markets, forest management practices, and extreme weather events), using a scale from very strong to weak (Figure 4). Forest owners, forest managers, policy and tree nursery classified the overall impact of policies as "strong". Meanwhile, tree breeders reported a "medium" level as dominant response. The only stakeholder groups with a noticeable share of responses indicating only weak policy impacts were forest owners and forest managers (25% and 14% respectively), but also for these stakeholders the majority of responses suggested strong or very strong impacts. That is, the general perception seems to be that policies, in comparison with other factors, have a high importance on the respondents' work.

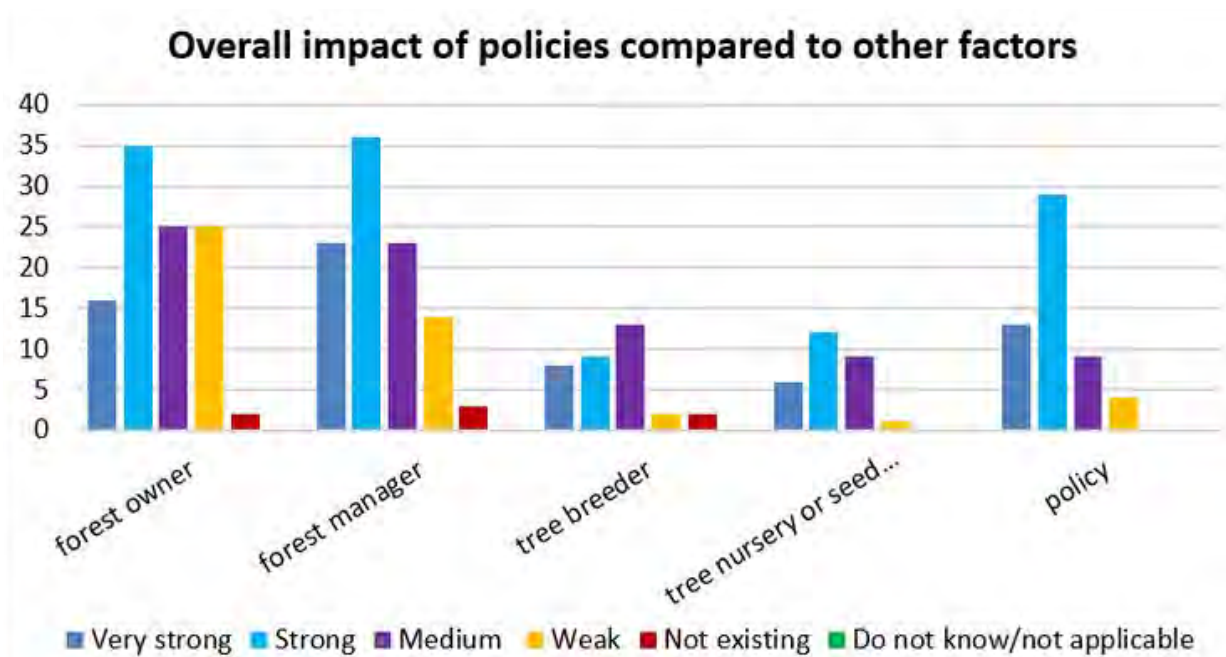


Figure 3: Overall impact of policies compared to other factors. Absolute values extracted from GenTree and B4EST surveys.

A set of specific questions were then posed to forest owners and managers to investigate about specific aspects such as for example forest management practices and the occurrence of extreme weather events. The most common management regime practiced by the respondents corresponded to a medium level,²¹ that implies combined objective multifunctional management. The choice of forest reproductive material in the case of artificial regeneration methods (for conifers and broadleaves), expressed by both respondents' groups, focused mostly on the quality aspects (e.g. best provenance. They also reported that a proper choice of forest reproductive material can help mitigating potential future threats (responses with relative values > 90 % respectively). Forest owners perceived pests and diseases as main threats followed by droughts and windstorms. Meanwhile, forest managers appointed pests and diseases as main natural disturbance, followed by drought and windstorm events.

²¹ Medium level REFERS TO "Combined objective forestry"/"site adapted forestry". This type of forest management is an approach that assumes that various objectives can be combined in a manner that satisfies diverse needs. Generally, both economic and ecological concerns play a major role in this type of management. Aside from timber production, additional objectives can include habitat, water, and soil protection; mushroom production; game management and nature protection.

The impact of EU legislation on stakeholders' work was also assessed with a classification on a scale from very strong to weak (Figure 5). Tree nursery, owner and manager opinions expressed a "medium" impact, while policy reported a "strong" one. Tree breeders had equal level for the "medium" and "weak" classes.

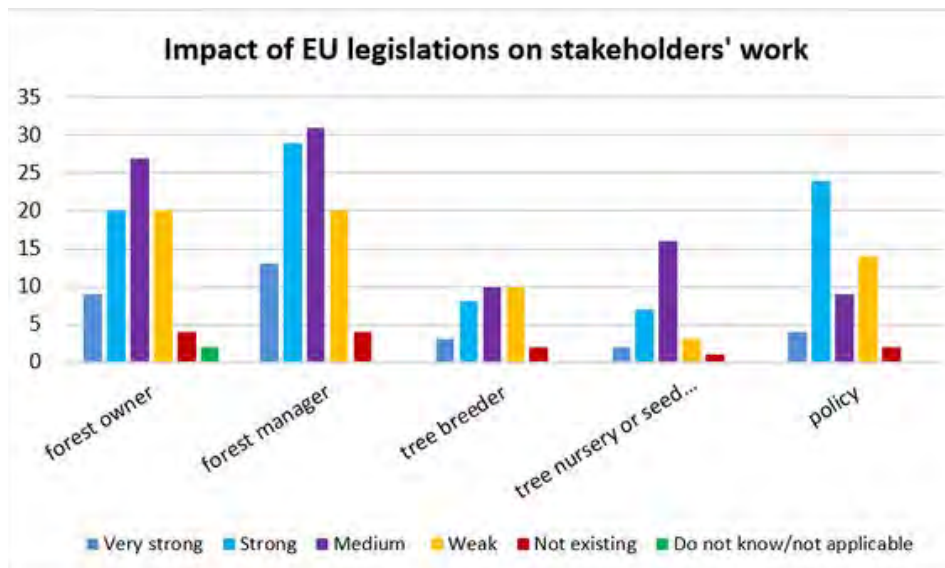


Figure 4: Impact of EU legislation on stakeholders' work. Absolute values extracted from the GenTree and B4EST surveys.

Specific questions posed to the nursery and breeder groups tried to reveal if gaps in the regulations are affecting the working activities, and if regulatory measures at the EU and national level constrain stakeholder activities.

The nursery's responses presented a balanced split between positive and negative choices for both questions. Individual responses included specific statements, for example "We want a better Communication and understanding for breeding at the Swedish forest agency. The number of clones we can use in a clone mix isn't evaluated and determined. We need regulations that gives us possibilities to act on the same forest plant market as other countries with less restrictions for chemical use in their nurseries" (quote by a nursery from Sweden). Another answer from Spain highlighted the complexity in the choice and use of FRM, and related implications for the legal and research aspects.

Tree breeders were asked in specific to express the degree of constraint on their working activities related to existing regulations (i.e. choose between high, some, little degrees or absence). The outcomes report the same response rates for the "little" and "some" degree levels. Specific individual answers underlined the presence of a low amount of resources allocated to forest selection (i.e. genetic improvement considered/seeing negatively), and the absence of a proactive policy promoting forest production, harvesting and timber use (respondent from France).²²

²² In this analysis France is the country reporting the highest number of tree breeders.

The managers and owners reported both positive and negative responses regarding the presence of gaps in the regulations which are affecting the working activities. In detail, a respondent from Lithuania specified that the climate zoning technique within the country seems to be outdated due to climate change. Meanwhile, “[...] mixing native and exotic trees in the same plot would be a preparatory measure to face future challenges [...]” is the opinion by Belgian forest owner. “Regulations must focus more on traceability of reproductive material rather than on the technical data for using FRM”, was the opinion of a forest owner from France”. The Norwegian law was generally considered too strict for the use of foreign processed plant material, as noted by an owner. Those comments by forest owners and managers highlight the presence of obstacles for climate change adaptation in the use of FRM.

4.2 Regional differences in perception of policies

The B4EST regional grouping is based on answers’ similarities and geographical borders. The response rates vary among regions and stakeholder groups. Only the three most mentioned groups of policies/legislation, i.e. nature conservation legislation, the Council Directive 105/99/EC and forestry law, are reported in this section.

Note: Some countries of interest for the B4EST project include several ecological and geographical regions within their borders, but the data did not allow to distinguish these regions.

Scandinavia/Nordic region (Norway, Sweden and Finland)

In Scandinavia the Council Directive 1999/105/EC and forestry law reportedly had dominantly positive effects on stakeholders’ work activities, meanwhile nature conservation was stated to have a partial positive/negative or rather negative perception (see Figure 6). None of the policies in Scandinavia received a “very negative” vote.

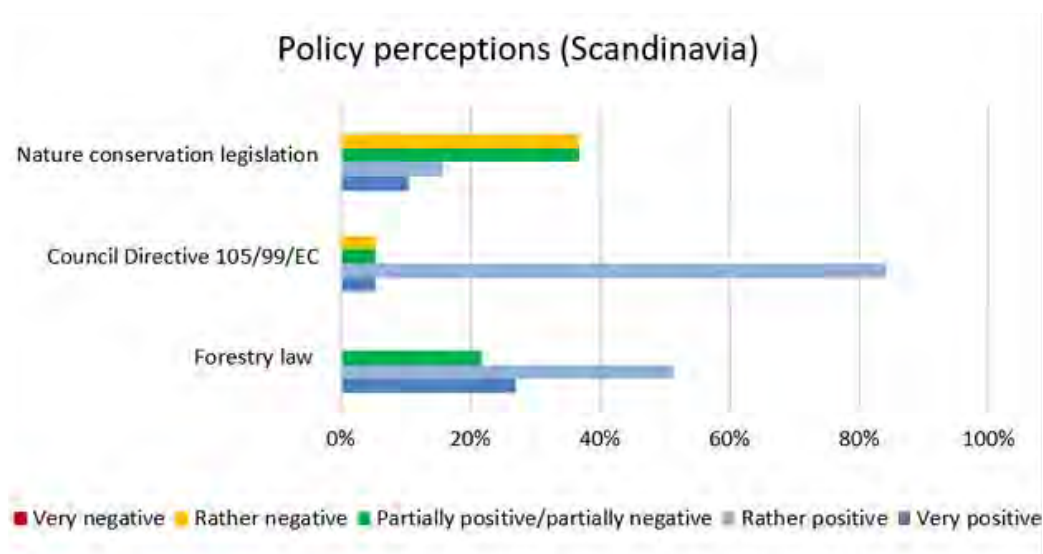


Figure 1: policies perception in Scandinavia/Nordic region (value corresponding to relative percentages).

In detail, respondents from Norway and Sweden often reported the need to promote the introduction of foreign species, as well as to reinforce bio-economy strategies (e.g. to improve effectiveness of the wood industry). Finnish respondents on the one hand highlighted a positive approach related to the national forestry laws focusing on sustainability aspects; on the other hand negative considerations were expressed in relation to the LULUCF and EU policies affecting Finnish forestry (i.e. ownership right is not respected). OECD schemes were stated to reinforce the development of harmonized regulations with trading countries, and the national regulations on FRM guide the national transfer, ensuring climate adaptation and plant health (opinions by Norwegian policy maker and breeder).

North-West region (UK, Ireland, Iceland)

In the North-West region a small number of responses were received and therefore the graphical representation is not reported.

The respondents from these three countries pointed out different limitations. UK respondents highlighted:

- A)** the need to use FRM across borders to support adaptation processes (policy-maker),
- B)** the necessity to improve biological diversity in managed forests, and
- C)** a demand to adopt grant schemes to promote multi-functional forest strategies (by forest owners). The Birds Directive reportedly creates limitations in Iceland, as it creates conflicts and limits the scope of forestry (opinion of a policymaker). Another expressed limiting factor was free grazing as an obstacle for forest regeneration (by manager from Iceland).

Central-East region (Denmark, Germany, Belgium, Netherlands, Austria and Slovenia)

In the Central-East region nature conservation legislations have often been perceived to have negative impact based on stakeholders' personal experience/work. The Council Directive 1999/105/EC was predominantly seen as "rather positive", and the forestry law cluster was indicated to have "partially positive and negative" impacts.

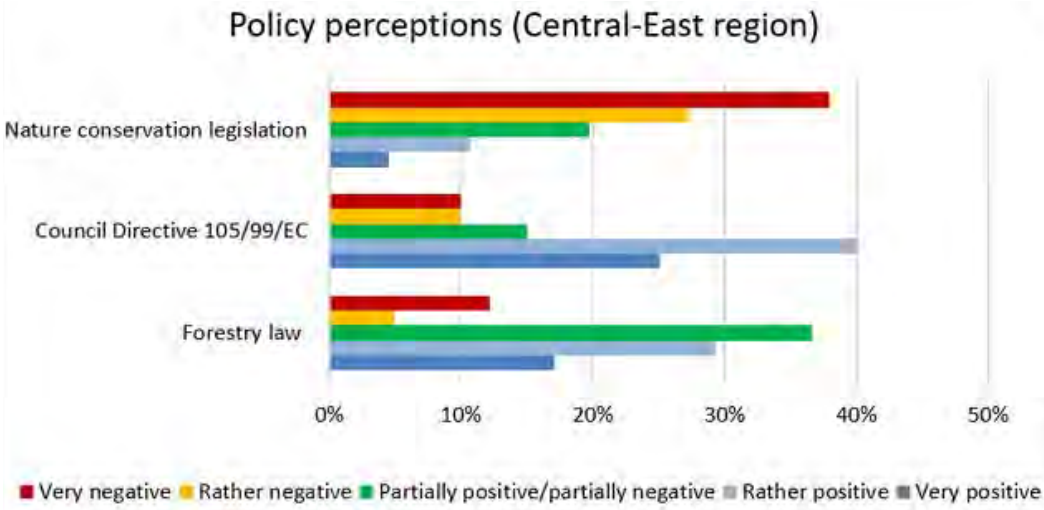


Figure 2: Policy perceptions in Central-East region (expressed as relative percentages).

The promotion of bioeconomy strategies (e.g. towards sustainable wood production) is highlighted by respondents from Austria, Belgium and the Netherlands. Belgium, the Netherlands and Germany reflect a strong regional power/decentralization. The respondents from Austria (with the highest response rate in this region) indicated a negative perception for the nature conservation legislation (e.g. due to increased costs, bureaucratic burden and lack of compensation guidelines). Tree species selection was stated to be very limited by funding guidelines and conservation policies (expressed by a forest owner from Germany). National forestry legislation sets a framework for the state forestry in Denmark, attention should be given to research and development activities (stated by breeder), while in Slovenia the national laws regulates the choice of species and provenances, as reported by a forest owner.

South-West region (France, Italy, Spain and Portugal)

The impact of nature conservation legislation on stakeholders' work activities received a dominantly rather positive perception, but it is also characterized by the highest negative effects in the region.

Council Directive 105/99/EC and forestry law were stated to have a predominately positive effect.

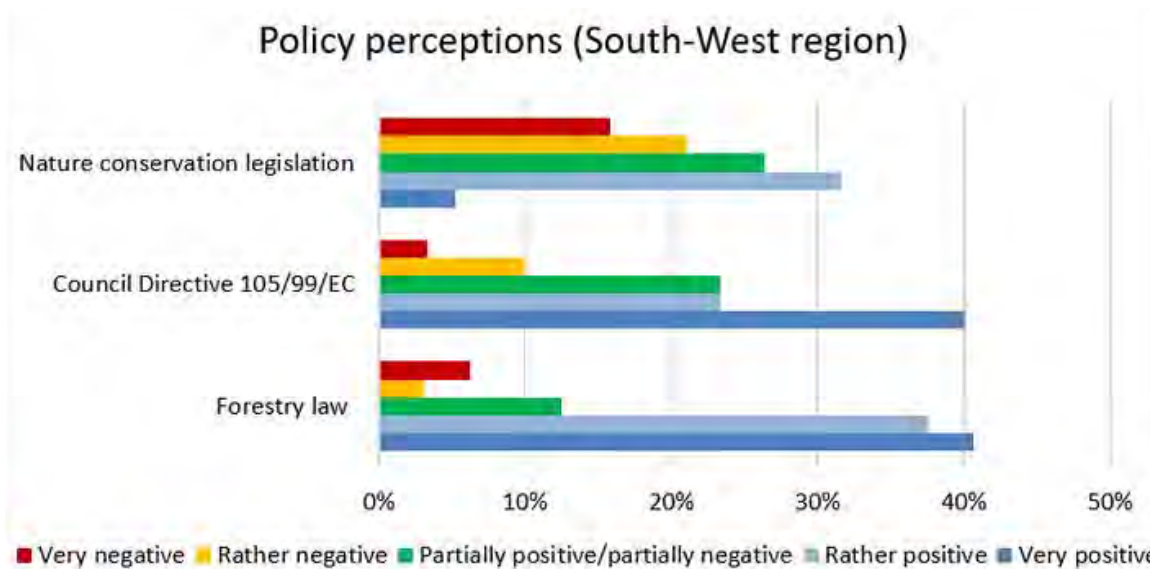


Figure 3: policy perceptions in South-West region (expressed as relative percentages).

Respondents from France, Italy, and Spain highlighted the importance of promoting reforestation practices, and improving the control procedures for the type of genetic material utilized. Nature 2000 framework implies limitations and prohibition to forestry activities with a poor compensation system (by forestry owner from Spain). The Council Directive 105/99/EC harmonizes regulatory practices at the European level which functions as a common market (opinion of a policymaker from France).

The Baltic region plus Poland (Estonia, Latvia and Lithuania plus Poland)

In the Baltic region plus Poland, the impact of nature conservation legislation was perceived rather negative or partially positive/negative values (same response rates). Impacts from the Council Directive 105/99/EC was stated rather positive, meanwhile, forestry law was predominantly perceived very positive. The Council Directive and the forestry law were not reported to present negative impacts influencing the stakeholders' work activities of this region.

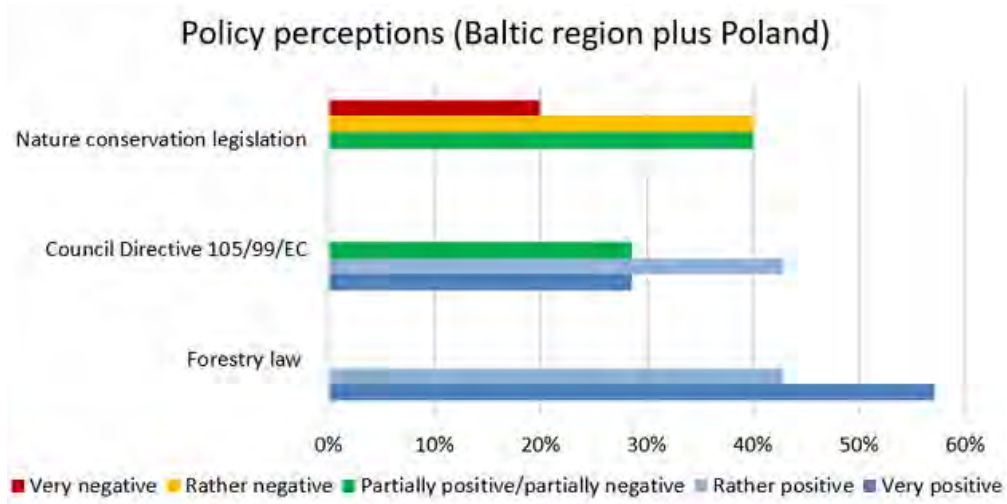


Figure 4: policy perceptions in the Baltic region plus Poland (values expressed in relative percentages).

There was no more detailed argumentation from this region in the open questions.

South-East region (Bulgaria, Bosnia, Croatia, Greece, Hungary, Macedonia, Romania, Serbia)

Nature conservation, Council Directive 105/99/EC, and forestry law policies have commonly rather positive impacts in the South-East region.

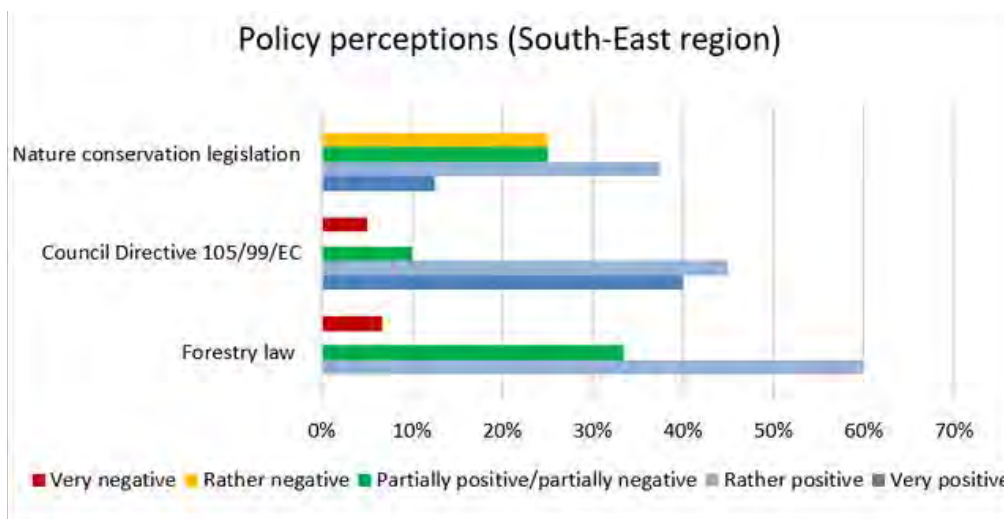


Figure 5: policy perception in the South-East region (value expressed as relative percentages).

There was no more detailed argumentation from this region in the open questions.

Regional comparison of policy perception

The perception of nature conservation policies differed noticeably across regions. Whereas the perception of this policy was very negative or rather negative in the Central-East region, in the Baltic region plus Poland equal rates were expressed for the rather negative and partially positive/negative classes, and no positive rates. Scandinavia showed dominantly rather positive and partially neg/pos opinions. In the South-West and South-East regions, rather positive perceptions dominated.

The overall perception of Council Directive 105/99/EC was generally rather positive or very positive. Very negative opinions were reported sporadically (with low relative percentage) by respondents from the South-East, South-West and Central-West regions.

Forestry law also had generally a positive perception. It ranged from predominately very positive in the South-West and Baltic region plus Poland, over rather positive in Scandinavia and the South-East region, to prevailing partially positive/negative opinions in the Central-East region. In the Central-East, South-West and South-East low shares of percentages expressed also a very negative perception (negative opinions were absent in Scandinavia and the Baltic region plus Poland).

4.3 National and regional policies that promote the use of local and non-local FRM

In order to assure that also for the future climate the optimal adapted FRM is used, it may be necessary to use material from an origin that presently grows in a climate similar to the one that is projected for the site in the future (assisted migration)²³ or even to change tree species. This means that the regulations concerning the use of FRM should allow these methods. For larger countries assisted migration may be dealt with mainly within the country, except for some border areas, and thus this can be regulated at a national level. For smaller countries it may mean that most of its FRM should be imported from neighboring countries, which may require additional regulations.

A group of specific questions were posed to part of the respondents to investigate the presence of legal or policy instruments in a country/region that: A) promote the use of native or local species, B) that discourage the use of non-local or exotic FRM, and C) that require consideration of the origin of FRM in afforestation/reforestation areas (Table 2).²⁴



²³ Assisted migration is an important method to mitigate climate change. It is the transfer of material from its original area to an area where the expected future climate may be similar to that of its original area (Aitken and Bemmels, 2016).

²⁴ These questions were asked only to policymakers in the GenTree survey, whereas in the B4EST survey, all targeted stakeholder groups were addressed (a total of 94 responses were received).

The survey showed that the presence of regulation that promotes native species was most common and reported by 84% of the respondents. Only 6% reported that such regulation does not exist in the country or region. Regulation that promotes the use of local species was less common than for the use of native species but was nevertheless reported by more than half of the respondents. The opposite type of legislation or policy instruments to discourage the use of exotic or non-local species was reported with somewhat lower frequency (72 % and 37 % relative values, respectively). Nevertheless, it is noteworthy that two-thirds of statements did report discouragement of exotic species, so this affected a clear majority of cases. However, it should be noted that the variable representation per country may have affected the relative importance of such legislation and policy instruments, as only few responses were collected for example from the UK and Ireland, i.e. from countries with a strong history in planting exotic tree species. Policies or legislations regulating the origin of FRM for afforestation and reforestation activities was widespread and reported by 59% of the responses.

Table 2: Summary of questions which investigate the promotion or not of local and non-local FRM. Data extracted from the GenTree and B4EST surveys.

Questions: “Are there legal or policy instruments in your country/region that promote [...]”	Yes (relative %)	No (relative %)	Do not know (relative %)
Use native	84	6	10
Use local	51	34	15
Discourage use exotic	72	24	4
Discourage use non-local	37	59	4
Consideration of the origin FRM for afforestation and reforestation	65	18	17

Table 2 clearly shows that there is an overall preference for using native and/or local FRM and that the use of non-local and exotic material is widely discouraged. This may thus hinder climate change adaptation through using assisted migration. It also has consequences for the development of the decision support tools in B4EST for choosing the optimal source of FRM. The tools must include the possible limitations caused by the regulations. This may be especially difficult when validating the tools for larger regions, including more than one country.

- ²³ Assisted migration is an important method to mitigate climate change. It is the transfer of material from its original area to an area where the expected future climate may be similar to that of its original area (Aitken and Bemmels, 2016).
- ²⁴ These questions were asked only to policymakers in the GenTree survey, whereas in the B4EST survey, all targeted stakeholder groups were addressed (a total of 94 responses were received).



4.4 Survey responses interpretation related to regulation of FRM use and management

Policy and legislation limitations/gaps related to FRM related policies

In the part of the survey with open questions, stakeholders were asked: “In your opinion, how do you think the listed legislation affects your work?” In the following we present responses that are relevant to the B4EST project.

The perceived negative/rather negative impact of nature conservation legislation in several regions was reported already in section 4.2. Several responses showed that the Natura 2000 framework influence on stakeholders’ activities was perceived as causing excessive constraints, especially for forest owners and managers. The stated reasons include high bureaucratic burden and increasing costs (respondents from France, Croatia, and Austria). Another opinion with high relevance for the B4EST was raised by an interviewee from France, stating that the Habitat Directive is “obsolete” because it prohibits the use of new species or species from different origins, which are seen as a necessity under climate change. This stresses the fact that FRM choices can be constrained by national and regional nature conservation legislation, and consequently preventing opportunities to select better adapted FRM for already altered and projected further changes in climatic conditions. Considering the wide influence this directive seems to have on the use of FRM, it may be a surprise that this was brought up only once. However, similar concerns were reported by breeders from Latvia and Hungary, who reported that the forestry law may include limitations in selecting the most suitable tree species and constraining the use of improved material and decisions on the regeneration choices. These constraints limit climate adaptation and mitigation measures unduly and regulations should instead be based on stand conditions, adaptation purposes and resilience principles.

²⁵ Natura 2000 is the European binding framework on protected areas. It aims to ensure long-term survival of the Europe’s most valuable and threatened habitats and species, listed under the Bird and Habitat Directives (European Commission, 2020) [Natura 2000 official website](#).

In the South-West region statements underlined that the lack of control in the plant production and use may diminish the transparency of the sector and that improved legislation is desirable to regulate the trade and control for the correct use of FGR through the nursery supply chain (nursery from Spain and breeders from Italy). Moreover, it was stated that lacking rigor in pest and disease control puts production at risk (nursery from Spain). The Nagoya protocol is indicated as a well-structured framework but having a complex reviewing process, and hindering exchanges of genetic resources between improvement programs (by a breeder from France). In fact, the Nagoya protocol should not prevent the use of foreign genetic resources in breeding, but it may come with additional administrative burden. This was exemplified by a nursery respondent from Sweden who stated that the development of plant passports creates administrative burdens for forest plant producers.

Needs for changes in policy and legislation affecting stakeholders' work activities

Below are highlighted the main policy and legislation needs reported by stakeholders in the question "Please describe shortly where (and how) you see the biggest need for change and/or adaptation about policies affecting your work".

Several stakeholders from multiple countries underlined the necessity to adopt and reinforce common adaptation and mitigation measures; such as A) improve and modernize the use and transfer of FRM (by a breeder from Norway), B) the unification of the region of origins across borders and breeding zones (by a manager from Austria), C) and also the need to use genetic material across borders within species to support adaptation to climate change (by policymaker from the UK).

In relation to assisted migration practices and regulations, on one hand assisted migration is promoted in few cases by France and Sweden, aiming at enhanced adaptation to climate change, species survival and to establish mixed species plantations (by owner and policy stakeholders). On the other hand, some reluctance was reported for example from Sweden and Poland, stating that assisted migration was difficult to put in place due to limited resources availability.

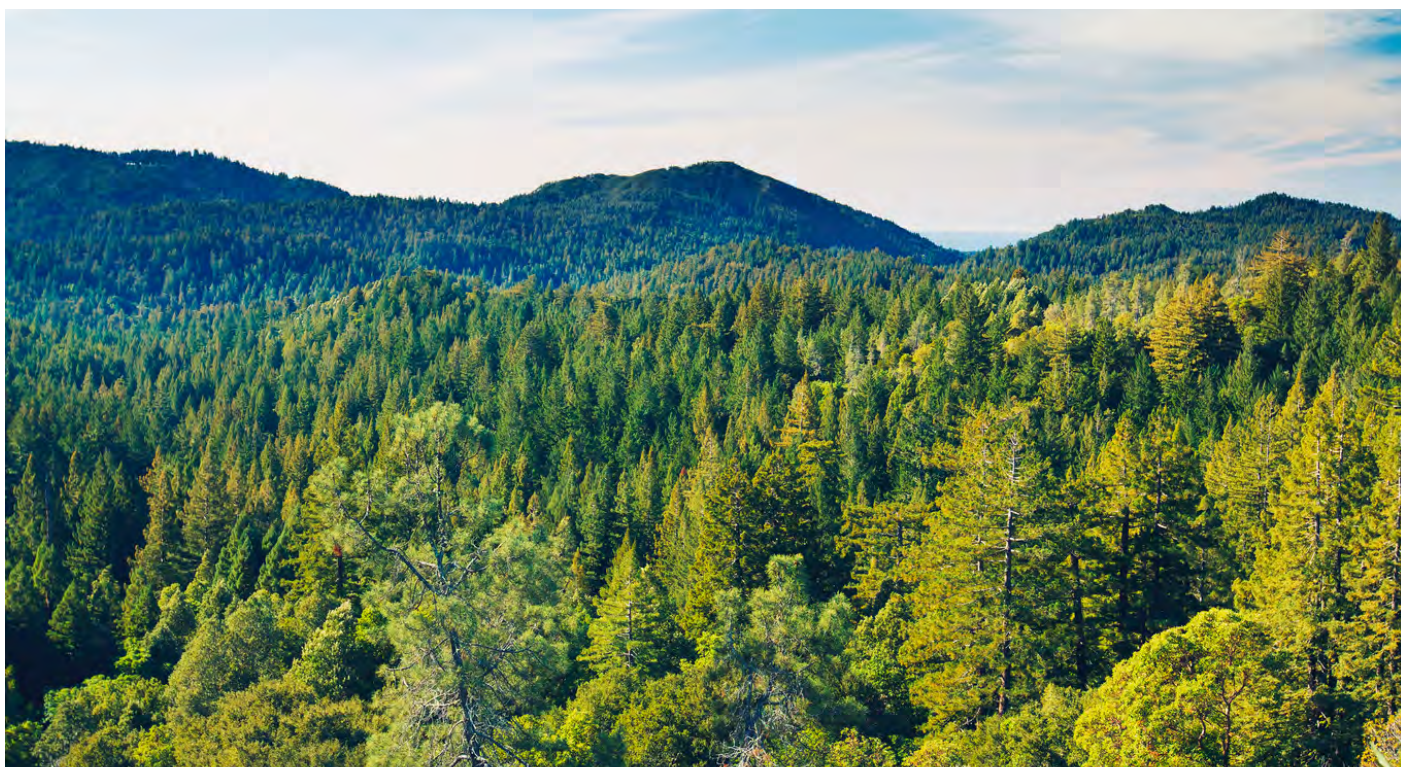
In the South-West region as well as in Bulgaria and Belgium, national, regional or state authorities do not support the establishment of plantation, afforestation and reforestation areas (reported by nursery, breeder, policy maker, manager). As shown in Table 2, the planting of foreign species is not encouraged in several countries and a policy maker from France stated a strong political will against this. In contrast, nursery and breeder responses stated the need to include this practice in the environmental laws, for example (from Germany, Latvia, Portugal and France).

Perceptions' similarities and differences among stakeholder groups

Nursery, breeder and policy maker groups seem to encourage the establishment and control of the FRM utilized for afforestation, reforestation and restoration practices, and called for the design of genetic improvement programs to guarantee sustainable European forests and plantations with sufficient adaptive capacity and high productivity.

Forest owners and managers²⁶ are quite reluctant towards conservation legislations, stating that those have objectives which are in contrast with sustainable forest management, and do not present clear compensation schemes (by Latvia, Lithuania, Austria). In contrast, the policy and nursery's opinions are quite positive, focusing on the importance of protecting and enhancing biodiversity in forest ecosystems. However, forest owners, managers, breeders and nurseries report a positive perception pattern toward forestry law and Council Directive 105/99/EC and related FRM law. Those policies regulate the use and trade of FRM (in Europe and at the national level), promote sustainable forest management, and guarantee the supply of FRM within the European and national economic framework. Nursery respondents had more negative perception expressed for the Council Directive 105/99/EC compared to the other stakeholders. It could probably be related to the statements which highlighted the need to develop recommendations for the use of FRM from non-local provenances for adaptation and mitigation purposes.

Note: the distinctive negative perception for the forestry law cluster by nurseries was not supported with open statements to articulate and discuss this pattern.



²⁶ The majority of responses collected are from Austria, therefore the dominant negative perception and opinions might be biased as limited to a specific country.

5 – ON-LINE DECISION SUPPORT TOOLS TO CHOOSE THE MOST OPTIMAL ORIGIN OF FRM

Scots pine Planter's guide (PG) is a decision support web tool for selecting Swedish and Finnish forest regeneration material for a given location in either of the countries and can be seen as a common platform where commercial seed sources of Scots pine in Sweden and Finland can be compared. The common Swedish /Finnish version tool has been available online since September 2019.²⁷ The development of Planters guide was based on a long-standing collaboration between Swedish and Finnish tree breeders and climate scientists, with the aim of developing for both countries common Scots pine transfer models (MBerlin et al., 2016). The regeneration material is ranked according to a performance index that combines survival and growth into an estimate of area production over a rotation. The deployment zones for the seed orchards are shown as maps delimited by both biological transfer limits and national legislations. The climate data used in PG are based on information from climate scenarios, which makes it possible to predict the performance of seed sources in simulated future climates. Prior to the introduction of PG, the Finnish Scots pine transfer recommendations were revised based on the report of Ruotsalainen et al. 2016 and the new transfer legislations were implemented in the spring of 2017.²⁸ With this legislation in place, Swedish Scots pine FRM can be used in Finland. However, for Finnish Scots pine FRM to be allowed for use in Sweden, they must be assigned a standardized latitudinal origin according to methods required by the Swedish Forestry Board (SFB). Skogforsk has therefore asked SFB to provide a formal approval of the methods used in PG, enabling the use of Finnish FRM in Sweden. Additionally, to make the Swedish and Finnish seed sources comparable in PG, common standards for definitions and methods of calculation of gain predictions etc. were developed (Berlin et al., 2019).

Within WP 4 of B4EST the aim is to expand the Planters guide to Norway spruce, not only for Sweden and Finland, but also including Norway and possibly the Baltic countries. This tool will serve as a benchmark for the possible development of similar decision support tools for different tree species in other European regions.

In WP 1 of B4EST,²⁹ with additional support from the UK Forestry Commission, a so-called Climate Matching Tool has been developed for selecting forest reproductive material suited to current and future climates to maintain forest resilience.³⁰ The tool provides a visualization of regions with a similar climate to the climate projection for any location in Europe. It gives an indication of the climate that trees are likely to experience in the future. This can help forestry practitioners understand future climate conditions for forests in Europe and to consider the selection of better suited material from environments that their region may experience in the future (the tool was described in the confidential deliverable D1.1).

²⁷ <https://www.skogforsk.se/english/products-and-events/software/planters-guide-pine/>

²⁸ <https://www.ruokavirasto.fi/sv/odlare/vaxtproduktion/fro--och-plantproduktion-av-skogstrad/frokalla/anvandningsomraden/grunder-for-tallfroplantagernas-anvandningsomraden/>

²⁹ <http://b4est.eu/climate-matching-tool-to-help-forestry-practitioners-understand-how-the-climate-will-change-over-time-across-europe#post-1155>

³⁰ <https://www.forestresearch.gov.uk/tools-and-resources/climate-matching-tool/>

6 – DISCUSSION AND CONCLUSIONS

The results of earlier surveys by EUFORGEN and the GenTree project have shown that there is still large variation in the regulations, especially between countries, that affect the use of improved FRM in Europe. Another, maybe somewhat surprising, outcome was that there are several regulations, both national and international, that although they do not directly address the use of FRM still seem to have large effect on it. Especially regulations concerning nature conservation may have a rather large effect which stakeholders often perceive as negative. It should also be noticed that the regulations and policies are almost always regarding FRM in general, and rarely make a distinction between improved and unimproved FRM. Only the EU and OECD regulations on the marketing of FRM are exceptions.

Two important measures to mitigate forests and forestry to climate change involve the use of better adapted FRM, assisted migration and the introduction of new tree species to certain areas. However, the surveys revealed that often national and/or regional policies only promote the use of native and local FRM and discourages the use of non-local and exotic material. Several stakeholders from multiple countries expressed the necessity to adopt and reinforce common adaptation and mitigation measures, promoting the use of (improved) FRM across borders to support adaptation to climate change. One could argue that improved FRM should be preferred for cross border transfers, because it should be more reliable due to testing and selection and because the origin is well-known. Because of the common goal of sustainable forestry in a changing climate and because of the need for cross-border transfers of FRM, a broader international attempt to come to common regulations is needed.


Forest owners and managers, but also nurseries have a need for guidelines and regulations to find the optimal balance between wood production and the request for conservation of the biodiversity (including genetic diversity) when choosing the most optimal FRM. Decision support tools, such as Planters Guide, should be developed further for other regions and tree species to choose the optimal FRM for the area of interest that take into account regional and national regulations concerning biodiversity or other environmental aspects.



7 – PARTNERS INVOLVED IN THE WORK










8 – ACKNOWLEDGEMENT

An aerial photograph of a vast forest of evergreen trees, likely spruce or fir, bathed in the golden light of a sunset or sunrise. The trees are densely packed and their needles catch the low sun, creating a warm, yellowish glow. In the background, a city with various buildings and structures is visible, followed by rolling hills and mountains under a clear, light blue sky with a few wispy clouds. The overall scene is peaceful and scenic.

We would like to thank the GenTree project (Horizon 2020 research and innovation programme under grant agreement No 676876) consortium for allowing us to use the results from their survey for further analyses for this deliverable and the EUFORGEN network for allowing us to include the results from their 2012 “Survey on Forest Reproductive Material in European countries – legal framework, guidelines & recommendations” to assess legislations at national level.

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B4EST is an EU-funded H2020 project which focuses on adaptive breeding for productive, sustainable and resilient forests under climate change.

Climate change can increase forest vulnerability to damage and disease, reduce forest health and productivity, and cause economic losses. B4EST's goal is to increase forest survival, health, resilience and productivity under these circumstances, while maintaining genetic diversity and key ecological functions, and fostering a competitive EU bio-based economy. B4EST aims to provide forest tree breeders, forest owners, managers and policy makers with better scientific knowledge to deal with these issues.

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