

CLASSIFICATION AND DESCRIPTION OF THE MOST WELL-KNOWN ENVIRONMENTAL APPROACHES USED FOR THE MAINTENANCE AND IMPROVEMENT OF FOREST MANAGEMENT

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ABSTRACT. The importance of forests in our society is extremely significant, with multiple benefits for both the environment and people. Considering the high importance of forests and the need for responsible and sustainable utilization, various approaches have been developed to promote sustainable forestry in different ways. This paper focuses on identifying, classifying, and analysing these approaches in Romania and at the European level.

Firstly, the legislative system, through its crucial role in establishing rules for different sectors, plays an important role in ensuring sustainable forestry. The entirety of laws that impact forests form the regulated tool of the state. On the other hand, organizations that benefit from goods and services provided by forests aim to assure customers that their activities do not have a negative impact on forests. Taking these factors into account, non-governmental organizations have developed different standards and policies to maintain and improve forest practices. These systems are not regulated by the state; rather, they are voluntary instruments. Their use depends on the willingness and interest of the forest owner or manager. Both types of instruments aim to improve forest practices and promote a sustainable approach to the utilization of forest resources.

Key words: *Responsible forest management, voluntary system, regulated system.*



INTRODUCTION

The importance of forests in our society is extremely significant, with multiple benefits for both the environment and people. Human needs, such as agriculture, fire, and other wood uses, have altered the balance between agricultural and forest land. The first concerns regarding forest management emerged during the Roman Empire period (Duduman, 2019). By 1850, the general perception was that “the application of theoretical knowledge to control nature had been achieved. The application of knowledge is beneficial because the result was purely positive, people know what they want and what they have” (Wiersum, 1995).

The first regulatory instrument in the field of forestry is Forest Legislation. For example, in the case of Romania, the Forest Code was approved in 1881, stating that the protection of vulnerable forests can be done regardless of ownership type, as it influences the public interest (Duduman, 2019). With the introduction of Forest Legislation, the concept of “Forest Management Plan” also emerged, aiming to regulate the zonal functions of the forest. In Romania, this concept appeared as a result of the influence from the French school (Duduman, 2019).

At the beginning of the 20th century, with population growth and industrialization, concerns about forest quality became increasingly important, questioning the *status quo* (Joffe et al., 1990; McCormick and Mitchell, 1989; Shabecoff, 1993). For example, Shabecoff (1993), identified that the main enemy of the environment is man and the decisions made by him. McCormick and Mitchell (1989) identified that human rights are not fully respected in the United States.

Currently, we understand that the aforementioned aspects have great importance in sustainable management. The effects of this practice are best observed over time. The fact that we have a forest in 2020 reaching the age of 120 years is the first sign indicating that since 1900, that land area has been sustainably managed, considering all the challenges of that period. Considering the high importance of forests and the need for responsible and sustainable utilization, various approaches have been developed to promote sustainable forestry in different ways. This paper focuses on identifying, classifying, and analysing these approaches in Romania as well as in 10 European countries.

The methodology used is based on literature review, which involves conducting a comprehensive analysis of existing literature sources to gather relevant information and insights on environmental approaches used for the maintenance and improvement of forest management. The research is based on the following research questions: What are the main environmental approaches utilized for forest management?, How are these approaches classified and described in the literature?, What are the benefits and limitations associated with each approach?.

Literature review is used often to document and identify topics already covered by multiple researchers. It's practically a systematic search across various academic databases, journals, books, reports, and relevant online sources to identify relevant literature. Use appropriate keywords and search terms such as "environmental approaches for forest management" or "sustainable forest management practices".

TYPES OF CLASSIFICATIONS

Classification based on the method of implementing defined requirements

There are many approaches developed by different organizations. One classification was made by Bemelmans-Videc, which indicates the existence of approaches that impose constraints in case of non-compliance - the stick (Bemelmans-Videc et al., 2010; Zimmermann et al., 2018). On the other hand, there are approaches that offer a reward in case of implementing a measure - the carrot (Bemelmans-Videc et al., 2010; Zimmermann et al., 2018).

Classification based on the entity developing the requirements

Another type of classification is based on the entity developing the requirements. Considering this, we can distinguish between a regulated system and a voluntary one.

The regulated system encompasses all actions and regulations established by government institutions. These requirements often have a mandatory character. Non-compliance with these regulations may result in

penalties and coercive measures (e.g., revocation of operating rights, sales bans). This type of instrument is characterized by the implementation of constraints - the stick (Bemelmans-Videc et al., 2010; Zimmermann et al., 2018) - to ensure that organizations comply with the requirements. Although by the 1980s, some countries had fairly effective regulated systems for environmental protection, each country has sought additional measures. With the establishment of the European Union, a unified approach has been pursued to ensure environmental protection. The core of the regulated system is represented by forest legislation, which establishes the minimum set of regulations (figure 1).

Silvicultural measures are developed with support of

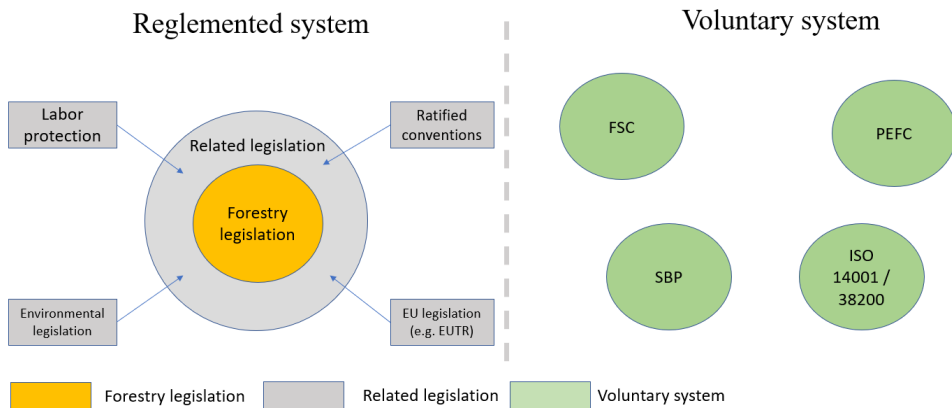


Fig. 1. *Systems used for the development of silvicultural measures based on the entity that develops the requirements*

The voluntary system is often developed by non-profit organizations that aim to establish a benchmark for making statements about an organization's level of involvement in sustainable development or responsible management (figure 1). This type of instrument is characterized by the implementation of incentives - the carrot (Bemelmans-Videc et al., 2010; Zimmermann et al., 2018), - to ensure adherence to principles and standards.

Classification based on the degree of regulation

Each country has implemented forest legislation with the purpose of regulating the functioning of the field and establishing specific rules. In this process, countries can regulate sustainable development, close-to-nature forestry, or responsible management at various levels. The level of regulation in each country takes into account the political history and the historical involvement of a country in environmental protection concerns. At the same time, each country can define and regulate terms such as illegal logging or deforestation in different ways.

Overlap between the regulated and voluntary systems

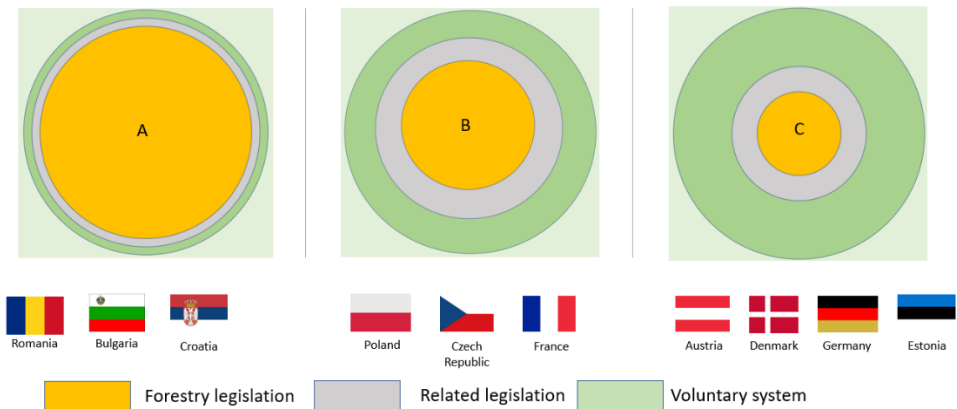


Fig. 2. *Graphic representation of the overlap between the regulated and voluntary systems based on a study conducted in 2018 (Nichiforel et al., 2018a)*

At the European level, a study was conducted to assess the rights of forest owners in 30 countries. The results of this study reveal a significant difference in the requirements imposed on forest owners. This discrepancy can influence the degree of involvement in the sustainable development of forests in terms of the “stick” concept (Nichiforel et al., 2018b). In

countries where forest-related legislation is not very strict, these gaps can be compensated for by implementing voluntary instruments that provide access to subsidies for meeting certain indicators (figure 2). However, currently, there is no study analysing the subsidies implemented in different countries to support sustainable development (Nichiforel et al., 2018a).

It is important to mention that differences in requirements within the regulated system across European countries can create discrepancies in the approach to sustainable forest development. While some countries may have strict and mandatory rules, others may adopt more flexible approaches based on voluntary instruments and subsidies. These differences can influence the level of involvement and the success of implementing sustainable practices in the forestry sector in each country.

Therefore, a more detailed evaluation of the subsidies implemented in different countries is necessary to better understand how they can support sustainable forest development and to identify best practices that can be applied across the European Union.

Classification based on indicators that indicate the credibility of a country

Internationally, several indicators are defined to classify countries. One of the most well-known indicators is the Corruption Perceptions Index (CPI). This index is maintained by Transparency International and updated annually. Countries with a score above 60 are considered to have a strong legislative system that ensures rigorous implementation (Transparency International, 2021). Another internationally developed indicator is the Governance Effectiveness Index created by the World Bank, which measures the level of governance efficiency (World Bank, 2015). Another indicator is the Fragile States Index (FSI) developed by The Fund for Peace. This index highlights countries where the legislative system does not function at the highest level and countries at risk of instability (The Fund For Peace, 2022).

REGLEMENTED SYSTEM

The regulated system is represented by the existence of forest legislation along with related legislation. The regulated system refers to a framework of rules, regulations, and policies that govern a particular domain or industry (figure 3). In the context of forest management, the regulated system entails the establishment and enforcement of laws and guidelines related to the sustainable use, conservation, and protection of forests. It aims to ensure compliance with specific requirements, standards, and practices for managing forests in a responsible and environmentally sustainable manner. The regulated system plays a crucial role in promoting the long-term health, biodiversity, and socioeconomic benefits of forest ecosystems.

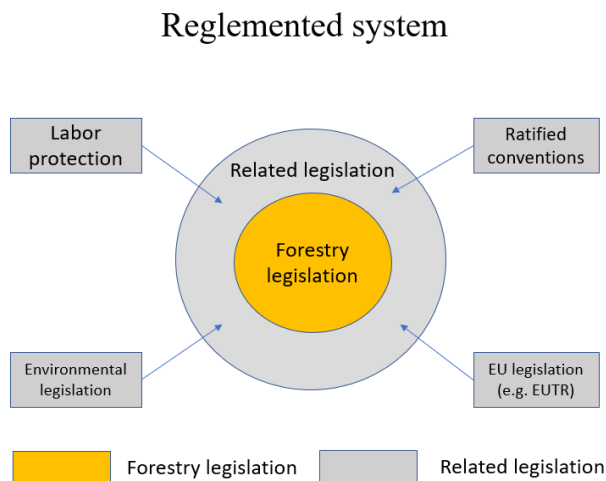


Fig. 3. *Reglemented system used for the development of silvicultural measures*

Forestry legislation

Forest legislation can be defined as the collective body of laws, orders, and regulations that define the functioning of the forestry sector. Based on this definition, the following subsections aim to create a profile for each country included in this study and describe their forest legislation.

In Romania, the Forestry Legislation does not differentiate between forms of ownership. The forestry regime encompasses a set of “forestry technical, economic, and legal norms regarding forest management, exploitation, protection, and safeguarding of the forest resources, with the ultimate goal of ensuring the sustainable management of forest ecosystems.” (Romanian Parliament, 2008). To implement the forest regime in all forests, regardless of ownership type, two definitions are used: the Production Unit (UP) (based on territorial units), which are organized in the same way regardless of ownership, and the Forest Management Plan (FMP) for each UP (Preferred By Nature, 2017g). Forest management units (FMUs) represent divisions within the PU, and they can be assigned a functional group for production and protection or solely for protection. The functional group, along with other characteristics, determines the type of work that can be carried out (Preferred By Nature, 2017g).

Bulgarian forests are managed in accordance with the requirements of the Forest Act (Bulgarian Parliament, 2011a), the Ordinance on Defining Maximum Allowance (Bulgarian Parliament, 2011b) and administrative acts (orders, instructions, etc.) issued by the executive director of the Executive Forest Agency (EFA) and the Minister of Agriculture and Food. Forests are divided into three functional categories: protection forests, forests with special use, and production forests. As a result of the establishment of the Natura 2000 network, a significant portion of forest areas has special and/or protective functions. Special and/or protective functions are found in almost 70% of the forest area (Preferred By Nature, 2017a).

In the national legislation of Latvia concerning forestry, there is no specific definition of forest types and functions. Land use regulations and property classification define forest land as “land where the primary commercial activity is forestry,” encompassing production and protection activities, as well as forest infrastructure, harvesting areas, swamps, and meadows. Forest land may include agricultural land, provided that it does not constitute the majority of the land and agriculture is not the primary economic activity (Preferred By Nature, 2019b).

Forests in Poland are classified into three main categories: production forests, protection forests, and social forests. Production forests are managed to ensure their sustainability in terms of timber and forest product exploitation,

tourism development, income generation from timber sales, and provision of hunting services. Protection forests serve as a refuge for biodiversity, housing a variety of habitats and animal species. Social forests contribute to improving recreational opportunities (Preferred By Nature, 2017f). In state forests, the process of obtaining logging authorization involves multiple stages. Firstly, the Forest District approves the annual harvesting inventory. Then, forestry personnel issue logging permits to companies. In Poland, logging is exclusively carried out by contractors. After the logging process is completed, harvested timber is marked by foresters as legally sourced.

In Denmark, only forest reserves (*fredskov*) are regulated by the Forest Act and managed accordingly (Preferred By Nature, 2017b). Forests that are not classified as reserves can also be used for forest conservation but are not subject to the same law. All public forests are considered forest reserves. A forest can be excluded from a forest reserve at the request of the relevant municipality. If a forest reserve is cancelled by the Ministry of Environment and Food, another area of similar size is declared as a forest reserve or afforested (Preferred By Nature, 2017b). Forest management in Denmark is primarily regulated by the Forest Act. It does not include many measures regarding forest management techniques such as harvesting, planting, or thinning. Harvesting within forest reserves and outside of them does not require a harvesting permit. However, if harvesting needs to take place in a Natura 2000 area, it is subject to a notification system. Forest managers are required to inform the authorities when certain types of activities occur in Natura 2000 areas (Preferred By Nature, 2017b).

In Estonia, the definition of a forest is presented in the Forest Act. There are three main categories of forests: commercial forests, protection forests, and protected forests. To carry out forest harvesting operations, a valid forest inventory or management plan is required. Additionally, a harvesting permit issued by the Environmental Board is necessary. The forest legislation does not apply to forest land smaller than 0.5 hectares. Harvesting up to 20 cubic meters of timber per Production Unit (PU) is allowed without a harvesting permit (Preferred By Nature, 2017c). If a forest owner intends to harvest more than 20 cubic meters for each PU, they need to complete a harvesting permit and submit it to the Environmental Board for approval. This can be done either in paper format or electronically. The harvesting

permit is valid for 12 months from the approval by the Environmental Board. All harvesting permits and data from the forest inventory are available in the public forest management system (Preferred By Nature, 2017c).

All forestry activities in Finland are subject to the same legislative framework. The same legislation applies, with a few exceptions, to all forests, whether owned by the state, municipalities, companies, or individuals (Preferred By Nature, 2017d). In 2014, the forest legislation underwent significant revisions, increasing the freedom of choice for forest owners in managing their forest properties, improving the profitability of forestry and the timber industry, and promoting forest biodiversity. Among the notable changes were the recognition of uneven-aged stands, the removal of age criteria and diameter limits in regeneration, the diversification of tree species used, and the increased importance given to habitats (Preferred By Nature, 2017d). Forest owners are required to submit a “forest use declaration” to the Forest Center at least 10 days prior to commencing harvesting. The Forest Center constantly monitors the quality of harvesting and other forest operations (Preferred By Nature, 2017d). Certain types of harvesting are exempt from the forest use declaration, such as personal use harvesting, harvesting in accordance with a forest management and regeneration plan, harvesting of small trees, harvesting for the construction of a road, ditch, water pipe, power line, or similar purposes (Preferred By Nature, 2017d).

According to the legislative system in Italy, forest management activities must not compromise the continuity of the forest, and therefore, changing the land use is not permitted. Additionally, 87% of Italian forests are subject to hydrogeological restrictions. Forest operations in these areas require authorizations from designated regional authorities, while all forests are subject to landscape restrictions (Preferred By Nature, 2018). At the national level, the Ministry of Agriculture, Food, and Forestry is responsible for defining the strategic objectives for forestry policies. Since 1977, the competences and responsibilities in the field of agriculture and forestry have been transferred to regional administrations. Each regional administration has established its own primary and secondary legislation in forestry matters (Preferred By Nature, 2018). Therefore, planning and harvesting procedures differ, and the corresponding authorizations are issued in accordance with regional/ provincial legislation (Preferred By Nature, 2018). As a result, the

forest legislative framework is vast, encompassing 19 regional laws, two provincial forest laws, and additional secondary legislation. Monitoring of harvesting operations, including the issuance of sanctions, is the responsibility of forest personnel (Preferred By Nature, 2018). Given the highly diverse regulatory framework, harvesting authorizations have different names and follow different issuance procedures. In this context, authorizations can be classified into two main categories: harvesting notifications, required for small-scale harvesting operations (e.g., small areas, limited volumes, etc.), especially in old-growth forests, and usually involve a simple and fast procedure.

The Forestry Service within the Department of Agriculture, Food and the Marine is the primary authority for regulating forestry activities in Ireland. A felling license issued by the Minister for Agriculture, Food and the Marine provides the permission to fell one or more trees and thin a forest for silvicultural reasons. Typically, the felling of a tree is accompanied by the obligation to replant (Preferred By Nature, 2019a). The Forestry Service within the Department of Agriculture, Food and the Marine is the primary authority for regulating forestry activities in Ireland. A felling license issued by the Minister for Agriculture, Food and the Marine provides the permission to fell one or more trees and thin a forest for silvicultural reasons. Typically, the felling of a tree is accompanied by the obligation to replant (Preferred By Nature, 2019a). In some cases, felling license applications are circulated to various national government agencies and local authorities. They can provide comments and recommend specific conditions to be attached to the felling licenses based on the impact on the felling activities. After the issuance of a felling license, the state agency is responsible for monitoring compliance with the license conditions during the timber harvesting process.

Norwegian forests are primarily managed as “LNFR areas” (Landbruks-Naturog Friluftformål samt Reindrift, meaning areas for agriculture, nature, outdoor activities, and reindeer grazing) according to the general plans of each municipality for the designated areas (Preferred By Nature, 2017e). In most forest areas, no permits are required prior to forest exploitation. However, in protective forests bordering the mountains, selected coastal areas, Marka (adjacent to Oslo), and northern Norway (Nordland, Troms, and Finnmark), various forms of notification or applications must be submitted and approved by local forestry authorities before forest exploitation can take place. Most

logging and planting activities are carried out by specialized companies engaged by clients interested in timber (Preferred By Nature, 2017e). The Norwegian timber exploitation sector is predominantly controlled by approximately 10 companies, which can be either local divisions of a forest company, forest owner organizations, or independent commercial enterprises. The certification system used in Norway is PEFC, which allows for group certification at the timber exploitation company level (Preferred By Nature, 2017e). If a forest owner has a business relationship with multiple timber buyers, the owner is covered by each group certificate. The planning of exploitation is typically done by the timber buyer, and the actual harvesting is carried out by a contracted team working for the timber buyer (Preferred By Nature, 2017e). The forest owner typically establishes the contract with the timber buyer, while the harvesting team is usually chosen by the buyer.

The Forestry Act in Sweden aims to support sustainable and long-term wood production while protecting the environment during forestry operations (Preferred by Nature, 2017). The definition of productive forest land is land capable of producing at least 1 m³ of solid wood, including bark, and is not used for other purposes such as agriculture, buildings, or infrastructure (Preferred by Nature, 2017). Most provisions of the Forestry Act apply to activities carried out on productive forest land. However, there are also regulations aimed at protecting conservation values on unproductive forest land. In general, the Forestry Act mandates forest regeneration on forest land, prohibits harvesting of trees below a certain age, limits the size of harvesting areas and young forests within a single property, and requires prevention of pest outbreaks. However, the law does not specify specific obligations regarding silvicultural measures such as pre-commercial or commercial operations (thinning) (Preferred by Nature, 2017). Determining what forestry actions are legal or illegal in the Swedish context is a complex process. Most of the detailed requirements set by authorities such as the Swedish Forest Agency or the Swedish Work Environment Authority are not directly sanctioned by fines or imprisonment (Preferred by Nature, 2017). Instead, these requirements are used as a basis for issuing specific injunctions to forest owners or purchasers of harvesting rights. Typically, these injunctions are used preventively. Without the issuance of injunctions, it is not evident that an action violates regulations and should be considered

“illegal” (Preferred by Nature, 2017). Harvesting permits are only required for certain forest land, such as mountainous areas, but final fellings on areas smaller than 0.5 ha need to be notified in advance to the National Agency. Since 1993, production and environmental objectives have received equal importance in forestry legislation (Preferred by Nature, 2017). The Swedish Forest Agency has also established detailed regulations regarding requirements for species and environmental protection. However, these requirements cannot result in significant economic losses for the landowner without adequate compensation (Preferred by Nature, 2017).

Related legislation

At the international level, there are various environmental approaches that can improve the functioning of the forestry sector and facilitate the implementation of different concepts. These approaches may not automatically be part of forest legislation, as each country has the discretion to decide what to implement.

Here are some examples:

- The United Nations Framework Convention on Climate Change (UNFCCC) sets targets and principles to counter climate change. Within the UNFCCC, there are specific mechanisms that address forest-related issues, such as the Clean Development Mechanism (CDM) and the Reducing Emissions from Deforestation and Forest Degradation (REDD+) initiative (United Nations, n.d.-a);
- The Paris Agreement: It is a global agreement adopted under the UNFCCC aimed at limiting the global temperature increase to below 2 degrees Celsius above pre-industrial levels. Forests and their sustainable management play a crucial role in national strategies for adaptation and greenhouse gas emissions reduction (United Nations, n.d.-b);
- The United Nations Environment Programme (UNEP): UNEP promotes the conservation and sustainable use of natural resources, including forests. Through UNEP, projects and initiatives are carried out to protect and sustainably manage forests (United Nations, n.d.-a);

- The Food and Agriculture Organization of the United Nations (FAO) provides guidance and assistance in the development and implementation of global forest policies, including the establishment of international standards and norms for sustainable forest management (FAO, n.d.);
- The Convention on Biological Diversity (CBD) aims to conserve and sustainably use biodiversity. Forests are recognized as habitats for a large number of species and are essential for biodiversity conservation. The CBD promotes actions to protect and restore forest habitats and the species that depend on them (Convention on Biological Diversity, n.d.).

These internationally regulated instruments reflect the international community's commitment to addressing environmental issues and promoting sustainable forest management. Through these instruments, the aim is to ensure responsible utilization of forest resources, contributing to biodiversity conservation, environmental quality protection, and the fight against climate change.

Labor protection and ratification of International Labor Organization conventions

All the countries studied have ratified multiple conventions developed by the International Labour Organization (ILO). These conventions include Convention 87/98 on the right to freedom of association and collective bargaining; Convention 29/105 on the elimination of all forms of forced or compulsory labor; Convention 182 on the elimination of the worst forms of child labor; and Convention 100/111 on the elimination of all forms of discrimination in employment and occupation (ILO, 2023). However, one of the most important conventions applicable in the forestry sector is Convention 155, which provides minimum standards for occupational safety and health (ILO, 2023). Although the ILO does not provide detailed rules for each type of personal protective equipment (PPE) in forestry, it emphasizes the importance of using PPE and that employers should provide adequate PPE and ensure that employees are properly trained on its use. Additionally, employees need to be aware of the importance of using PPE and wear it

correctly during work. Through ratification, the signatory countries commit to implementing in their national legislation requirements that cover at least the ILO recommendations (ILO, 2023). In other words, the implementation of safety and protection measures in the workplace is necessary in all the countries studied.

Legislation developed at European Union level for wood products

An increasingly important aspect promoted at the European and international level is ensuring that products entering the market are legally sourced in the country of origin. Due to significant differences in forestry legislation, this objective is not uniformly implemented in terms of the concept of sustainable development (EC, 2021).

Illegal logging and/or trade of illegally harvested timber have major social and economic consequences, with a significant impact on the environment. Illegal logging disregards the intention to comply with legislation and, consequently, to responsibly manage forests. Often, this phenomenon leads to forest degradation and deforestation, resulting in the disruption of forest-dependent communities (EC, 2021). In tropical regions, these activities have led to species extinction and the destruction of important habitats for species survival. Additionally, illegal activities result in significant losses of assets and revenues from public goods through tax and royalty losses for developing countries. Recognizing the multiple implications of this type of activity, governments and non-governmental organizations are seeking the most effective way to ensure compliance with legislation in the country of origin or throughout the supply chain (EC, 2021).

The establishment of policies addressing illegal logging and/or trade of illegally harvested timber began timidly in 2008 in the United States with the enactment of the Lacey Act (Prestemon, 2015). A significant subsequent step was taken by the European Union through the implementation of the “European Regulation laying down the obligations of operators who place timber and timber products on the market” (European Parliament, 2010). Currently, several countries are implementing different systems to promote legality in supply chains (e.g., Australia, Switzerland, the United Kingdom). These policies have had a partially positive impact by raising awareness among actors in the timber and paper supply chains and highlighting the negative effects of illegal logging and/or trade (Holopainen et al., 2015).

With the creation of the European Union, an attempt was made to implement a similar set of measures in several countries. Thus, in 2010, the European Parliament adopted the European Regulation laying down the obligations of operators who place timber and timber products on the market (European Parliament, 2010). It took approximately four years for the legislation to be transposed in all countries, and effective implementation began. This regulation imposes obligations on companies that place timber and timber products on the market - defined in the regulation as operators. Specifically, companies must ensure that the timber is harvested in accordance with the legislation of the country of origin (European Parliament, 2010).

VOLUNTARY SYSTEM

In the dynamic discussions and decisions related to the forestry sector, it is not only government authorities that play an essential role. The voices of other stakeholders, such as consumers of wood products and various non-governmental organizations focused on environmental protection and human rights advocacy, are increasingly being heard. They have made significant contributions to shaping a non-governmental approach, reflecting the diverse involvement of society in the protection and responsible management of forest resources (Kiker and Putz, 1997).

In the context of globalization, we have witnessed the formation of complex and transnational supply chains. An example of this could be a book that is currently printed in China, using pulp obtained from three different countries in South America. This highlights the deep interconnections that are formed in the timber industry and its products, with environmental impacts occurring in various corners of the world.

The existence of these long and complex supply chains has led to the need for increased responsibility and transparency measures in the industry. As a result, certain stakeholders in the sector have chosen to join voluntary systems that demonstrate that their products have no negative impact on the environment or local communities. Essentially, these voluntary approaches function as marketing tools, providing an opportunity for environmentally conscious consumers to support sustainable practices. These consumers can consciously choose products that are associated with voluntary certification systems.

To facilitate the identification of these environmentally responsible products, the concept of eco-labelling has emerged. This has further evolved into a more formal certification system, which allows for independent verification and validation of sustainability claims. As a result, consumers can make more informed choices, supporting companies that are committed to protecting and responsibly managing forest resources (Sedjo and Swallow, 2002).

Forest certification is a process through which a written proof is obtained from an independent third-party organization, certifying the location and management of a forest according to the standards issued by the certification scheme owner (Kiker and Putz, 1997). This process involves assessing the quality of forest management against a predefined set of principles and criteria. Furthermore, forest certification provides consumers with a credible assurance that the product comes from a management system that complies with developed standards, which in some cases can be considered equivalent to sustainable development, responsible management, or close-to-nature forestry concepts (Forest Stewardship Council, n.d.-a).

A certification scheme may utilize one or more types of certification in varying proportions. Most forest certification schemes encompass two essential components of the process that address different aspects of production and trade:

1. Forest management certification refers to the assessment and certification of forest management practices. It aims to ensure that forests are managed in a manner that respects the principles of sustainability, including the protection of biodiversity, the respect for the rights of local and indigenous communities, and the promotion of sustainable economic returns. Forest management certification involves the direct assessment and monitoring of forest sites, with a focus on the processes and practices of forest management itself (Overdevest and Rickenbach, 2006). This certification often includes a combination of system and performance certification.
2. Chain of custody certification, on the other hand, refers to the process of tracing forest products throughout the supply chain, from the forest where the timber was harvested to the final product. It ensures that products labelled as coming from responsibly managed or certified forests are actually derived from those sources (Overdevest

and Rickenbach, 2006). Chain of custody certification does not involve the evaluation of forest management practices themselves, but rather the system of record-keeping and control that allows for the tracking of forest products along the supply chain. This certification often includes a combination of product certification, transformation certification, and system certification.

Forest Stewardship Council (FSC)

The Forest Stewardship Council (FSC) is a non-profit international organization established in 1993, following the success of the Rio Conference, with the aim of promoting responsible forest management. Initially, its focus was on tropical forests, but over the past three decades, it has not been able to attract a significant number of forests in this region. Currently, the majority of certified areas are found in developed countries. This voluntary system is considered by many experts to be the most well-developed and credible system that has successfully engaged stakeholders. At present, there are over 200 million hectares of certified forests and more than 40,000 organizations with chain of custody certifications (Forest Stewardship Council, n.d.-b).

The certification system operates through audits conducted by third-party organizations known as Certification Bodies (CBs). These CBs are overseen by a single Accreditation Services International (ASI) (ASI, n.d.). In terms of the materials that can be included in certified products, they are divided into two main categories: wood sourced from certified supply chains or wood sourced from uncertified supply chains, for which a risk-based approach is implemented to ensure that these materials meet a minimum set of requirements. Wood sourced from certified supply chains is referred to as “Controlled Wood.”

Regarding the standards, the main standard that forms the basis of certification is the Forest Management (FM) certification standard (Forest Stewardship Council, 2023). This standard is applicable internationally and consists of 10 principles and 70 criteria. Based on this standard, national standards/approaches can be developed to ensure better integration of the internationally defined requirements at the local level.

Pan European Forest Certification (PEFC)

PEFC, the Programme for the Endorsement of Forest Certification, was founded on June 30, 1999, in Paris, with the aim of promoting sustainable forest management through third-party certification (Programme for the Endorsement of Forest Certification, n.d.-b). PEFC is an organization that promotes the principle of mutual recognition among numerous national certification standards. Essentially, PEFC is a union of national standards implemented in different parts of the world (Programme for the Endorsement of Forest Certification, n.d.-b, n.d.-a). Although initially created to address the European situation, the PEFC approach has now become global. The opposite characteristic compared to FSC is the encouragement of a bottom-up approach through collaboration with multiple stakeholders in the development of national certification standards and the respect for the use of regional policy processes to promote sustainable forest management as the basis for certification standards (Michal et al., 2019). This makes the certification system more closely aligned with the governmental side compared to FSC. In some cases, the organizations that established the national system are actually government associations. For example, the national scheme in Poland is actually established and supported by the state forest administrator.

The scheme recognizes the standards of the national forest certification system. The process of recognition and incorporation of new national forest certification systems into the PEFC family is known as “endorsement” and involves assessments carried out by an independent evaluator and recognition by the PEFC Council (Programme for the Endorsement of Forest Certification, n.d.-a). After five years from the date of endorsement, the approved systems should initiate a process of revising the national standard. In practice, this does not always happen, with some national schemes still using standards developed in 2010 as of 2021. Additionally, the certification scheme has faced criticism as it was revealed in an investigation that any type of organization could obtain certification under this scheme. In the investigation, a nightclub and a nuclear power plant were able to obtain certification (EIA, 2017).

Despite the existence of national systems, the certification scheme includes international standards that must be applied in each national standard. One of these standards is the Forest Management (FM) standard,

which is based on 6 criteria and 94 requirements (Programme for the Endorsement of Forest Certification, n.d.-c). Another important standard is the Chain of Custody standard, which incorporates the method for incorporating non-certified materials into certified products.

Other certification schemes

SBP (Sustainable Biomass Program) is a certification scheme that accepts contributions from other major and well-known certification schemes (currently approved schemes are FSC, PEFC), as well as inputs within its own assessment framework. Products certified through its own standard are based on risk assessments. The credibility of the SBP scheme largely depends on the strength of the schemes it approves – currently, schemes approved by FSC and PEFC. As indicated in the certification scheme’s name, this system is primarily designed for biomass producers in Northern and Northeastern Europe (Sustainable Biomass Program, n.d.).

Certification bodies have also developed verification schemes that primarily focus on legality verification. One such system is “Origine et Légalité des Bois” developed in 2004 by Bureau Veritas Certification, while another system is “Legal Source” developed in 2014 by Preferred by Nature. These schemes typically do not allow the use of claims on final products (Bureau Veritas, n.d.; Preferred by Nature, n.d.).

Another standard that uses a different approach is “ISO 38200:2018 Chain of Custody of Wood and Wood-based Products,” which sets requirements for a chain of custody system to enable the exchange and tracking of information about wood and wood-based products throughout the supply chain. In this system, there are no normative requirements developed for accrediting certification bodies that certify to the standard, and it is important to note that the standard is not intended solely for certification. The standard allows for the use of other certification schemes as long as they meet the requirements. Additionally, the standard itself does not specify requirements or limitations regarding communication about the use of the standard. This aspect of ISO 38200 means that any claim must be carefully evaluated to understand what it covers (ISO, 2018).

CONCLUSIONS

Firstly, the legislative system, through its important role in establishing rules for different sectors, plays a crucial role in ensuring sustainable forestry. The entirety of laws that impact forests forms the regulated instrument of the state. On the other hand, organizations that benefit from goods and services provided by forests seek to assure their customers that their activities do not have a negative impact on the forests. Taking these factors into account, non-governmental organizations have developed various standards and policies aimed at maintaining and improving forestry practices. These systems are not regulated by the state; instead, they are voluntary tools. Their use depends on the willingness and interest of the forest owner or administrator. Both types of instruments aim to improve forestry practices and promote a sustainable approach to the use of forest resources.

Taking into account the first three classifications, we can say that the foundation is represented by forestry legislation. This often applies constraints in case of non-compliance, but there are also cases where rewards are implemented (e.g., tax exemptions for owners who choose to be certified). Additionally, related legislation represents the next level that must be followed. Similar to the first level, it often applies constraints. There are no known cases where related legislation provides rewards. The third level is represented by the voluntary system, which is primarily based on a rewards system. If the requirements are met, a certificate is granted that can be used towards the end consumers of products and services. However, the voluntary system also employs constraints: if a certain indicator is not met, this will be made public. In practice, we can say that based on these classifications, each country (sometimes region) can have a different set of approaches and varying levels of promotion of sustainable forestry.

In post-socialist countries such as Bulgaria, Estonia, Latvia, Poland, and Romania, the forestry sector has undergone significant changes following the collapse of communist regimes. These countries had to transition from a centralized and collective forest management system to one based on market principles and private management (Albulescu et al., 2022). In Bulgaria, after the change of regime, the forests were privatized and private owners were encouraged to manage their forests. However, the process of

privatization and restitution of forest property was challenging and faced multiple issues and disputes (Preferred By Nature, 2017a). Estonia, with its large forest area, stands out as the post-socialist country with the most impressive changes in forestry legislation. It has managed to rapidly improve its forest resource management system and is recognized for its use of advanced technologies and implementation of international forest management standards (Preferred By Nature, 2017c). Latvia, being a country with a rich forestry tradition, has had a relatively smooth transition to private forest management. Forest ownership is largely private, and many Latvian forests are certified according to sustainable management standards (Preferred By Nature, 2019b). In Poland, the privatization of forests has been a complex and lengthy process. Forest ownership is divided between the state, local administrations, and private owners. Poland has implemented FSC forest certification, but currently the state has started to withdraw from this type of certification (Preferred By Nature, 2017f). In Romania, the transition to private forest management has been challenging and uncertain. A large portion of forests is state-owned, and privatization has been partial and accompanied by controversies and litigation (Preferred By Nature, 2017g). Overall, post-socialist countries in Eastern Europe have faced challenges in transitioning to private forest management. These challenges include difficulties in forest privatization and restitution, inadequate regulations, outdated infrastructure, and the need to develop administrative capacity and expertise in the forestry sector. However, these countries have made significant progress in adopting sustainable forest management practices and implementing international standards. Forestry in Western countries such as Denmark, Finland, Italy, Ireland, Norway, and Sweden is characterized by a long-standing tradition and sustainable forest management. These countries have abundant forest resources and have developed policies and practices to promote sustainable management and biodiversity conservation. In general, forestry in these countries is less regulated, giving owners the right to exploit the forest at their discretion. Various incentives are introduced when owners decide to protect the forest. Denmark, although it has a small forest area, focuses on sustainable forest management and the ecosystem services provided by forests, such as biodiversity conservation and soil protection (Preferred By Nature, 2017b). Finland has a long tradition in forestry and is one of the major

producers of forest products in Europe. Forest management practices are rigorous and focus on sustainability, biodiversity conservation, and addressing climate change (Preferred By Nature, 2017d). Italy has a diverse range of forests and promotes an integrated approach to forest resource management. However, forest legislation varies greatly across regions, resulting in different levels of forest practice development (Preferred By Nature, 2018). Despite having a smaller forest area, Ireland focuses on the conservation and development of existing forests. Projects have been implemented to protect biodiversity and fragile forest ecosystems (Preferred By Nature, 2019a). Norway has sustainable forest management practices and places particular emphasis on biodiversity conservation and ecological forest management. Norway has also developed international partnerships to address global forest issues and climate change (Preferred By Nature, 2017e). Sweden is recognized as a leader in sustainable forest management. It has a considerable forest area and emphasizes biodiversity conservation and sustainable use of forest resources (Preferred by Nature, 2017). In general, Nordic and Western countries are committed to responsible forest management, biodiversity protection, and combating climate change through more relaxed policies and practices compared to post-socialist countries.

In addition to regulated instruments, there are also voluntary tools that encourage the adoption of better practices and promote transparency and accountability in forest management. The most well-known voluntary instrument is forest certification. The most recognized forest certification systems are the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC). These systems are independent of regulated instruments and function by granting a certificate to forest owners and companies that demonstrate their commitment to their standards. Other types of regulatory instruments include best practice guides, collaborative initiatives, and information exchange platforms. These provide resources and guidance for improving forest management and facilitate the exchange of knowledge and experiences among different industry stakeholders.

Both approaches developed by regulated instruments and voluntary ones play an essential role in the development of sustainable forest practices. Regulated instruments establish a legal framework and ensure compliance with minimum requirements, while voluntary instruments provide additional opportunities for forest owners to demonstrate their commitment.

With the growing concept of certification, numerous certification programs have emerged, each developing in different directions. These programs cover various aspects of forestry, ranging from global to national and regional levels. However, in terms of importance, the Forest Stewardship Council (FSC) and the Pan European Forest Certification (PEFC) systems can be considered the prominent ones. The other systems can be grouped into a third category.

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Appendix 1. Comparison of regulated systems from multiple countries in Europe

Type of classification	Implementation Method of Regulations	Degree of Regulation	Other Indicators		
Romania	More using constraints	A	CPI 45	WBI 00047,60	FSI 53
Bulgaria	More using constraints	A	CPI 42	WBI 47,12	FSI 51,8
Latvia	Using constraints and rewards	B	CPI 59	WBI 77,40	FSI 43,3
Poland	More using constraints	A	CPI 56	WBI 63,46	FSI 45,2
Denmark	More using rewards	C	CPI 88	WBI 99,04	FSI 17,9
Estonia	More using rewards	C	CPI 74	WBI 89,42	FSI 38,6
Finland	More using rewards	C	CPI 88	WBI 98,56	FSI 16
Italy	Utilizes a different approach in each region	B	CPI 56	WBI 64,90	FSI 42,6
Ireland	More using constraints	B	CPI 74	WBI 92,31	FSI 19,5
Norway	More using constraints	A	CPI 85	WBI 98,07	FSI 14,5
Sweden	More using constraints	A	CPI 85	WBI 96,15	FSI 20,6