

Review

# The Winding Road towards Sustainable Forest Management in Romania, 1989–2022: A Case Study of Post-Communist Social–Ecological Transition

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**Abstract:** Forest ecosystems are a prime example of the heated debates that have arisen around how forests should be managed, and what services and benefits they should deliver. The European transitions in governance to and from communist regimes have had significant impacts on forests and their management. Unstable legislative and institutional changes prior to, during, and after a communist regime, combined with unique remnant areas of high-conservation-value forests, make Romania an ideal case study to explore the social–ecological transitions of forest landscapes. The aim of this paper is two-fold. First, we present the origins of, the evolution of, and the current state of forest management and ownership in Romania during transitions between the pre-communist (–1945), communist (1945–1989), and EU periods (2007–). Second, we focus on the enablers and barriers in Romania towards sustainable forest management as defined by pan-European forest policies. We used a semi-systematic, five-step scientific literature review on forest ownership, governance, and management in Romania. The analysis shows that both enablers (e.g., forest certification) and barriers (e.g., redundancy and the questionable effectiveness of the network of protected areas; illegal, unsustainable, and unreported logging; loopholes in the legislative framework) have contributed to the current approaches to interpreting forests, forestry, and forest management. The installation of the communist regime translated into sustained wood yield forest management under singular forest ownership, which opposed the previous system and forest ownership pluralism. In the post-communist period, forestland restitution led to significant legislative changes, but forest management must still confront remnant elements of the communist approach. Both communist and post-communist policies related to forests have shaped the evolution of forest landscape management in Romania, thus stressing the need to learn from the past towards securing sustainable forest management into the future. These lessons provide insights on both positive and negative drivers of forest management, which can contribute to smooth future transition towards more sustainable forest management practices.

**Keywords:** sustainable forest management; forest ownership; governance; post-communist forestry transformations; wood production; rural development; biodiversity



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## 1. Introduction

Since the early 1990s, sustainable forest management (SFM) policy has aimed at delivering multiple forest benefits and services that are socially just, ecologically sound, and economically viable [1]. As a result, the political agenda changed from the sustained yield

of wood to highlighting the importance of safeguarding biodiversity and local livelihoods and sustaining multiple ecosystem services [1–5]. To this end, wood and non-wood forest products that provide jobs, as well as the maintenance of biological diversity and, more recently, climate change adaptation and mitigation, are primary targets. The European Union's recent biodiversity strategy [6] and forest strategy [7] represent iterated calls for SFM, as shown by ambitious goals to establish protected areas covering at least 30% of European land and seas and to further the transition to a competitive circular bioeconomy [7]. Some of the main measures proposed to help develop or strengthen SFM relate to the sustainable production and use of wood resources, the adoption of environmentally friendly practices by forest owners and managers, the promotion of alternative forest industries (e.g., ecotourism), and the protection of primary and old-growth forests to support biodiversity conservation [7].

Understanding the legacies of the past is an important starting point towards understanding barriers and bridges to implementing SFM policy [8–10]. In parallel to the call for SFM, the fall of the communist regimes in Central and Eastern Europe (1989–1991) more than three decades ago triggered major social, economic, and environmental transformations that affected forests, the forestry sector, and forest management. These transformations in post-Soviet countries are often considered to be similar, and they contrast to other European countries. Transitions towards SFM policy differ depending on local traditions and cultural expectations [9,11,12], ownership and governance structures [13], property sizes, support structures such as curricula in education programs, and forest owner associations [14,15]. This highlights that at least three key aspects of SFM need to be assessed: economic, social, and ecological.

The impact of forest-related legislative and policy frameworks and their implementation is of vital importance to understanding the consequences of both policy development and the transformation of governance in the social system, as well as their outcomes on the ground in terms of indicators such as wood production, rural development, and biodiversity. Legislative and institutional changes from a planned economy to a market economy have intensified the battle between forest conservation and wood harvesting [16,17]. This conflict has shaped the composition, structure, and function of forest landscapes, as well as the sociocultural perspectives on forests, including forest ownership. The restitution of forestland—meaning the return of state-owned forests to their former private and community owners or their descendants [11]—has represented a turning point for forest ownership in many post-communist countries [18,19]. The re-privatization of forests has taken place in the Czech Republic, Romania, Slovakia, Slovenia, and the Baltic states [20], while in some countries of the former Soviet Union (i.e., the Russian Federation, Belarus, and Ukraine), the forests are still owned and managed by the state [21,22]. Between these extremes, the forest ownership structure in the countries that once formed the Yugoslav Federation was only slightly affected [23].

Romania hosts the largest area of primary and old-growth forests in the post-Soviet countries of Europe [24], is one of the latest countries to join the EU (2007) and is known for high rates of illegal logging. This makes Romania an ideal case study [25] for the interplay between the different factors affecting the key dimensions of SFM.

The aim of this paper is twofold. First, we present the origins of, evolution of, and current state of forest management in Romania during the transitions between the pre-communist (–1945), communist (1945–1989), and EU periods (2007–). Second, to identify the enablers and barriers of sustainable forest landscape management in Romania, we made a content-based analysis of the scientific literature published since the beginning of the century. The research questions are: (i) What was the impact of the post-communist transition on forest management and forest ownership in Romania and (ii) what are the challenges faced by forest management in Romania on the road towards SFM?

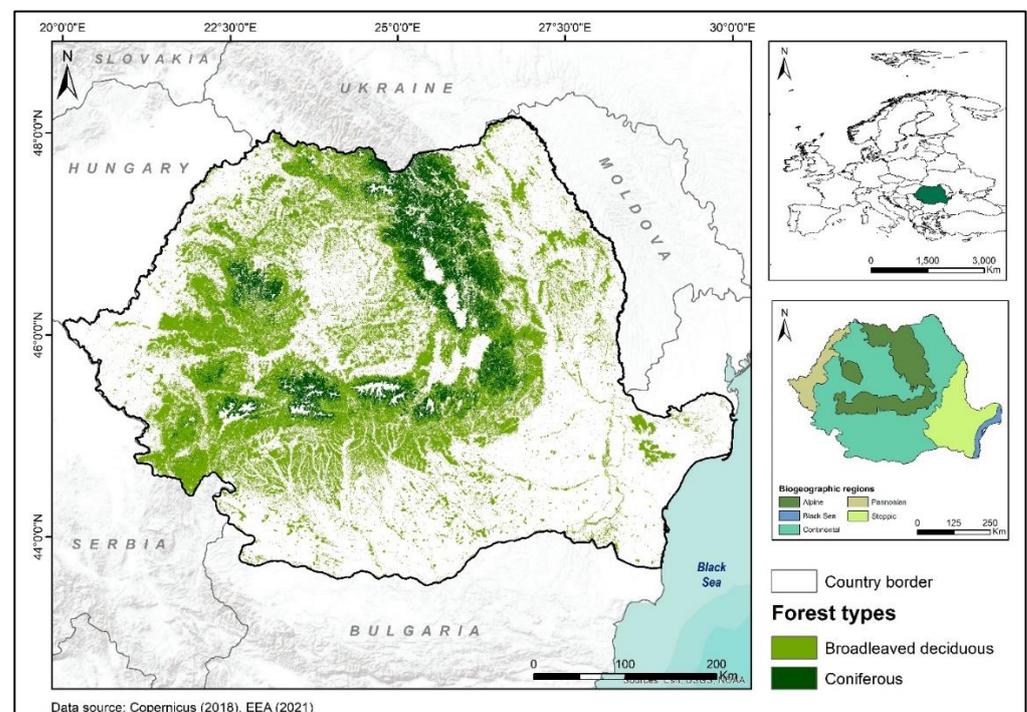
## 2. Methodology

### 2.1. Romania's Forests as a Case Study

Traditionally, forests have provided Romania with a major source of income, wood, and other forest products and values, which have sustained the livelihoods of local rural communities. At the same time, high-conservation-value hotspots that harbor important intact old-growth forests [26,27] and intact forest landscapes [28] have been conserved.

According to the FAO (2021), Romania ranks 9th in terms of wooded area within the EU, covering 6.6 M ha, or 28% of the national territory [29]. This includes forest areas, as well as other land covers (terrain designated for reforestation/afforestation, lands used for tree cultivation, public administration purposes, unproductive forests, etc.), ponds, and river channels [30]; these are all united under the umbrella term “National Forest Fund”. The National Forest Fund refers to forestland irrespective of the presence or absence of trees. Specifically, a forest is defined as a minimum area of 0.25 ha covered by trees that reach a minimum height of 5 m at maturity and under normal vegetation conditions [30]. Thus, with this definition, the forest area *per se* is 27.05% of Romania's territory, meaning 6.4 M ha [29]. The latest primary and old-growth forest inventory of Romania, made in 2010, indicates 218,494 ha or just over 3% of the current forest cover is distributed into 3402 sites >50 ha. Most of these are located in the Southern Romanian Carpathians, mostly at elevations of >1000 m a.s.l., and are composed of beech (*Fagus sylvatica*), Norway spruce (*Picea abies*), stone pine (*Pinus cembra*), fir (*Abies alba*), and oak (*Quercus robur*, *Quercus petraea*) [31].

The diversity of climatic conditions and elevation gradients make Romania varied in terms of forest vegetation and growth and yield [31]. Forests range from lowland Pannonian, mixed forest ecoregions, via mesophytic deciduous broadleaved and mixed coniferous–broadleaved forests, to montane coniferous forests [32]. The Alpine biogeographical region comprises about half of the forests in Romania, while the Pontic and Pannonian biogeographical regions cover <1% (Figure 1).



**Figure 1.** Forest types in Romania (data source: [33,34]).

The counties with the most forest are located in the Carpathian Mountain area (e.g., Suceava, Caraș-Severin, Hunedoara, Argeș, Bacău), while the ones with least forest overlap

the Romanian Plain in the south (e.g., Călărași, Ilfov, Ialomița, Brăila, Teleorman) (Figure 2). The same elevation gradient is followed by the proportion of forest cover, which reaches the maximum values in Caraș-Severin (50%), Suceava (50%), and Vâlcea (46%) and minimum values in Călărași (4%), Teleorman (5%), and Constanța (5%).

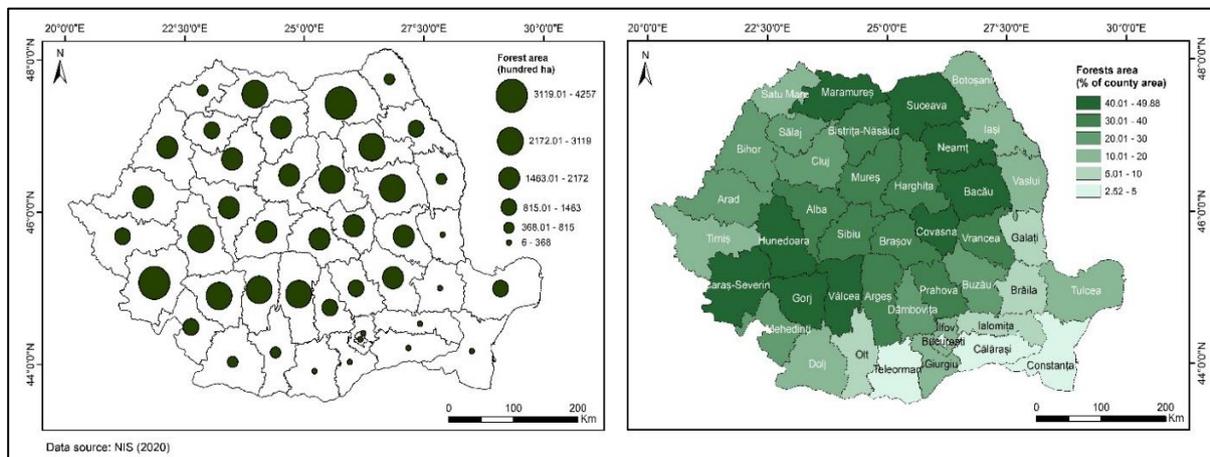


Figure 2. Forest area distribution at the county level in Romania (data source: [29]).

Broadleaved deciduous tree species are the dominant category (68%: 31% beech, 16% oak, and 21% other species), followed by conifers (32%; of which 19% spruce, 4% fir, 9% other coniferous softwood species) (Figure 1). Both the average annual forest growth ( $7.8 \text{ m}^3 \text{ year}^{-1} \text{ ha}^{-1}$ ) and the average stand volume ( $321.9 \text{ m}^3 \text{ ha}^{-1}$ ) are higher than the European averages. The age distribution of forests is dominated by trees ranging in age from 1–100 years old (84%) but extends up to 200 years (Figure 3) [35].

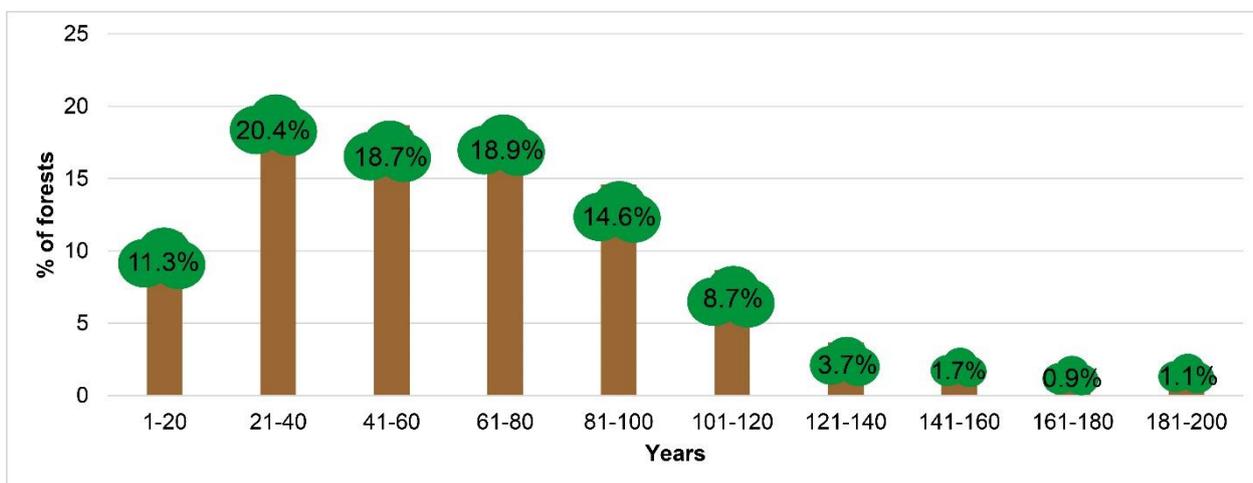


Figure 3. Age class distribution of Romanian forests (data source: [35]).

Romanian forest management uses a segregated functional grouping of forests, which is a legacy of the post-communist era (e.g., [36,37]). The spatial segregation of different forest landscape functions aims to minimize the rivalry between wood production and protective functions, as well as the conservation of biodiversity [38,39]. More than half of Romanian forests (67%) are represented by Functional Group I, which is defined as “forests with special protection functions”; the rest make up Functional Group II, which accounts for “forests with production (primary) and protection functions”. There are also six functional types of forest:

- Functional Type I (3%): No forest treatments allowed, with rare exceptions vetted by the Romanian Academy;

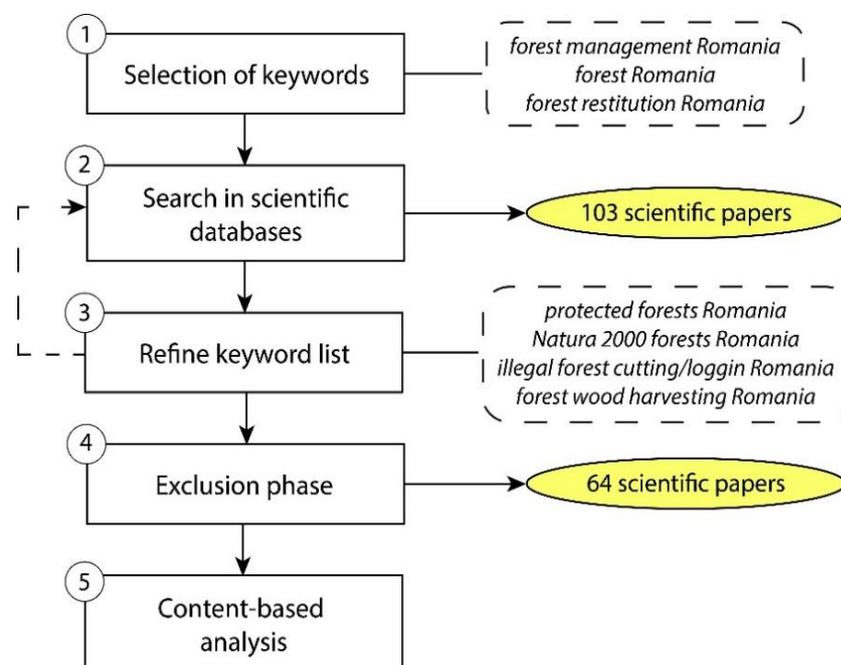
- Functional Type II (22%): Only conservation works are allowed;
- Functional Types III (11.4%) and IV (21%): Intensive forest treatments that promote natural regeneration are permitted, except for clearcutting of spruce, pine, poplar, acacia, and willow stands;
- Functional Types V (5%) and VI (41%): All forest treatments are allowed [35].

This generally involves a “cut and leave” approach [40] with thinning of young stand formations followed by very long rotations, and periods of no-cut before final harvesting.

## 2.2. Literature Review

The literature review was performed using a semi-systematic approach in 5 steps (Figure 4). Relevant keywords were established based on the two research questions:

- What was the impact of the post-communist transition on forest management and forest ownership in Romania?
- What are the challenges faced by forest management in Romania on the road towards SFM?



**Figure 4.** Literature review methodology using five steps.

The first keyword list included the following general terms: “forest management Romania”, “forest Romania”, “forest restitution Romania”, which were searched for in the Web of Science, Scopus, DOAJ, JSTOR, and ERIC databases using scientific literature search engines (e.g., Web of Knowledge, Google Scholar, Research Gate). Subsequently, the keyword list was refined to refer to more specific topics: “protected forests Romania”, “Natura 2000 forests Romania”, “illegal forest cutting/logging Romania”, “forest wood harvesting Romania”. Additional resources included reports published by Greenpeace Romania; the FAO; UNECE; EIA; the European Forest Institute; and the Romanian Ministry of Environment, Water, and Forests, as well as NIS statistics and gray literature from blog articles written by scientists.

All the papers that were selected at this step were written in English or Romanian and published from 2000; the latter language being native to two of the authors. Journal metrics or paper types (e.g., research article, literature review paper, technical report) were not taken into consideration, as the goal of the review was to present the drivers that have shaped forest management in Romania since 1989 in a comprehensive way.

This first search step resulted in a pool of 103 articles, of which 64 were selected for content-based analysis. The exclusion criteria referred to the quality of the scientific discourse and its relevance for answering the research questions. Articles not respecting basic methodological rules (e.g., the IMRAD structure, the use of proper methodologies), as well as the ones that presented narrow case studies, were excluded from the literature review. The remaining 64 articles were thoroughly read, analyzed, and corroborated with forest area data provided by the National Institute of Statistics (NIS); the Ministry of Environment, Water, and Forests; and Greenpeace Reports in order to identify the drivers that shaped forest management during the early and the late transition to the democratic regime, as well as in more recent times. The main goal of this literature review was to portray the challenges that derived from the progression of forest management types and the ways they were implemented, as well as the specific causal links. This was achieved through the identification and complementary integration of key findings from the existing scientific literature.

### 3. Results

#### 3.1. The Evolution of Forest Ownership and Management in Romania

Throughout the three analyzed periods, the forest management particularities were greatly influenced by the forest ownership structure, which also dictated the legal framework dynamics. Table 1 summarizes the main characteristics of the time intervals, which are described further on.

**Table 1.** Particularities of Romanian forest ownership and management during the analyzed periods.

	Pre-Communist Period	Communist Period	Post-Communist Period
Time period	–1945	1945–1989	1989–
Forest ownership	Pluralism	State-owned forest	Pluralism
Forest management	Forest regeneration-focused	Sustained wood yield-focused	Seeking balance between wood harvesting and conservation purposes
Forest management practices	<ul style="list-style-type: none"> <li>- Wood harvesting respecting forest regenerative limits;</li> <li>- Forest management at the discretion of the owner, respecting the forest regime;</li> <li>- Certain set-aside forests.</li> </ul>	<ul style="list-style-type: none"> <li>- Sustained wood yielding associated with high harvesting rates;</li> <li>- All forests centrally managed by the Romanian communist state;</li> <li>- Protected forests only on paper.</li> </ul>	<ul style="list-style-type: none"> <li>- “Cut and leave” approach [40];</li> <li>- harvesting operations done under forest management plans;</li> <li>- Formally protected forests with questionable efficiency.</li> </ul>
Legislative milestones	Early regional forest codes of 1781 and 1782 The 1881 forest code	The Nationalization Law (Law 119/1989) The 1962 forest code	Forest restitution laws of 1991, 2001, and 2005 The 2008 forest code and its 2015, 2016, 2017, 2018, and 2020 amendments

##### 3.1.1. Under the Pre-Communist Period (–1945)

Over time, Romania has been subject to different benefit portfolios from forest landscapes, forest management approaches, and forest ownership configurations. This is in part due to the partition of the territory among historical political powers: the Romanian Principates, the Ottoman Empire (from the end of the 14th century to 1877), and the Habsburg Empire (from the beginning of the 16th century to 1918) [41]. Traditionally, forest ownership types could be either state-owned or private [42], and the focus of forest management at the beginning of the 18th century was related to the regeneration of forests [27]. It is worth mentioning that the first attempts to protect forests from exploitation date back to the 14th century, to the “*Letters of forbidden forests*”. According to these transcripts, certain forest

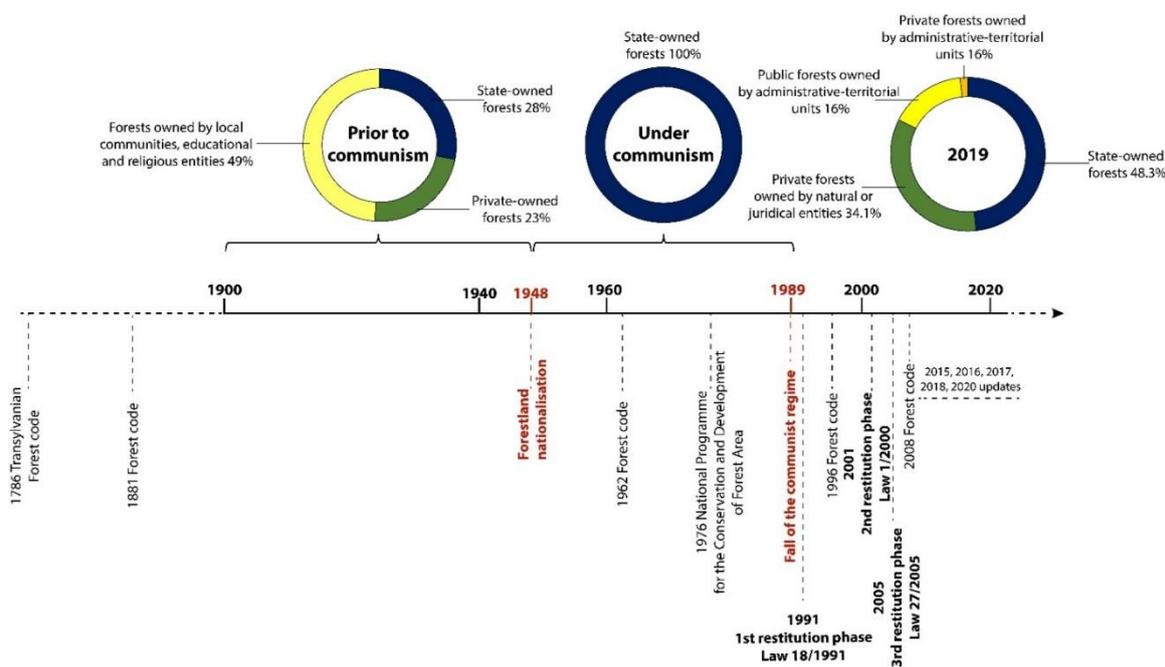
areas called “*braniști*” (i.e., forests with old trees used as pastures and hayfields) were restricted from felling and the harvesting of non-wood products [31].

The oldest forest code that coordinated forest management in the territories collectively known today as Romania may be traced back to 1781 (the Transylvanian Forest Code) and 1786 (the Forest Code of Bucovina, issued by Maria Teresa’s heir, Joseph the 2nd). These legislative documents regulated wood harvesting, respecting its regenerative limits, and include specific punishments for forestry-related illegalities and unlawful management [43]. The next forest act was issued in 1881, and it was adapted from the French Forest Code of 1827 [44]. This left forest management at the discretion of the owner but in compliance with the forest regime and a 15-year forest management plan.

Prior to the installation of the communist regime, Romanian forests were owned by the state (28%); non-industrial private actors (23%); and towns, villages, and local communities in the form of so called compossessorates, i.e., educational or religious institutions and other legal entities (49%) [45,46]. The last category is consistent with the traditional village systems based on pastures, forest grazing, and wooded grasslands that are often considered multifunctional landscapes [47,48].

### 3.1.2. Under the Communist Regime (1945–1989)

While the idea of nationalizing forestland emerged in 1919, the source being the doctrine of the Peasant Party [11], it was only implemented in the wake of communist rule in 1948. Forests then became centrally administered by the Ministry of Forests (Figure 5). According to the 1962 forest code, the managing institutions were the Forest Districts (FDs), with 467 regional units [49].



**Figure 5.** Forest ownership evolution, political cornerstones, and the progression of forestry-related legal frameworks.

Initially, the main focus of forest management under the communist regime was to increase the forest cover by developing forest plantations that exceeded the limits of the historical forestland [41]. This approach was motivated by the desire to compensate for the massive cutting that took place due to the two world wars (Munteanu et al. 2016). Starting in 1975, the focus of forest management switched to sustained yield wood production. During this time, Romania maintained high logging rates that were not exceeded, not even as a consequence of the massive harvesting that followed the post-communist forest

restitution [50]. Two periods of peak wood harvesting came around 1965, when Romania had to pay war reparations to the Soviet Union [51], and in 1982–1985, when Romania had to pay loans provided by the International Monetary Fund [52].

Irimie and Essmann [18] report that forestry scientists who supported the intensive use of forests to consolidate their positions and benefit from it were involved in the shaping of the 1962 forestry legislation, which aimed to implement the prerogatives of the communist regime (e.g., sustained wood production). Half a century later, forestry professionals opposed the forest privatization endeavor, protecting the *status quo* due to reasons relating both to the foreseen impact on forests and personal interests [18]. Thus, forestland restitution essentially represented a debate between the idea of a moral compensation on historical justice grounds, promoted by the political right-wing, and the necessity to maintain the status of forests as public goods, supported by the political left-wing [20]. In this context, land privatization was used as a carrot-type instrument to obtain votes from rural communities during the elections of 1996, 2000, and 2004 [53].

### 3.1.3. Under the Current Post-Communist Period (1989–)

Unlike in other countries that took a unitary, one-phase approach to forestland restitution, in Romania, the process unfolded in three phases regulated by specific laws (Figure 5), with the last still being in operation. The first phase began in 1991 and was coordinated by the resentment-generating Law 18/1991, which mandated that private owners were to receive only 1 ha of the forests they previously possessed, regardless of the initial size of their properties [54]. By the beginning of the 20th century, only 5% of the total forest area (353,000 ha) had been restituted to approximately 400,000 individual owners [45,55,56].

The second phase of the procedure (i.e., Law 1/2000) increased the restituted forest area to 10 ha for individuals, and 30 ha for churches and educational institutions as well as to whole forest properties owned by local communities under the limit of 20 ha/community member [57]. Subsequently, the former owners claimed about 2 M hectares in total, but only 1.93 M ha were validated for restitution, of which 1.73 M hectares were actually restituted to former owners [45,58]. Several types of forest (experimental ones, forests with protection functions, seed sources) were exempted from restitution; the owners were compensated with forest areas similar to the ones they previously held [46]. After this second restitution law, about 35% of the national forest area was privatized [45].

In a third step, the legislative framework was amended to return the entirety of the forestland to the possession of its rightful private owners, regardless of forest type and location [59]. At the beginning of this stage of restitution, Ioraş and Abrudan [45] estimated that private forest ownership in Romania would reach 65%, but recent data set it at 52% [35].

It may be noted that this modification was implemented too late, as the first two laws caused a significant delay in restitution. This gave way to both legal and illegal cutting [60], which was motivated by the desire of the new owners to obtain profit or by the fears associated with unsecured ownership [53,61]. Accordingly, illegal cuttings contributed to a negative perception in society of private owners, one fueled by the politicians who blamed the 2004 floods on forest felling, for which private owners were responsible [55,62]. As a rebuttal, the accused private owners responded that hunger and poverty stood behind the choice to exploit their forests (Dragotescu 2004, cited by [55]). Altogether, this points to the complex social issues that motivated wood harvesting during the period of post-communist transition to the democratic regime.

Another issue is represented by unlawful forestland restitution, which happened in many forms and still needs clarification. There were several cases of illegally granting land title to people who had forged their property right documents, or who presented outdated or improper documents (e.g., transcripts that granted administrative rights but not property rights). There were also cases where larger forest areas than the ones previously owned were restituted, which resulted from applying for the restitution of the same forestland in different counties. In addition, the Romanian justice system made errors concerning the restitution of the same forest area to different people [23].

It should be highlighted that the selling of restituted forestland brought to light a new category of “secondary” private forest owners [63] after the EU accession of Romania. Other forms of private forest ownership emerged through forestland restitution to not-for-profit organizations (e.g., environmental NGOs, foundations, churches), while new forest ownership through the afforestation of former cropland or degraded lands is weakly represented [23].

The most recent data show that the state owns 48.3% of the forest area in Romania, the rest being formed from the private properties of natural or juridical entities (34%), public properties (16%), or private properties owned by administrative-territorial units (<2%) [35] (Figure 5). While approximately 828,000 owners possess small holdings <10 ha each, the large properties sum up to 29% of the total forest area and are owned by approximately 2200 owners [64]. This excessive fragmentation of the forest area is the result of the previously described faulty restitution process [20,65,66], which aimed to correct the moral and material damages caused by forced forest nationalization [35] but was poorly designed and implemented, its regulations oftentimes functioning as electoral bait [65].

### 3.2. Sustainable Forest Management in Romania

#### 3.2.1. Legislative and Institutional Transformations in the Post-Communist Era

The reforms of forestland restitution were accompanied by major legislative and institutional transformations. Romania is the only post-communist country that imposed a forest restitution limit [45]. The first forest code under the new democratic regime was issued in 1996, and it barely integrated the newly privatized forestland, taking a general approach regarding the legal provisions to be applied in relation to state-owned or privately owned forests. The forest regime continued to coordinate the technical forestry norms, regardless of forest ownership, as the view of forests as public goods was still the paradigm [20].

The first regulations designed for private forests were issued in 1999, followed shortly after by Government Order 116/2002, which allowed the creation of private FDs (Tobescu [67], cited by [68]). These added to the decline of state FDs, which reduced in number to 360 in 1990 [56] and 320 in 2005 [45]. In this early post-communist stage, the FDs oversaw forest management, and the private owners were given the option to choose the type of FD that would perform forestry activities on their forestland.

The aforementioned dates point out that the first restitution law (i.e., Law 18/1991) was followed by a new forest code after 5 years and by legislative acts that regulated private forest management after 8 years [20]. These delays translated into profound social resentments linked to the unmet expectations of the new private owners [45] and to massive forest exploitation performed under uncertain law enforcement [61]. The latter was also exacerbated by the 11-year delay in the creation of forest monitoring and law enforcement institutions, such as forest inspectorates and environmental guards [69].

Currently, there are four forms of forest ownership in Romania: public state properties, private properties of natural or juridical entities, public properties, and private properties owned by administrative-territorial units [30]. The managing agencies in charge of the administration and monitoring of forests owned by the state are the National Forest Administration Romsilva (NFA), the Administration of State Protocol Patrimony (“R.A. Administrația Patrimoniului Protocolului de Stat”) (2.5 thousand ha), and the National Institute for Research and Development in Forestry Marin Drăcea.

The NFA is a financially autonomous organization with a commercial mandate that also administrates protected forest areas and national parks (Abrudan et al. 2009). Initially, it operated through forest inspectorates, which performed inspection and control functions [45], but now FDs are the operational units of forest management, and forest guards are responsible for monitoring and control activities. The history of the institutions and ministries that coordinate forest management is much more extensive, as thoroughly presented by Drăgoi and Toza [65].

The FDs manage both publicly and privately owned Romanian forests, as the nonstate forest owners are required by law to sign management contracts and to associate with an authorized state or nonstate FD in order to perform legal forestry activities. The creation of nonstate FDs in 2002 was a step that enhanced the liberty of private forest owners by offering them the choice of the institution that would manage their forest. At the beginning of 2022, the total number of FDs in Romania reached 509 [70]. Forest guards are monitoring and control institutions that exercise state authority, verifying if the forest owners comply with the prerogatives of the forest regime and forest code. Nevertheless, the NFA may be considered the “main player in forest management” [56], managing almost half of Romania’s forests. It is aided by the forest guards, who have authoritative power. Both the NFA and forest guards tend to assume speaker and mediator roles in forestry but are not accepted by other stakeholders [43]. What transpires here is a trust and communication problem among different forestry actors, which hinders harmonious collaborations.

The operational instrument that coordinates forest management based on “sustaining forest capacity for perpetual wood yield and strengthening economic performance” [43] is a 10-year forest management plan that stipulates the types, extent, and distribution of cuttings; the legal wood volume to be harvested every year; and the projected forestry infrastructure investments. These regulations are elaborated with respect to the particular forest regime, a term that refers to the technical norms applied to specific forest types and functions [11]. The technical norms are detailed and determined almost entirely by planning, but the specialized firms also may consult owners during the planning process. Although the technical forestry norms are aligned with the international standards—including regulations inherited from the past regime—the objectives of these plans are difficult to operationalize given the absence of timelines for planned activity, budgets, and indicators [71].

Tract timber inventories, which should be designed a year prior to harvesting, also regulate wood exploitation. Forest management plans are mandatory to conduct forestry in both state-owned and privately owned forests larger than 10 ha [72]; without them, only sanitation cuts are allowed [30]. Private forest owners may harvest the wood themselves, but only if the quantities are lower than 20 m<sup>3</sup> [73]. Besides hiring a contractor, a private owner with more than 10 ha of forestland is obliged to acquire a forest harvesting permit and environmental authorization. The certificates are issued by a certification commission that functions inside the Association of Foresters in Romania (ASFOR), while environmental authorization is issued by the Regional Agency of Environmental Protection (ARPM). Later, the introduction of wood products to the market requires a due diligence (DD), as of 2015, issued by the forest guards under the Ministry of Water and Forests. All these characteristics validate the following statement in the Country Reports Volume [23]: “*the Romanian forestry is based on the principle of unitary, compulsory and ecological-sound forest management system*”.

The legislative document that stipulates all these regulations is the Forest Code, published in 2008 and updated through the years (i.e., Law 227/2015 of the Fiscal Code, Law 232/2016, Law 175/2017, Law 112/2018) according to the EU conservation-targeting forest policies—the last time in 2020 (i.e., Law 197/2020). Unlike previous forest codes, the 2008 legal framework includes several conservation-oriented provisions: the establishment of annual harvesting options through forest management plans and prohibitions on exceeding it, the prohibition of clear-felling in national parks, and reducing the clear-felling area from 5 to 3 ha. Thus, the current forest code aims to ensure that the forest area, growing stock, and average annual increment do not decline in time [43].

The Forest Code updates of the last few years aim to promote closer-to-nature forest management, which is defined by [7] as “*seeking multifunctional forests by combining biodiversity (even in planted forests), carbon stock preservation and timber-related revenues*”. To this end, the 2015 update regulates the compensation of private forest owners who were assigned protected forests during the restitution process and who cannot legally exploit them. In 2016, another amendment was made to establish higher penalties for forestry law infringements, and to include over 200 new forestry-related contraventions. The 2015 and

2016 amendments worked towards the prevention of unlawful forest exploitation, also addressing public concerns regarding forest degradation and illegal logging. These are expressions of the more active role of the Association of Private Forest Administrators and of different environmental NGOs (Greenpeace, WWF, Agent Green, Coalition Natura 2000) in forestry-related decision-making [20]. The 2020 update stipulates that illegal cutting is registered as a crime that may be punished with jail time, regardless of the volume of wood that was unlawfully exploited. Other new provisions concern the confiscation of vehicles used for timber theft, the prohibition of clearcutting within natural reserves (not only in national parks as before), the obligation to acquire transport certificates for any wood product, enhanced wood traceability due to the modification of commercialization practices, and the access of the public to certain types of forests [74].

### 3.2.2. Forest Harvesting

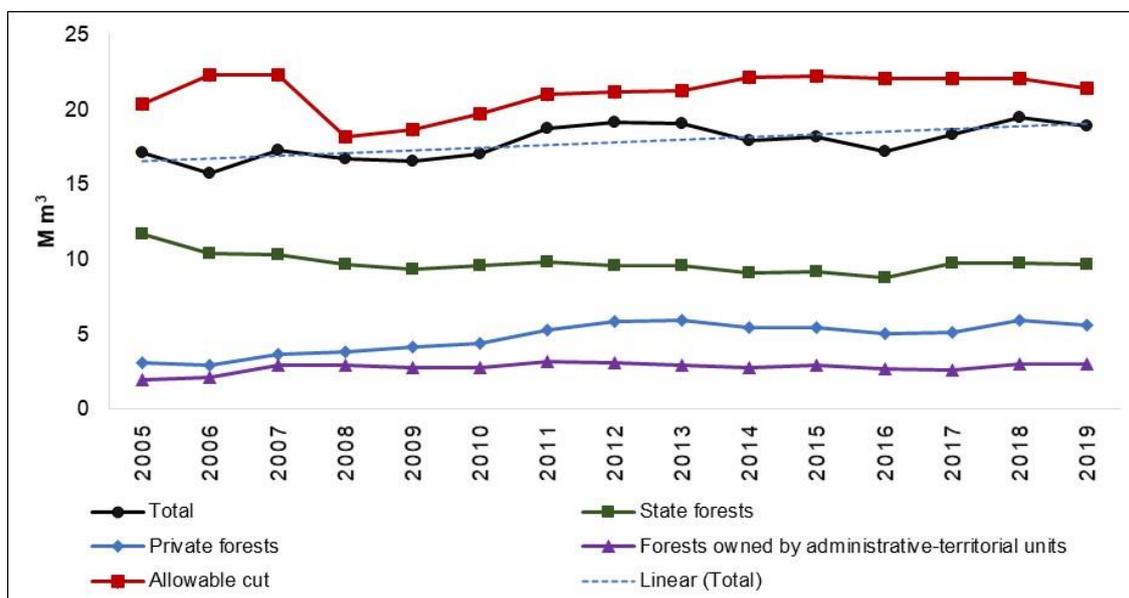
During the communist period, the high logging rates were supported by large-scale clearcuts, motivated by the need of the Romanian socialist state to pay war remunerations to the Soviet Union [75]. This production-oriented forest management changed in 1987 with the introduction of Law 2/1987, which formulated rules about rotations that exceeded 100 years for all main tree species, thinning for stand formations, and prohibited clearcuts larger than 3 ha. The next forestry legislative instruments followed the same lines, only allowing the thinning of forest stands in earlier developmental stages [76].

Until 2008, the maximum amount of wood/ha that could be harvested was established by the Romanian government. With the introduction of the 2008 Forest Code, the maximum wood volume to be harvested became established via forest management plans, which should not exceed the annual forest growth. Thus, timber harvesting is performed according to an imposed set of top-down rules [77]. In summary, the cornerstones of harvesting regulations applied in Romania are thinning from below, 100-year rotations, and periods of no-cut before harvesting (i.e., up to 25 years). Bouriaud et al. [76] estimated that these provisions may cause losses in production of approximately 12.8 million  $\text{m}^3\text{y}^{-1}$  in regular mountain production forests. This is consistent with the National Forest statistics showing that 84% of forest stands are <100 years of age (Figure 3) [35].

Overall, these harvesting methods confront many logistical limitations—*“timber harvesting operations still rely heavily on the use of motor-manual tree felling and processing followed by skidding”*—but there are several companies that operate with state-of-the-art machines and equipment [78]. Cable harvesting on steep slopes is possible in many forest areas of Romania, but it is not practiced because there is no appropriate infrastructure, and the roads are poorly developed [40]. This adds to the problem of health and safety risks in forest operations in Romania, which have organizational and equipment-related aspects as the most prominent risk factors [79]. It should also be noted that employment in the forestry sector is approximately three times lower than under the communist regime. The State of Europe’s Forests report [80] states that there are about 33,000 people working in forestry in Romania.

The annual allowable wood volume varied between 15.5 and 18.5  $\text{M m}^3$  in 1991–2008 [56]. Additionally, Olofsson et al. [50] estimate that the logging rate increased by 60% from 2000 to 2010. However, during the 1991–2019 period, the harvested wood volume did not exceed the allowable cut [56,81]. This is in contrast to the situation under the communist regime (1951–1955, 1962–1975, 1976–1979, 1980–1984), when the allowable cut was exceeded [75]. Data extracted from reports on the state of Romanian forests issued by the Ministry of Environment, Water, and Forests between 2005 and 2019 [81] show that the allowable cut varied between 18.1  $\text{M m}^3$  in 2008 and 22.3  $\text{M m}^3$  in 2006 and 2007 (Figure 6). This represents 35–44% of the mean annual growth of forest cover in the country. While the volume of wood harvested from state-owned forests varied within close limits, the ones harvested from private forests and forests owned by administrative-territorial units slightly but steadily increased. Nonetheless, the amount of legally harvested wood was smaller than the allowable cut, but in 2020 the Ministry of Environment, Water, and

Forests confirmed that the allowable cut was exceeded by 100% in every year of the past decade as a result of illegal logging [82].



**Figure 6.** Dynamics of legally harvested wood volume and the allowable cut in 2005–2019 (data source: [81]).

In the early 2000s, cheap timber and labor, characteristic of the economic transition period in post-communist countries, attracted many foreign investors to the forestry sector. Consequently, harvesting and wood processing are currently fully privatized [56,83]. The investors that operate in Romania (e.g., Holzindustrie Schweighofer/HS Timber Group, Kronospan, Egger) are also world leaders in the timber value chain. They have confronted repeated accusations from conservation-oriented NGOs regarding the trade of illegal timber obtained from Central and Eastern Europe [84]. In Romania, the monopoly of the Austrian company Schweighofer was constructed with the help of state authorities [85], a fact that was brought to light by the media and led to public pressure in both Romania and Austria [83]. Street protests were organized in December 2019 in Vienna, as well as in several Romanian cities [86], and the company was sanctioned by the Forest Stewardship Council (FSC) by canceling its certification. Further pressure was added by the petition initiated by 20 NGOs (“Save the Forest: take the saw away from Holzindustrie Schweighofer!”) and by petitions presented to the European Commission, who, in turn, sued the Romanian government for violating several conservation directives at the start of 2020 [83].

### 3.3. Enablers of Sustainable Forest Management

#### Forest Certification in Romania

Considering the emergence of the SFM concept after the UN Conference on Environment and Development in 1992, together with its forest certification guaranteed by different certification organizations, the hot debate on forest exploitation vs. conservation advanced in the direction of the former. Forest certification refers to wood exploitation (i.e., certified forest management) and processing (i.e., the certified chain of custody for wood products) that are performed with environmental, economic, and social considerations [87] to the benefit of future generations [88]. Certification is well established in many European countries (e.g., Sweden, Norway, Switzerland, Belgium, Portugal) and post-communist countries (e.g., the Baltic states, Poland, Croatia), and it is acknowledged as “one of the most important initiatives of the last two decades to promote better forest management” [89].

Romania applied for forest certification to the Forest Stewardship Council (FSC)—The first certification organization in the world—in 2001. Currently, the certified forest areas

in Romania extend over 2.8 M ha [90], meaning 43.9% of the total forest area. In 2015, the proportion of certified forests that belonged to the state (72%) was larger than those that were privately owned (9%) [89]. The emergence of this configuration may be traced to buying FSC-certified timber by foreign and autochthonous companies in the early 2000s [45], and to 2005, when the NFA decided to apply for the certification of large shares of the forests they manage [91]. A detailed evolution of forest certification in Romania up until a decade ago is provided by Hălălișan et al. [92] and Măciucă and Diaconescu [93] and continued by Nicorescu et al. [94], who analyzed the history and present situation of forest product chain of custody certification.

Additionally, the interest in forest certification is motivated by the exemption of paying property taxes for forest ownership [89] and by the desire to obtain competitive and economic advantages [95,96] to improve forest management [96], or even to clean/promote the name and image of certain companies [95]. In 2014, the introduction of the EU Timber Regulation (EUTR) stimulated the interest in certification, as forest actors were concerned with assuring international customers of the legality and sustainability of timber supply chains [95]. In Romania, the FSC certification worked as a facilitator of preparation and alignment with the EUTR regulations for many companies [97]. However, Halalisan et al. [96] showed that compliance with wood commerce regulations was not on the list of motives to apply for forest certification. This suggests that certification is perceived as a form of “voluntary regulation” [89] and as a profitable tool, but that it is not affordable or appealing to all private forest owners [95,96]. Still, this mechanism addresses the concerns of Romanian society, as it is also promoted by environmental NGOs.

The contribution of forest certification to achieving improved sustainability in the Romanian forestry sector is hard to assess. In theory, forest certification may be a solution for stopping, or at least reducing, the occurrence of illegal felling. However, Halalisan et al. [96] indicated that the interviewed FD managers do not consider it efficient in this regard. FSC audits brought to light several legal nonconformities related to harvesting operations [91], environmental impacts, community relations, and monitoring and assessment operations [98].

Nonetheless, several aspects are worth noting: The introduction of certification brought changes regarding the measures for safeguarding endangered species and protected areas, the use of chemicals, forest monitoring and surveillance, the transparency of records, consultations with local communities [96], supporting better working conditions for foresters, and increased environmental awareness [93]. Forest certification also stimulated communication between state and nonstate FD managers [93], facilitating the pluralization of forest expertise and decision-making, which is generally hard to accept by the NFA [86]. However, certification did not translate into modifications to forest management plans [96], unlike in the cases of other countries [99,100]. Other studies in both post-Soviet and democratic countries have also shown that certification is quite weak in terms of conserving natural forest patterns, processes, and biodiversity [101–104].

### 3.4. Barriers in the Way of Sustainable Forest Management

#### 3.4.1. The Smokescreen of Protected Areas

The review written by Stringer and Paavola [105] shows that the first attempts at forest preservation in Romania took a fortress conservation approach. During the 1400-year monarchy, several nature reserves were established for recreational purposes. In these first protected areas, hunting was forbidden, as was the case for harvesting in certain areas (Sorani et al., 2000, cited by [105]). The first law on environmental protection was issued in 1930 (i.e., Royal Decree 2/478), supported by the Romanian naturalist Emil Racoviță, during an era when scientific ignorance was considered responsible for the degradation of the environment [105].

Five years later, the first national park in Romania (Retezat National Park) was established. In addition, 36 nature reserves covering a total of 15,000 ha were established between 1930 and 1943; the numbers increased to 130 and 75,000 ha after WWII [106].

This was followed by the communist period, when Marxist principles governed forest management, in which nature's purpose was to fulfill the needs of society. However, in the 1954–1985 period, the protected areas increased in size, having reached 300 nature reserves and 100,000 ha by the 1970s [107]. However, high-impact human activities such as harvesting, poaching, mining, and agriculture were still performed within them under the law [105].

After the major political changes of 1989, the protected areas—including the ones containing forests—registered an upward trend. At the beginning of the new democratic era, the protected areas covered 4% of Romania's territory, evolving to 7% by 2005—largely achieved by establishing 12 national parks [106]—and to 19% in 2010 [108]. Currently, there are 1550 protected areas in Romania, covering 23% of its land and 21% of its marine waters [109]. Out of the entire protected area network in Romania, 56% is covered by forest ecosystems [109] and more than 80% of the primary and virgin forests of the country are included in Natura 2000 (N2k) sites [31]. Since 2004, the protected area network has been managed by the NFA [56].

Currently, more than half (67%) of Romania's forests are registered as Group I forests with special protective functions, which are valued for their ecological services related to climate, hydrological, soil, and hunting aspects. This group also includes the forests of national parks and nature reserves, and forests designated to recreational activities. Within this category, there are two types of forests: Type 1 (3% of forests), which includes formally protected forests that cannot be exploited and require the approval of the Romanian Academy for forest interventions, and Type 2 (22% of forests), represented by what can be considered voluntarily protected forests, where only conservation works are allowed [35]. It should be highlighted that, despite the name of Group I forests, only the forests located within national parks and nature reserves are restricted from harvesting.

Even if the forests located in protected areas were restituted to private owners or local communities after the fall of the communist regime, wood harvesting within them is prohibited under the law [30]. The compensations that were promised to the private owners that cannot exploit their forests due to their protection status, have not yet been received, even if the provisions in question were updated in 2015 [20,65,105]. Primary and old-growth forests are restricted from wood exploitation only if they are located in the core zones of protected areas; otherwise, they are legally subject to harvesting practices that respect forest management plans. Thus, 2720 ha of old-growth forests (1.3% of the total old-growth forest area) was likely lost, mainly due to anthropogenic disturbances between 2000 and 2010 [110].

Entering the EU in 2007, Romania implemented the N2k conservation instrument, meant to tilt the forest conservation–exploitation balance towards biodiversity conservation. This instrument supports a network of protected areas aimed at fulfilling protection functions for valuable habitats, as well as breeding and resting sites for different animal species [111], under two EU directives: (i) the Habitat Directive, which coordinates the designation of Special Areas of Conservation (SACs) using a list of sites of community importance (SCIs), and (ii) the Birds Directive, which designates special protection areas (SPAs) [112–114].

According to the EC [4] and the Biodiversity Information System for Europe [109], there are 435 SCI sites and 171 SPA sites that cover 60,577 km<sup>2</sup>, or 24%, of Romania's territory. Angelstam et al. [14] report that, out of the 606 N2k sites in Romania, 587 of them comprise forestland: 24,504 km<sup>2</sup> in 420 SCIs and 17,289 km<sup>2</sup> in 167 SPAs. As some SCI and SPA sites overlap, the final statistics for the forestlands in each type of N2k site are hard to compute [14,108]. Estreguil et al. [115] report that Romania displays one of the highest functional connectivity values for N2k forest sites. This is supported by Lawrence et al. [116], who assessed that most of the N2k sites in Romania, as well as their surroundings, have a low level of fragmentation, partly because the country lacks a well-developed transport infrastructure. However, Romania is in the process of expanding this, which may cause conservation-related conflicts in the future.

Initially, within the N2k sites, human activities were not totally restricted but rather were encouraged to follow a sustainable management and use trajectory [117]. However, in 2007, all sites were declared protected areas by Government Emergency Ordinance 57/2007, which means that human activities were severely restricted. This outcome has to do with the high overlapping rate between the new network of protected areas and the one established before EU accession, as well as the convergence of up to three distinctive protection statuses for 35% of the sites in 2009 [108]. Thus, the implementation of the new network of protected areas has drawn some criticism from the local communities and private owners, which regard them as a brake mechanism in the race for economic development, overlooking the importance of forest conservation [105,118]. This resulted because the new sites were designated without conducting field analyses—as the process began rather late in the autumn of 2005—or a proper consultation with the stakeholders [117]. To this end, Miu et al. [119] propose a better methodological framework for the identification of areas of very high biodiversity value that can help further N2k designations to meet the goal of the EU Biodiversity Strategy for 2030 (i.e., that 30% of the national territory should be covered by protected areas, of which one third should be under strict protection) [6].

Another problem concerning N2k sites relates to the representation of Romania's different biogeographical regions [108], for which some include less than 5% of the total SCI area (the Pannonian, Pontic, and Steppe biogeographical regions). In contrast, the Alpine bioregion comprises almost a third of the SCI area [14]. On a more positive note, the suboptimal representation of plants and invertebrates in the early Romanian N2k network [108] was amended by the extension of the network [119]. To date, the research on N2k sites focuses either on gap analyses or conservation status analyses [120], the latter being prevalent among the papers regarding the N2k network in Romania [14]. Furthermore, the literature review written by Blicharska et al. [121] ranked Romania among the countries with a high level of representation in publications on N2k sites.

The implementation of N2k sites in Romania may, however, be considered to be a smoke screen for four main reasons: (1) the high overlap between these new conservation units and the existing protected areas created prior to 2007 [105,108]; (2) the mismanagement of N2k sites, which comes primarily from underfunding [108,118], delays in the implementation of specific conservation-oriented programs [116], and scant law enforcement [108]; (3) top-down management approaches and the low-level integration of stakeholders' interests [105,122]; and (4) the large forest disturbances registered within protected areas [123]. Significant forest areas are disturbed by windstorms. These may be local, but, nevertheless, they result in almost 100% damage to forest stands in areas several hundred meters wide and several kilometers long. The harvested trees are normally salvaged, creating large clearcuts. This means that the new conservation boost that N2k sites aimed at was not acquired, as the role of the new conservation structure was redundant [14,108]. It should be mentioned that the high overlap (96.2%) computed by Ioja et al. [108] corresponds to only the first two stages of N2k site designation. In 2011, the third stage of N2k site implementation increased the SCI and SPA covers to 17% and 15%, respectively, of the national territory. Furthermore, another 54 SCIs and 22 SPAs were added to the network, increasing the coverage of SCIs to 18% of Romania's territory [118]. Thus, it may be assumed that the overlap between the protected areas designated before 2007 and after this temporal milestone was reduced in the recent third and fourth phases of implementing N2k sites.

Nevertheless, the effectiveness of the protected area network in Romania has been challenged by many studies [105,110,119,123–125]. Butsic et al. [123] found that forests in older protected areas in the Romanian Carpathians were less affected by harvesting and natural disturbances than forests located within newer protected areas. The authors state that the type of protected areas did not significantly affect the forest disturbance rate for the 1985–2010 period [123]. Moreover, Knorn et al. [110] indicated that 72% of forest cutting disturbances registered in the old-growth forests of the Romanian Carpathians were located within protected areas, clustering in the Apuseni Mountains, the Maramureş Mountains,

the Carpathian Arc, and the Southwestern Carpathians. Several studies on land use changes inside the EU's N2k sites show that forest areas were affected by disturbances, although they were located in the aforementioned protected areas. Kallimanis et al. [124] stated that forests and seminatural areas decreased inside the Romanian N2k sites in 2006–2012, while Ursu et al. [125] asserted that the threats and pressures that affect the N2k sites most frequently are related to forestry. To this end, Petrișor and Petrișor [126] confirmed that deforestation is responsible for much of the land cover and land use changes in Romania for the period between 2012 and 2018 on the national level, and also within all types of protected areas.

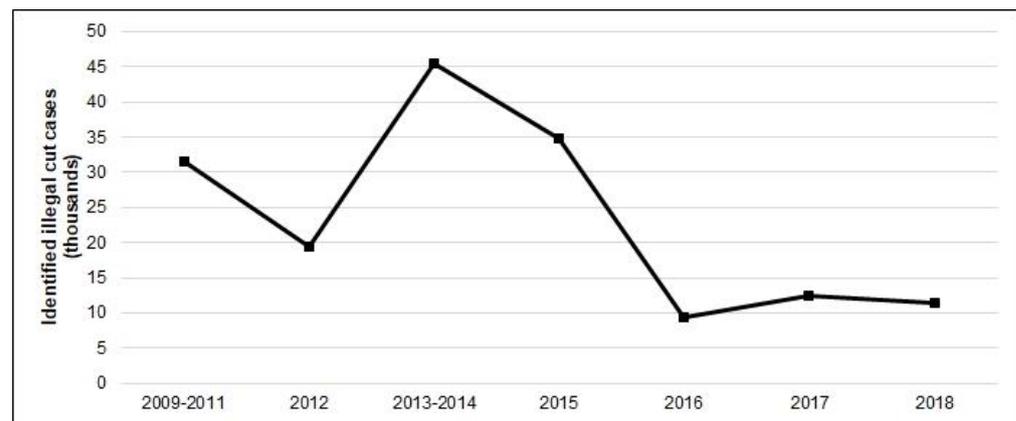
#### 3.4.2. Illegal Forest Cutting

When it comes to illegal forest cutting, two main phases are prevalent: (1) The first surge of illegal logging that took place during the post-communist transition and (2) the continuation of this unlawful practice after 2010. Both phases included infringements on harvest regulations (unauthorized logging) and criminal law (timber theft), together with other forestry-related illegal activities (e.g., the illegal trade of wood and wood products, illegal timber processing) [61,127].

It should be highlighted that unlawful harvesting in Romania is partially caused by the fact that there are still private forests that are not covered by forest management plans (about 700,000 ha, as estimated by Schmithuesen and Hirsch [128])—although the law demands it [27]. Another factor that contributes to the illegality of wood exploitation is the cumbersome, restrictive Romanian legal framework, which various forest agents find ways to elude [53].

Referring to the first issue, Bouriaud [61] reported that massive illegal logging and overharvesting are prominent in private forests compared to state-owned ones. Additionally, Bouriaud and Niskanen [127] stated that timber robbery prevailed more in private forests during the post-communist transition. It is estimated that up to 1 M m<sup>3</sup> of wood was illegally exploited yearly in 1992–2002 [129] and that, by 2005, 15% of the private forests of the time were already exploited [18]. Irimie and Essmann [18] argued that the massive cutting in the first two stages of the restitution process was motivated by the poor design and implementation of the restitution laws, as well as by the market pressure that characterized the transition to capitalism. Inadequate law enforcement [130], weak administrative capacity, and corruption [83] may also be added to the convergence of factors that amplified the phenomenon of illegal felling. Under conditions of unsecured ownership [53,61], the new forest owners wanted to obtain immediate profit or, as Dragotescu (2004) (cited by [55]) points out, poverty was the driver of forest exploitation immediately after restitution.

Greenpeace Romania reports [131] indicate that approximately 8.8 M m<sup>3</sup> of wood was illegally exploited in 2008–2012 and that 20 M m<sup>3</sup> of timber was not accounted for by official papers in 2013–2018. The latter number was picked up by a letter of formal notice sent to the Romanian government in 2020 by the European Commission, but several forestry scientists contested its validity [132]. The identified cases of illegal cutting reached a maximum in 2013–2014 (45,511 identified cases), decreasing up to 2016 (9443 identified cases), and then slowly increasing to 11,449 identified cases in 2018 (Figure 7). However, there are two main motives to be cautious about when analyzing these data: the Greenpeace Romania reports [131] include only the law infringements that were detected—not their totality—and they should not be taken out of context to enhance the datafication of the forestry crisis narrative [86].



**Figure 7.** The evolution of identified illegal cutting cases in Romania, 2009–2018 (data source: [131]).

The harvesting of trees in protected forests represents another illegal practice that has taken place in Romania, as several studies have called attention to [123,133]. Munteanu et al. [27] and Butsic et al. [123] concluded that state-controlled forest ownership patterns, such as the ones in Poland and Ukraine, are linked to fewer forest cutting disturbances in protected areas, whereas the forest restitution process may be correlated with a higher propensity for forest disturbance inside protected areas. Knorn et al. [110,133] cautioned that a definite nexus between forest restitution and their findings regarding the increase in forest disturbance rates in the protected areas of the Northeastern Romanian Carpathians since 1989 may not be formulated, but they also argued that natural disturbances are rare.

Another illegal practice refers to the harvesting of valuable healthy trees registered as sanitation cuttings because the harvesting age and diameter imposed by forest management plans are to be reached long after the trees meet their maximum commercial value [53,76]. Schulze et al. [40] call this the “cut the best and leave” system, since the trees of the highest economic quality are targeted during thinning and sanitary cuts, leaving the stand with unsaleable, small, and poorly formed trees. Besides the aforementioned practice, the overestimation of tree ages, together with afforestation that was planned but never implemented, completes the list of illegal practices that happen in the country of interest [23].

Vasile and Iordăchescu [86] cogently argued in their narrative-based analysis of illegal forest cutting in Romania that this is a multifaceted subject, one that was presented by the media and propagated through social media platforms only in relation to its sensational, worrisome characteristics, portraying a crisis of Romanian forests. This image is contradicted by scientific works that ascertain forest regeneration efforts and afforestation works and that aim to explain to the public that the media misuses the term “deforestation” and that it provides data that are not subject to fieldwork-based validation [132,134]. In turn, the reassurance promoted by the paper in question is contradicted by National Forest Inventory statistics: in every year of the past decade, the volume of timber that has been cut was double the legal amount [82].

The narrative of illegal logging has nurtured the vilification of various forestry stakeholders (i.e., “rural dwellers in mountain areas and local state forestry agents, timber business operators (of all scales), as well as higher state officials involved in forest control, or prominent politicians”) [86], as well as the transformation of several NGOs (e.g., Client Earth, EuroNatur, Greenpeace, Agent Green) into heroes that brought the public’s attention to the “conservation drama” [132]. This division is volatile, as certain actors have changed roles in time, but the ongoing narrative has fueled social tensions and violence. In 2019, the conflictual situation advanced to physical attacks on foresters. In return, requests for firearms were made, which may be considered a first step towards the militarization of forestry. Subsequently, during the COVID-19 pandemic, forests were guarded by the army and police. The narrative became political bait, as political parties put the battle against illegal forest

cutting on their electoral agendas. This coordinated the tightening of forest exploitation restrictions, negatively affecting the communities that rely on forests for sustenance [86].

Overall, FAO and UNECE [89] designate illegal logging in Romania as a key challenge to the implementation of SFM, which is also acknowledged by different forestry stakeholders [135]. Considering the high importance of Romania's ecosystems for European biodiversity, illegal felling raises reasonable concerns, backed by numerous voices that call for better monitoring systems [43,64,116,136]. The steps taken to resolve the problem relate to the creation of an anti-corruption agency focusing on forestry in 2015, the introduction of the EUTR [133], the implementation of timber traceability with the Integrated System for Timber Monitoring (SUMAL), and other smartphone applications that allow citizens to verify the legality of wood transports (e.g., Forest Inspector, which was launched in 2016 and gained 100,000 downloads in the following months) [86].

Unfortunately, the implementation of some of these measures was delayed, as in the case of EUTR, which was enforced in 2014, 6 years later than the legal adoption of SUMAL [83]. Another example is the malfunctioning status of SUMAL in 2017–2020, caused by the government's lack of interest in financing an update of its procedures [86]. These proofs of mismanagement constituted grounds for the suit initiated by the European Commission against the Romanian government in 2020, as well as the violation of the Habitats Directive 92/43/CEE, the directive concerning the access of the public to environmental information (2003/4/CE), and the directive on the environmental assessment (2001/42/EC) [132]. As a result, the Romanian government financed timber tracking technologies, committed to increasing the capacities of forestry-related law enforcement institutions (Iordachescu 2020), prohibited clearcutting in nature reserves, and updated the Forest Code to include more forestry infringements and punish forestry-related crimes more severely [74].

### 3.4.3. Loopholes in Romanian Forestry Legislation

The scientific literature of the last 10 years is replete with examples of studies that mention different loopholes in Romanian forestry legislation. There are many scientific and laymen voices that argue (1) on the cumbersome forestry legislation [11,20,46,53,65,72,76] and (2) on the issue of owners' limited freedom in integrating their interests in forest management plans [20,69,72,77,136,137].

Other studies point out failures to properly implement the provisions of the Forest Code; for example, compensation for the prohibition of harvesting wood from protected forests was not paid [20,65,105]. These provisions were reiterated in the 2015 amendment to the forestry-related legal framework [138] but are yet to be implemented. Notwithstanding, the access of Romania to EU compensation programs related to N2k sites is limited by command-and-control legislative instruments, which are the result of reactive approaches to forest management. Under conditions of overregulation, forestry personnel are vulnerable to charges of unlawful activities, as it is hard to comply with the letter of the law [53]. Moreover, Scriban et al. [20] asserted that the implications of the regulations imposed on private forest owners are too far-reaching, leading to larger anthropogenic forest disturbances that are then targeted by even more restrictions, closing the loop of reinforcing the causes that started the problems in the first place. These are not seen as mere legal framework-related failures, but as factors that converge to hinder the proper stewardship of the Romanian forests [46].

Furthermore, there are difficulties in enforcing forestry regulations related to forest monitoring, as Popa et al. [139] found out. According to this study, there is a relative apathy from forest inspectorate employees to engage in law enforcement efforts, although their attitude to the matter is positive. This is motivated by unsuitable legislation, unsuitable training, and improper planning and management [139].

## 4. Discussion

### 4.1. Impacts of the Post-Communist Transition

Our first research question concerns the impact of the post-communist transition on forest management and forest ownership in Romania. The fall of communist regimes in Central and Eastern European states triggered major political, societal, and economic transformations that also translated into changes to the forestry sector. The way the forestland restitution process was designed and implemented constitutes the main driver of the changes regarding forest ownership, the forestry legal framework, and forest management in the country of interest. Thus, the pluralization of forest ownership under democratic principles led to all the other aforementioned changes, although this happened with a significant time delay.

Table 2 summarizes the environmental, economic, and social impact of the three-phase forestland restitution process in Romania, pointing out that some of them are also challenges that forest management has to face on the road towards sustainability. Forest property rights have dictated many essential aspects of the forestry sector: the economic conduct and punitive actions that follow law-breaking [18], together with the relationships between different forestry actors. It should be stressed that forest privatization per se is not the source of these issues, but rather, the way this process was designed and implemented in Romania.

**Table 2.** The environmental, economic, and social impact of the forest restitution process and the challenges faced by Romanian forest management.

Negative Consequences of the Forest Restitution Process	References
Anthropogenic forest disturbances	[140]
Stimulation of changes in the structure of forests	[141]
Emphasis on tradable goods to the expense of the recreational function of forests	[43]
Unemployment in the forestry sector	[142]
Social tensions between private owners and forest management personnel	[11,46,55,68,86,137]
Undermining of the sense of community in rural Romania	[19,20]
Surge in illegal cuttings	[60,68]
Politicization of forest administration	[11,20,86]
Fervent corruption allegations	[55,143–145]
Institutional amnesia	[65]
<b>Challenges of forest management</b>	
Poor coordination between forestry sectors	[43]
Overly prescriptive forestry legislation and its glitches	[11,20,46,53,65,72,76,91]
Inadequate law enforcement	[108,130,132]
Illegal forest cutting	[60,61,68,131]
The promotion of a forest crisis narrative	[86]
Ineffective safeguard of the forests within the protected areas	[14,108,117]
Logistical limitations	[40,43,146]
Corruption	[53]
Transparency issues	[86]
The reluctance of forestry state authorities to accept the “pluralization of expertise and authority”	[86]

Most of the issues in Table 2 are socioeconomic, which draws attention to the discrepancies regarding the positions of forest owners in the political arena: While the state acts as both an owner and a rule-enforcing organism, the nonstate owners benefit only from the first role [18]. The Property Rights Index in Forestry (PRIF), elaborated by Nichiforel et al. [73], is used to illustrate the property rights distribution among private forest owners, relying on five property rights domains. The PRIF ranges between 0 (“no restrictions apply”) and 1 (“rights fully restricted”). Considering these domains, Romania scores 85% in relation to alienation rights, 81% when it comes to exclusion rights, 80% in terms of access rights, 30% regarding withdrawal of wood rights, and only 16% in relation to management rights. Thus, the overall PRIF was computed to be 43.8 based on 37 indicators grouped into the five aforementioned categories [73]. Notably, Romania’s PRIF increased from 30.4 in the mid-1990s to 38.4 in 2015, mainly due to modifications regarding the right of private forest owners to exclude the public from their properties. This level is well below the ones specific to Western European countries, but also to the other states with communist backgrounds (e.g., the Baltic states) [72].

In terms of environmental impact, the absence of specific regulations for private forests in the early post-communist transition converged with economic instability, potentially leading to significant forest disturbances. The Landsat-based analysis of Griffiths et al. [140] proved that about 75,000 ha of forest was disturbed from 1986 to 2010 due to the privatization of forests in the Romanian Carpathians. The disturbed area increased from the late communist period (1900 ha in 1984–1989) to 2500 ha during the first restitution period (1991–1999) to 3200 ha in the second restitution phase (2000–2004) and to about 4000 ha in the last stage of restitution (2005–2010). Naturally, the same trend was followed by the annual disturbance rates, which increased from 0.11% (1984–1989), to 0.15% (1991–1999), to 0.19% (2000–2004), and to 0.24% (2005–2010). In addition to the ascendant trend, forest disturbances registered particularly high rates right after the restitution laws were implemented [140]. The same study shows that, in the analyzed private FDs, the disturbance rates tended to be higher, whereas, in the forests managed by local communities, the disturbance rate tended to be lower. The Eastern Carpathians were particularly affected, together with the coniferous species in the study area [140].

#### 4.2. Challenges Faced by the Forest Management

The second research question focuses on the challenges faced by forest management in Romania, which evolved differently under both the communist and democratic regimes. In the first case, the peculiar economic situation of early communist Romania and the high debt of the country determined high rates of logging (1965, 1982–1985), which were then followed by offsetting measures (e.g., to extend the forest cover through forest plantations) [27]. Forest management switched its focus from high yields of wood to a more balanced approach that promoted carbon storage under the “cut and leave” system [40]. Later on, the inclusion of Romania in the EU put forward international environmental governance [86], but the implementation of promoters of sustainable development proposed by the EU (e.g., the introduction of N2k sites) had prevalently negative social effects [105,117,118] and little efficiency [108,110,124].

In Romania, many forest management weaknesses were inherited from the communist regime (1945–1989), and the improper design and implementation of the forest restitution process, together with institutional unsteadiness, aggravated these drawbacks [65]. It can be argued that the very legislative instruments that coordinate forestry are the ones that hinder the advancement towards SFM according to Scriban et al. [20]. Although only about half of forest area in the country is owned by the state [35], a top-down governance structure is still present, and the interests of non-industrial private owners have yet to be integrated in forest management plans.

Hapa [43] argued that many policy programs operate under the premises of “*sustaining forest capacity for perpetual wood yield and satisfying user needs on forest goods and services*”, promoting closer-to-nature forestry; however, their implementation falls short of meeting

these goals due to a high level of bureaucracy and the group identity issues of the forest staff. Long rotations (>100 years) aim to support natural disturbance-based forest management, which may be considered a trademark of SFM, as this practice tries to find a balance between nature conservation and economic needs. By mimicking “*natural tree mortality patterns and forest structures at multiple scales in forest management*”, the latter may reduce the ecological damage derived from timber harvesting to a minimum [147]. On the other hand, the extensive Romanian age class forest management system and the associated forestry legislation fall far from this target, leading to the cutting of healthy trees and their inclusion in the category of sanitary cuttings because their harvesting is legally permitted long after they reached their maximum commercial value [53,76].

There are certain steps that have been taken toward developing SFM, some of which were possible due to public mobilization and transnational advocacy networks [83], such as the promotion of forest certification and the development of timber tracking technologies. Another example is the support of the state for SFM in private forests, manifested as of 2015, by exempting the owners in question from paying land taxes for certified forests [138].

However, the roles of forest certification as a promoter of SFM and of illegal forest logging as a barrier on its way must be carefully considered. The benefits of forest certification may be blurred by their bureaucracy-increasing effect, which leads to overly formalist management systems. Given that the Romanian forest legislative framework has been reported as overly prescriptive [11,20,46,53,65,72,76,91], the ascendant trend of forest certification may reduce its role as a promoter of SFM in the long term. On the other hand, Buliga and Nichiforel [91] argue that “the additional effect of certification in the context of a stringent regulatory framework is less about setting higher standards in FM [forest management] but instead mainly about contributing to a better enforcement of the existing legal rules. Legislative frameworks are necessary, but mandated, detailed, prescriptive requirements may not always lead to the most sustainable outcomes. The Romanian examples show that even in a stringent legal system, governance approaches relying on civil society and market-based mechanisms are more effective at addressing the legality and sustainability of forest-based supply chains when the reactions of governmental agencies are slow”.

In addition, illegal forest logging is, rather, an umbrella term that encompasses wood-based products that were unlawfully harvested. This type of exploitation happens both on a small scale—unauthorized, small-volume logging performed by local communities to acquire household wood—and on a larger scale—unauthorized logging and timber theft performed within both state forests and other large forest holdings. These forms of illegal felling, although unaccounted for by forest management plans, have different impacts on SFM and forest cover dynamics, with the latter being more detrimental than the former. Therefore, illegal forest cutting should not be automatically considered unsustainable, as some forms of unlawful (i.e., unreported) felling have little effect on the level of SFM.

#### 4.3. Outlook

The problems confronted by the forestry sector in Romania are shared by other post-communist/socialist countries, although the forest privatization patterns vary within this cluster. After the fall of this political regime, two trajectories emerged concerning forest ownership: (i) the pluralization of ownership to different degrees—specific to Romania, the Czech Republic, Poland, Slovakia, Serbia, the Baltic states, and the states of the former Yugoslavia [20,23]—or (ii) the maintenance of the state monopoly in terms of forest land ownership, a situation specific to the Russian Federation, Belarus, and Ukraine [21,22]. The forestry systems of the countries in the first category went through major changes to adapt to democratic values and markets, and after 30 years of evolution, there are several shared outcomes that stand out:

- The lengthy forest restitution process in Romania, the Czech Republic, Croatia, Serbia, and the Baltic states [20,23,148–150];
- The high ownership fragmentation in Romania, Serbia, Slovakia, and the Baltic states [23];

- The unlawful wood exploitation taking place throughout ex-communist countries to different extents [62];
- The dominance of the top-down approach to forest management in Romania, Poland, Estonia, Serbia, the Czech Republic, and Slovakia [23,71,77,150];
- The lack of financial support from the state in Romania, Slovakia, Slovenia, and Serbia [23];
- The restrictive and cumbersome forestry legislation applied in Romania, Lithuania, Serbia, and Slovakia [23,72];
- The lack of forestry-related training for the private owners in Romania, Slovenia, Serbia, Estonia, and Latvia [23], as well as their weak political power [77];
- The communication chasm between private forest owners and forest management institutions in Romania and the Baltic states [23];
- The overlapping protection level of many forest areas in Romania and Lithuania [14,101];
- Missing updates for land ownership registers and cadasters that lead to unclear or disputed forest ownership throughout the ex-communist block [23,150];
- The poorly developed transport infrastructure in forest areas located in Romania, Croatia, and Slovenia [23].

Specific windows of opportunity to innovate forest management vary among post-communist countries. FSC forest certification proved to have positive social and ecological effects in Croatia, Serbia, and Slovenia [151], as well as in Romania [93,96]. In this regard, Maesano et al. [152] provided a forest certification map of Europe, which shows that the post-communist countries present different degrees, developments, and types of forest certification. Elbakidze et al. [103] reviewed Lithuania's generalized certification standard and found that this standard was insufficient in terms of maintaining biological diversity. In response, a national FSC certification standard was created in 2020 with the aim to improve social and ecological aspects, including a voluntary set-aside increase of 100% (i.e., from 5% to 10%) [90]. As to whether this has improved the consequences on the ground still needs to be evaluated.

Another initiative aiming to strengthen SFM and the protection of forests in the Baltic states is a woodland key habitat program, which was adapted from Sweden [153]. Although this woodland key habitat initiative promotes improved biodiversity conservation by setting aside small, high-value natural habitat patches, their small size, lower quality, limited long-term survival, and low connectivity hampers their role as substantial contributions to biodiversity conservation [154,155]. Another novel initiative is the growing interest in forest owners' associations in the Baltic states, which, together with EU and state funds, form important premises for a more sustainable approach to forestry based on "young stand tending, reforestation of damaged areas, Natura 2000 payments" [23].

That different stakeholders and actors define terms like forest, forestry, and forest management differently is a primary challenge for the implementation of SFM [7]. Current debates about forests revolve around two different worldviews. One is that forests are complex ecosystems that should be used such that all values are maintained and sustained, and that they can withstand disturbances of various kinds (i.e., being resilient). The other views forests as cropping systems, the purpose of which is to maximize the production of raw industrial material to support a growing bioeconomy. Thus, there is a necessity to find a balance between these two extremes towards reaching SFM.

Well-functioning societies are based on effective hard and soft infrastructures. Hard infrastructures are roads; railways; power lines; and pipelines for water, information, and communication. Soft infrastructures refer to society's knowledge base, democratic institutions, the financial system, and a country's informal rules and norms. The foundation for both hard and soft infrastructures is ultimately natural capital in the form of resources and functions provided by functioning and resilient ecosystems. Debates about climate and biodiversity are good examples of the challenges of conserving and building green infrastructures. Traditional village systems represent a collaborative approach aimed

at multifunctional landscapes. This needs to be complemented with sufficient areas of functionally connected networks of primary and old-growth forests [156].

Romania and the other post-communist/socialist countries of Central and Eastern Europe would benefit from switching the focus of their forest management systems to biodiversity promotion and close/closer-to-nature approaches [157,158]. By increasing the retention of deadwood, emulating natural forest disturbance and tree diversity through retention forestry, greater landscape structural variation is attainable [157]. A major step towards promoting biodiversity policies is to implement informative and educational programs aimed at making the purpose of this forest management approach clear to local communities. This would facilitate the implementation of such policies, help integrate the needs and interests of local people, and lead to harmonious collaborations. There is certainly a need for regionally and culturally adapted approaches to landscape stewardship and forest management, which are underpinned by evidence-based knowledge about how to achieve SFM based on both forest naturalness and cultural landscape values and benefits [159].

## 5. Conclusions

Romania is an interesting case study regarding the effects of the post-communist transition on forest ownership, forest management, and forestry legislative framework. The country stands out from the other post-socialist/communist states through its three-phase forestland restitution process and through its “cut and leave” approach to forest management [40], which proved to be detrimental to the sustainable management of its biodiversity-rich forests. On the other hand, there are many negative legacies of forestry from the communist period that Romania shares with other countries in Central and Eastern Europe.

Under the new market economy regime, forest management in Romania shifted from one focused on the sustained yield of wood to one based on low thinning, rotations that exceed 100 years for all main tree species, and the prohibition of large-scale clearcuts. This change was partly motivated by the accession of Romania into the EU, which put forward the prerogatives of international environmental governance.

Confronting the problems of restrictive forestry legislation, reliance on technical norms, highly fragmented forest ownership, strong communication barriers between forest and forestry actors—partly motivated by cultural and historical factors—and the illegal logging that initiated an ominous narrative concerning unsustainable forest management, Romania’s forestry sector has taken steps towards meeting the goals of SFM, but the journey has just commenced. The main promoter of sustainable management that is recurrent in the scientific literature [93,95,96] is forest certification, but the risk of it also becoming a promoter of bureaucracy and overly formal forest management systems is rarely mentioned. Moreover, some of the barriers that hinder progress in this direction (i.e., illegal logging) should be examined with caution, as their effects vary in terms of impact and relevance to SFM.

Discussing the impact of the post-communist transition on forest management and forest ownership, together with the challenges associated with the quest for sustainable forest management, this literature review presents the forestry-related transformations that have taken place in Romania. As the understanding of the past represents a key element for improving the present and the future, this paper offers perspectives on what needs to be halted, changed, or continued in order to set optimistic outlooks for forest management in a country that benefits from high-value forests, but not from its historical political background.

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