Deforestation and windbreak implementation in Romania: assessing public perceptions and sustainable strategies

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Abstract. The present study focuses on deforestation and the implementation of windbreaks in Romania. It explores sustainable forest management and public perceptions. Strategically planting windbreaks plays a crucial role in protecting ecosystems, agricultural land, and communities from the adverse effects of wind and soil degradation, effectively countering deforestation. The study has two primary objectives: 1) to investigate public perceptions regarding "forests", the severity of illegal logging (both current and future), and the importance of forest ecosystem services in Romania, and 2) to evaluate the impact and efforts of measures aimed at implementing windbreaks. To understand the extent of deforestation in Romania, a survey was conducted to reveal public perceptions of the importance of forests and potential concerns arising from resource loss. By raising awareness and recognizing the value of forests' various benefits, informed decisions can support conservation efforts. Additionally, an impact-effort matrix was constructed based on responses from 12 forest experts. The results provide valuable insights for policy makers, conservationists, and the public. It seeks to develop efficient, sustainable strategies for the long-term well-being of both human society and the environment, ensuring that forests continue to thrive and provide essential services for generations to come.
Key Words: deforestation, forest, forest fund, impact-effort matrix, perceptions, windbreak.

Introduction. Although forests play a vital role in meeting human needs through important functions, they tend to be undervalued because of their untradeable nature and, very often, the correlation of nature to the functioning of human support systems is neglected. Today, multiple threats affect forest ecosystems and endanger their integrity; these arise primarily from changes in land use resulting from population growth and intensification of activities such as agricultural expansion, timber extraction, cattle farming, and infrastructure development (Alamgir et al 2019; Petrescu-Mag et al 2022).

Driven by the extraction of firewood, including biofuels and the production of commercial commodity wood products, forests in Romania face massive logging, which in turn puts pressure on forest ecosystems (https://www.saveparadiseforests.eu). According to the most recent data provided by the Romanian Court of Accounts, illegal cutting causes significant environmental degradation, as logging is carried out at high rates (Romanian Court of Accounts 2013). The estimation indicates a dramatic reduction in forest tree cover in Romania during the twentieth century, with it reaching 27.05% by 2021 and today România is below the European mean of 43% and significantly below the capacity and optimal quantity of 45% (Greenpeace 2018). For a more complex picture, it is important to mention that some 100 years ago forested areas occupied 40.8% of Romania's land area (https://buceginatura2000.com). Researchers confirmed that „a visible concerning trend of forest destruction, excessive thinning, and extensive deforestation has emerged especially since 1990. This is evident from photographs

captured between 1990 and 2007 by N.A.S.A. and supported by statistical data presented by the Romanian Center for Journalism and Investigation" (Ungur 2010).

In addition, intensive logging seems to increase in areas where virgin forests are growing. In the last 50 years there has been a continuous decline in old-growth tree coverage from 10-12% to only 5% of the total forest cover of the country (Biriş & Veen 2005). Due to the high-speed deforestations within virgin forests and uncertainties of inventories, the numbers that reflect the area cover of these forests vary between 200,000 and 300,000 ha. However, România is ranked among the top countries in terms of the area covered by virgin forests, confirming the outstanding value and importance of the Romanian Carpathians for the conservation of biodiversity (Schickhofer & Schwarz 2019). Virgin forests from România harbor unique species of plants and animals, including Europe's largest bear population and large carnivorous mammals – lynx, wolf, etc. (Greenpeace 2018).

Knowing that these rare untouched forests represent the highest range of naturalness, their damage affects not only biodiversity habitats, but also homelands of communities (Braga et al 2023). Therefore, apart from their essential ecological functions, old trees are integrated into the social realm and offer diverse social-cultural benefits to people (Blicharksa & Mikusinski 2014).

The sociocultural function emerged from the link of two functions as a consequence of the forest's influence on human behaviour. Ecological and economic roles have been completed in the course of the history through the protecting role against threats and intrusions, provision of essential resources for human livelihoods, and creating optimal conditions for maintaining people's physical health. Thus, a cult of "forest" and its connection with the man developed and it can be found in the entire Romanian culture. As a result, the permanent relationship with the forest became a fundamental element on the territory of Romania, the interconnection with forests on this land prevailing by the appearance and strengthening over time the human sense of dependence on this element of the natural environment (Guran-Nica & Marin 2014).

Given the importance of functions that source the long-term development of society, the value of forest ecosystems is reconsidered through the prism of "ecological services"; these include protection of biodiversity, of air quality and of water resources, source for subsistence and health, and elements of preserving communitary identity (Greenpeace 2019). Ecosystem services denote all kinds of benefits that people obtain from nature, therefore, they contribute to the connection of human and ecological systems (Hartel et al 2014).

The utilization of forest ecosystem services influences the human system and generates over time a dependent evolution of human-nature interrelation, shaping societal perceptions and values attached to forests. As the way society perceives forests evolves, its behaviors and attitudes toward them also change, leading to landscape alteration. In contrast, as the environment undergoes changes and individuals interact with it, society's appreciation about forests is also shaped (Roux et al 2022). Aside from this, ecosystem services that are indispensable to the well-being are experienced differently across different space settings. These components of well-being refer more to personal and social functioning, expressing what a person values doing or being. A sustainable well-being of a community depends on the ongoing provision of ecosystem services and the equitable distribution of associated benefits and costs. In the sense in which nature creates the goods, humans seek to add economic and cultural value to suit their needs and purposes (McMichael et al 2005).

The availability of qualitative forest ecosystem services is directly related to the ecological security of a distinct considered area. While temporary disturbances in a forest cannot affect the balance of the ecosystem at its core, long-term exploitation has far-reaching implications with disruptions in functions and composition of forests. For example, the composition, age structure, and disturbance patterns observed today in Romania's forest ecosystems are significantly shaped by extensive harvesting practices that were distinctive for forest management of the last century (Munteanu et al 2016). Ecosystem services may be lost if suitable management practices are not implemented because of land-use changes that can affect the nature of the relationship between

people and the environment, because a wide range of valuable cultural and ecological elements are altered (Hartel et al 2014).

As forests are cleared for agriculture, urbanization, and other human activities, natural barriers to wind and soil erosion are lost. This leaves landscapes vulnerable to the destructive forces of wind, leading to soil degradation, reduced agricultural productivity, and increased susceptibility to weather-related disasters such as droughts and storms. Windbreaks play an essential role in mitigating these adverse effects by acting as protective shields against wind and erosion. By strategically planting trees and shrubs, windbreaks not only combat soil erosion and maintain soil fertility, but also contribute to reforestation efforts and the preservation of biodiversity. In essence, the establishment of windbreaks is a vital response to the consequences of deforestation, offering a sustainable solution to protect ecosystems, agricultural land, and communities from the harmful impacts of wind and soil degradation. To address these challenges, it is essential to delve deeper into the attitudes, perceptions, and behaviors of individuals and communities towards their environment (Kopaei et al 2021; Negahdari et al 2023). Understanding how people perceive and interact with forests and the broader environment is key in the quest for sustainable solutions (Petrescu et al 2015; Kopaei et al 2021; Barona et al 2022). It is through this understanding that we can cultivate a sense of shared responsibility and commitment to safeguarding our natural heritage. It was in this context that it was considered relevant to conduct a comprehensive study on the deforestation phenomenon in Romania with a focus on sustainable forest management and public perceptions. Consequently, the following main objectives were set:

1. to investigate public perceptions of "forest", illegal logging (present and future severity) in Romania, and importance of forest ecosystem services;

2. to evaluate the impact and efforts of measures aimed at the implementation of windbreaks.

This research can help formulate evidence-based strategies and policies for sustainable forest management and conservation efforts in Romania, as well as to raise awareness and understanding of forest management.

Material and Method. To respond to each objective, we developed two case studies. In the first case study, an online survey was implemented to collect data with the following aims:

a) to reveal interviewed people knowledge about what "forest" and "forest fund" means: the research explored what people thought about the terms "forest fund" and "forest". It involved understanding how the respondents conceptualized and defined these terms, which could provide valuable insight into their understanding and awareness of forest-related issues;

b) to explore the perceived severity, in the present and future, of illegal logging. The questionnaire aimed to gauge the perceived severity of illegal logging in Romania from the perspective of the respondents. By assessing their perceptions, researchers could gain an understanding of how problematic illegal logging is seen and whether it is a matter of concern for the public. The research was intended to explore whether the respondents believed that illegal logging will worsen over the next 10-20 years. That question intended to capture their views on the sustainability and future trajectory of the issue, and whether they anticipated it becoming more problematic over time;

c) to reveal the importance assigned to forest functions. The questionnaire measured the perceived importance of various functions provided by forests. The analyzed functions were: productive function - by providing woody mass for energy production, productive function - as construction material, protection for biodiversity, protection function - for flowing waters, ensuring constant flow, clarity, preventing the transport of materials, protective function – to defend the soil against erosion and degradation, protective function - against harmful climatic and industrial factors, cultural function - as a recreation space, cultural function - to preserve the cultural identity of local communities. Understanding how people value these functions can help inform conservation and policy efforts.

The survey was carried out using the iSondaje online platform to reach the respondents with different backgrounds and age groups. It was distributed from October 2022 and until June 2023, according to established academic protocols. All respondents received detailed information on research objectives and the voluntary nature of their participation. Informed consent was obtained from each respondent before proceeding with the survey and anonimity was ensured. A total of 101 respondents participated; of these, 52 were male, accounting for 51.5% of the participants.

In the second case study, we conducted a one-on-one interview with 12 forest experts. Their average experience in the field is 21.33 years. An impact-effort matrix was developed to explore suggested measures that could help the implementation of windbreaks. According to this matrix, the measures were grouped in four categories: measures that can be easily implemented and have a great impact in achieving the objectives; measures that require significant effort but have a high impact; measures that can be easily implemented, but which do not provide a sufficiently large impact; measures that require a lot of time and effort and the impact is low.

The impact-effort matrix is a methodology used for the evaluation and prioritization of projects, strategies, or actions based on their impact and the effort required for implementation. In practice, this matrix was designed to choose from a range of suggested solutions that could be the most effective in terms of the minimum effort required for implementation and the maximum beneficial effects (Andersen et al 2010). Specifically, following the adoption of the suggested solutions for implementation, a diagram is created where the effort required for implementation is represented on the horizontal axis and the impact on the vertical axis. Subsequently, the space within the angle formed by the axes is divided into four quadrants, where the solutions will be classified according to their effort and associated impact. Solutions that fall within the quadrant with the least effort required for implementation and the highest impact should be the first to be considered for implementation (Croft 2023).

The method is especially used in the field of quality assessment, but can also be applied in project management, strategic development, and decision-making in areas such as environmental protection and sustainable development. In the specialized literature, there are few articles that use the impact-effort matrix. For example, in the study conducted by Ilbahar et al (2023), the impact-effort matrix was used to evaluate possible scenarios associated with the adoption of new energy plans. In the present study, the application of the impact-effort matrix allows the evaluation of measures that are already in place or could be implemented to achieve the goals of planting forest belts. By using the impact-effort matrix, forest specialists can identify strategies that provide the highest impact in relation to the effort required. This can help us to efficiently use limited resources. By identifying best practices, this research can contribute to the more sustainable implementation of forest belts, protecting natural resources, and conserving biodiversity.

Results and Discussion. Romania, with its fluctuating legislative and institutional changes, presents an excellent opportunity to investigate the social and ecological transitions of forest landscapes, especially when highlighting before (1945), during (1945-1989) and after (1989) communist regime, in contrast with existing forest areas of high-conservation value status. Even communist policies were left behind in the past, the management of forestlands still deals with remnants of the old system approaches that the current administration must address (Albulescu et al 2022). While legislative measures can effectively address the challenges in front of achieving a sustainable management of forests, the results will require a considerable temporal extent to be observed, especially when considering past intensive exploitations and their impact on forest ecosystem services. The numerous anthropic implications over the past century caused a diminishing and damaging effect on the forest areas of România, in present they represent 6.4 million ha, which is 27.05% of the country's territory, while, at the end of 2021, the national forest fund occupied an area of 6.6 million ha, an equivalent of 27.7% of the country's area (Bohatereț 2012; INS 2022).

Forests in Romania encompass diverse ecoregions, including 'lowland Pannonian, mixed forest regions, through mesophytic deciduous broadleaved and mixed coniferous-broadleaved forests, to montane coniferous forests' (Albulescu et al 2022). The Alpine biogeographical region represents approximately half of the country's forests, whereas the Pontic and Pannonian regions account for less than 1% (Albulescu et al 2022). The distribution of various woody vegetation in forests is generally determined by climatic conditions; although there is minimal variation from a latitudinal perspective, elevation changes play a significant role in influencing tree positions (Cojinovschi & Rusu 2014).

Counties from the Carpathian Mountains have the largest forest area, as seen in Figure 1 (Suceava – 438,000 ha, Caraș-Severin – 434,000 ha, Hunedoara – 316,000 ha, Argeș – 277,000 ha, Vâlcea -274,000 ha). The counties from the southern plain territories register the smallest forest cover: Călărași – 22,000 ha, Ilfov – 26,600 ha, Ialomița – 26,100 ha, Brăila – 28,400 ha, Teleorman – 29,300 ha (Albulescu et al 2022; INS 2022).
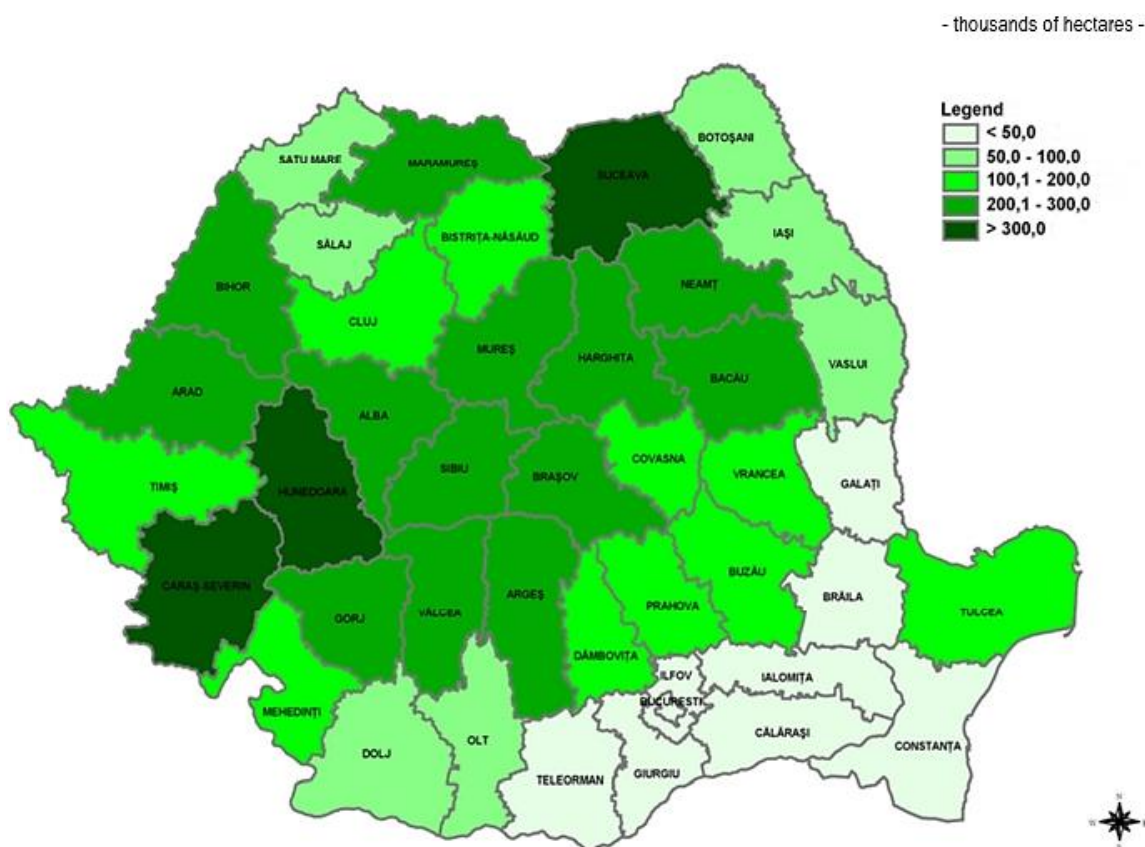

Figure 1. The forest fund area in Romania by county, at the end of 2021 (INS 2022).

Forests contain mainly broad-leaved trees of 69%: beech 31%, oaks 18%, other species about 20%, coniferous trees, on the other hand, make up to 31% of the forests: spruce - 23%, fir tree - 5% and other species - 3% (Borlea et al 2006). The largest area of forests (21%) is in the range of 21-40 years, the II age class (Figure 2), followed by the IV (19%) and III (18%) age classes. In total, these three categories cover more than 58% of the total forest area of the country (IFN 2016).

The latest inventory indicates that primary and old-growth forests occupy approximately 3% of the actual forest area, distributed across multiple sites (3402) with more than 50 hectares, totalling 218,494 hectares (Albulescu et al 2022). Most are in the central part of the country at an altitude of 1,000 meters above sea level or higher. Virgin forests consist of a variety of tree species: beech, spruce, pine, etc. (Albulescu et al 2022) and provide habitats for various species: 84% of the mammals, 62% of the birds,

87% of the reptiles, 94% of the amphibians and for 62% of the freshwater fish species from Romania (Biriș & Veen 2005).
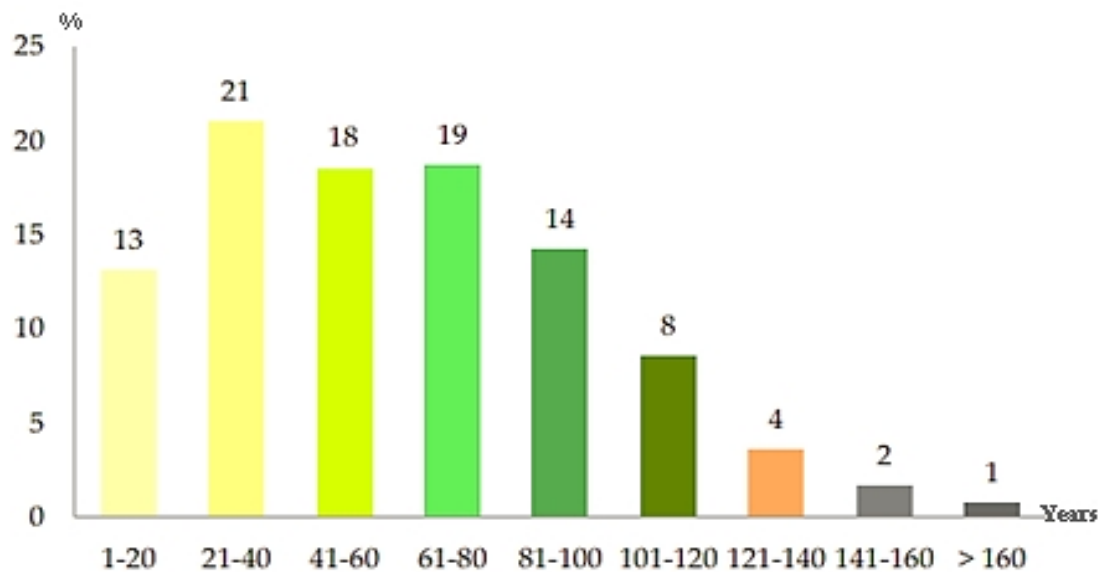

Figure 2. Distribution of Romanian forests by age classes (IFN 2016).

Deforestation poses a significant threat to Romania's natural ecosystems as inventories indicate alarming rates of illegal logging, occurring at more pronounced pace. Based on Greenpeace observations on tracking changes in Romania's forest coverage from 2000 to 2011, an estimated 360,000 hectares have been cleared during that period (Greenpeace 2018).

It was assessed that illegal logging, which includes harvesting activities that are not in compliance with formal forest management plans, as well as all types of timber transport and trade without valid documents, are at the level of some 30% of total annual cut (TC OPER 2011). To address this problem, an effective innovation called SUMAL was developed, which allows wood to be registered at the location of harvest and then traced to its destination (TC OPER 2011). In 2017, 12,487 cases of illegal logging were identified across the country (Figure 3) and represent a mean of 34 cases per day, which is 32% higher compared to 2016. The counties with the most frequent cases of illegal cutting were: Mureș – 1,511 cases , Brașov – 762 and Olt - 730 cases; the fewest were registered in Ialomița and Ilfov counties - 22 cases in each county, respectively Brăila - 14 cases (Greenpeace 2017). This evolution may be attributed to the improved detection of such incidents by the authorities, but also to the increase in the incidence of illegal cutting (Greenpeace 2015).

Forest cover experience continued to reduce because of timber harvesting, when cut to obtain new areas for agricultural purposes, settlements, and communications facilities. The steady reduction maintained the trend after the 1989 political transformations, due to irrational and occasionally illegal mining practices, which coincided with the fragmentation of forestlands through restitution to originally privately owned properties and the absence of administrative constraints and leniency toward exploitations (Cojinovschi & Rusu 2014).

In addition to human influence, forests are also subject to the impacts of natural calamities, such as strong storms and fires, which contribute also to the degradation of tree-covered areas (Baland et al 2010; Sati 2023). Protection of their integrity is important to maintain the provision of ecological key services, thereby supporting intricate long-term ecological functionality. Different practises and interventions within forested areas are applied according to management principles that approach the very distinctive features of existing forest categories. In the past decade, new forestry laws adopted in countries in Central and Eastern Europe (CEE) have widely embraced sustainability as the guiding principle for forest management. As part of management

activities, the state forest service is mandated to carry out forest protection to mitigate potential risks resulting from damaging factors and actions (Bouriaud & Niskanen 2003). In România, the state is responsible for the administration of 48.5% of the country's forests (Figure 4), known as: forest fund – public property of the state. Additionally, municipal forests contribute an additional 15.9% to the public forest fund, these are owned and managed by local administrative units represented by communes, municipalities, cities and towns (Giurcă & Dima 2022).
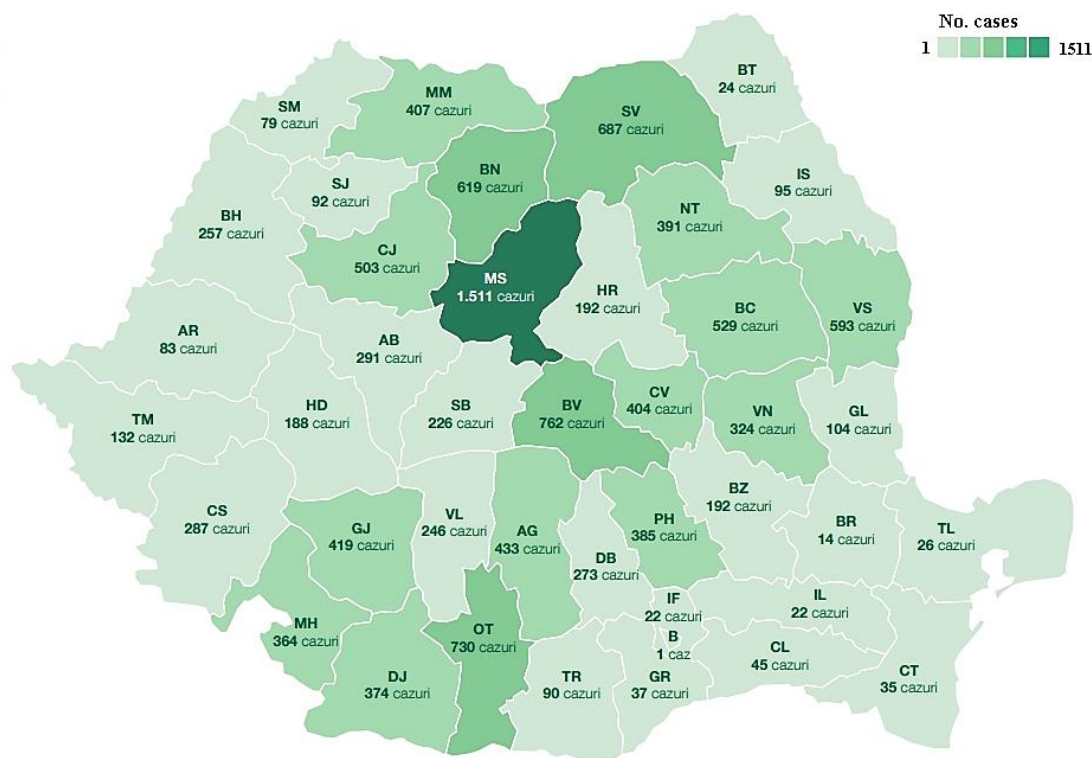

Figure 3. Cases of illegal logging/county for the 2017 year in România (Greenpeace 2017).
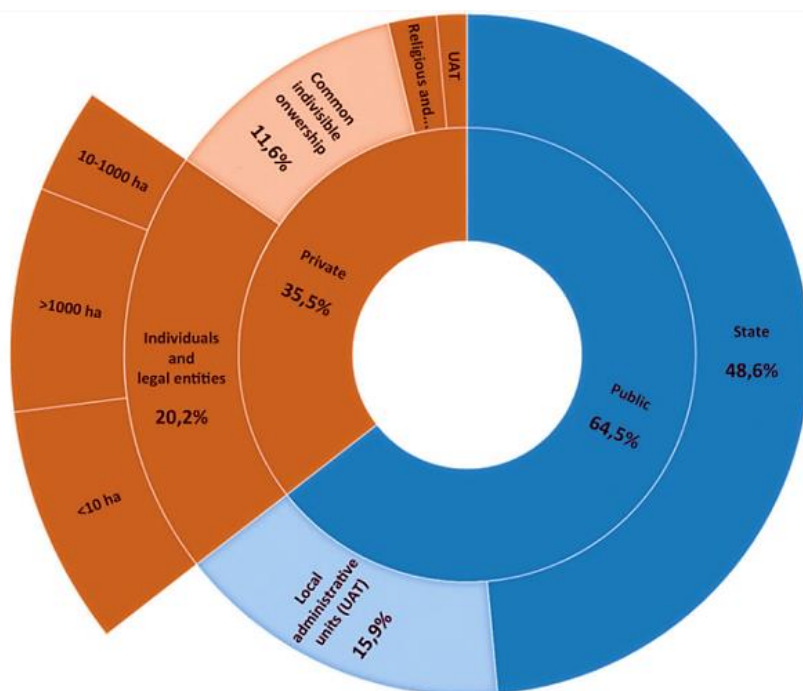

Figure 4. Forest ownership structure in Romania (Giurcă & Dima 2022).

Private ownership accounts for 35.5% of forest areas within the national forest fund, allocated to local administrative units, and individual owners and legal entities (USV 2019). The area of the forest fund under private ownership has steadily increased, to the disadvantage of public-owned areas, due to the continuous process of forestland retrocessions (INS 2022).

For the first case study, a key aspect of the survey was to assess the community's understanding of the composition of the forest fund in Romania, addressing the first request to choose which variant from the provided variant represents 'the forest fund' from their point of view. Based on the selection, most participants identified the forest fund in Romania to include forests (28.4%), degraded and unforested land (17.7%), and nurseries, plantations, and cultures of parent plants (8.9%). This suggests that the community recognizes the multifaceted nature of the forest fund and its diverse components. It is worth noting that some respondents expressed uncertainty or frustration with this question, which could indicate a lack of awareness or clarity on the categorization of forest funds. The second question in the survey was to gather the individual definitions of the term "forest". By asking participants to express their interpretation, we obtained a high variation, most definitions emphasized the presence of trees and associated flora and fauna. It highlights the community's understanding that forests encompass not only trees but also various ecosystems and living organisms. Another important aspect of the survey was to acknowledge the community's perceptions of the observed changes within the forests over the past five years. From the results it becomes evident that the majority (78.2%) believed that the forest area had not increased, reflecting general skepticism regarding the effectiveness of management efforts and potential challenges for future protection. This may be influenced by historical background, legislative changes, and privatization processes marked by illegal logging.

Similarly, when asked about changes in the forest fund area, respondents were more uncertain. Although 9.9% believed that it had increased, a significant proportion (32.7%) expressed uncertainty. This suggests a lack of awareness or information about changes in the forest fund, highlighting the need for effective communication and transparency on forest management.

The survey participants expressed concerns about deforestation in Romania when asked in the fifth question, most of them considering it a serious issue. Approximately 65.3% of the respondents characterized deforestation as extremely serious and an additional 25.7% believed that it had high gravity. These responses reflect the community's awareness of the environmental impact and potential consequences of deforestation.

Concerning the anticipated effects of continued deforestation in their respective areas over the next 10-20 years, the sixth question examined the expected effects of continued deforestation in their respective areas, most respondents (56.4%) considering it extremely serious, while 31.7% perceived it with high gravity. This suggests that the community is concerned about the long-term impacts of deforestation, including potential ecological, social, and economic consequences.

The seventh question explored the importance of various forest functions, indicated that the functions of: defending the soil against erosion and degradation (76.2%), the protection of flowing waters (75.2%) with the same percentage as protection from harmful pollutants, and the protection of biodiversity (72.3%). Relatively lower importance holds for the educational and preservation function (47.5%), productive function - berries, mushrooms, resin (43.6%), cultural function as a recreation space (42.6%) and cultural function for preserving the cultural identity of local communities 35.6%. The least important functions were considered the productive function for energy production (24.8%) and construction materials (20.8%). The results indicate a strong emphasis on ecological and cultural values associated with forests, which emphasizes the potential for further use of forest resources in a sustainable manner. The total responses represent the sum of the responses selected by the participants to a particular question. The percentage for each option is calculated by dividing the sum of the same options by the total responses. The average age of the respondents is 32.2 years and the majority identified themselves as female (62.3%). The survey respondents predominantly had

higher education (72.3%), this indicating that a relatively educated sample may influence their awareness and understanding of forest related issues. The income levels appear that are various, but most of the participants are in the category of above the 5000 RON/month (41.6%). This income distribution reflects the economic diversity of the surveyed population and may have implications for their attitudes and priorities with respect to forest management. The distribution of residence allowed for exploration into both urban and rural perspectives, but with a more comprehensive representation of urban insights (79.2%), rural areas being partially represented by 20.8% of the participants.

By acknowledging the strong link between forests and society and embracing community-driven approaches, the barriers that limit good cooperation for effective forest management can be overcome. The survey results serve as a valuable resource for policy makers, forest managers, and conservationists in designing appropriate strategies to preserve forest attributes and ecosystems.

For the second case study, the impact-effort matrix developed based on the input of 12 forest experts offers valuable insights into the prioritization of measures for windbreak establishment and maintenance. It is clear from the matrix (Table 1) that certain measures, such as the selection and planting of native species, regular monitoring, and management, and promoting sustainable agriculture methods, stand out as both easily implementable and highly impactful. These should be prioritized in any strategy aimed at achieving the objectives of the establishment of the windbreak. The conservation of local biodiversity, the improvement of soil quality, and the support of sustainable agricultural practices are crucial for the long-term success of windbreak projects. Additionally, measures such as simplifying legal procedures, creating financial support schemes, and providing technical guidelines can facilitate the implementation of windbreaks and should be given due attention. This matrix provides a robust framework for decision makers to allocate resources effectively, ensuring that efforts are focused on actions that produce the most significant positive outcomes.

Table 1

Impact-effort matrix

IMPACT		Measures that can be easily implemented and have a great impact in achieving the objectives (implementation of these measures should be a priority):	Measures that require significant effort but have a high impact:
	High	- Selection and planting of native species: the selection of native plant species for windbreaks can be easily done and will contribute to the conservation of local biodiversity; - Regular monitoring and management: maintenance of windbreaks by periodic cutting and spraying can improve their condition and implicitly the impact on the soil and biodiversity; - Promoting the use of sustainable agriculture methods: supporting farmers in the implementation of sustainable agricultural and agroforestry practises, such as organic agriculture or crop	- Habitat restoration: restoration of natural habitats with native species requires considerable resources, but can have a significant impact on the conservation of local biodiversity; - Setting up efficient irrigation systems: the development of irrigation systems for agriculture that efficiently use water resources can reduce erosion and improve soil quality, including in windbreaks; - Promote appropriate zoning regulations: governments can impose zoning regulations to

	Minimum Effort	High
	rotation, intercropping crops with forest species can improve the productivity of agricultural crops and soil quality; - The use of existing projects for the establishment of windbreaks on the lands of large owners and their financing through the National Resilience and Reconstruction Programme; - Creating a legal basis to simplify the procedures for establishing windbreaks/afforestation and supporting land owners/land administrators for the establishment of windbreaks; - Creation and implementation of financial support schemes for the establishment of windbreaks; - Publication of technical guidelines for the establishment and management of windbreaks and materials that promote the role and importance of windbreaks.	protect windbreaks from inappropriate urban and agricultural development; - Community awareness of the need to create and maintain windbreaks, financing the owners and administrators of agricultural land to establish new windbreaks through national programmes, and legislative measures to accelerate expropriations; - Establishment of windbreaks with saplings of native species; - Expropriation by the state of land intended for the implementation of windbreak networks at the level of territorial administrative unit/locality.
Low	*Measures that can be easily implemented but which do not provide a sufficiently large impact (the implementation of such measures is not a high priority)*: - Education and awareness programmes: local education and community awareness can be relatively easy to implement, but their impact on biodiversity or soil quality can be limited; - Establishing the correct planting standards: the introduction of appropriate planting standards can improve the health of the forest canopy, but may not produce significant improvements; - Use of fast growing plant species.	*Measures that require a lot of time and effort, the impact is low (these measures are not extremely useful and should not be given much attention)*: - Restoration of degraded soils: restoration of degraded soils in the forest canopy may require years of work and significant resources, but the impact may be limited; - Development of long-term research projects: long-term research to assess the impact of forest curtains can require a lot of time and resources and the impact may not be immediately obvious; - Updating the databases on existing degraded agricultural land.

It is obvious from the matrix that there are measures that, while having a high impact, require significant effort and resources. For example, habitat restoration and the development of efficient irrigation systems can play a pivotal role in biodiversity conservation and soil quality improvement but require substantial investments. Therefore, careful planning and resource allocation are essential when considering these measures. Similarly, promoting appropriate zoning regulations and expropriation for windbreak networks can be powerful tools for safeguarding windbreaks but can involve complex legal and administrative processes. On the other hand, measures that are relatively easy to implement but offer limited impact, such as education and awareness programmes or the establishment of correct planting standards, should not be entirely ignored, but should be balanced with more impactful actions in any comprehensive windbreak strategy.

As limitations, while efforts were made to obtain a representative sample for the survey, it is essential to acknowledge that the findings may not fully represent the entire population of Romania due to the inherent limitations of survey-based research.

Conclusions. Forestry efforts must encourage active participation and dialogue between stakeholders, including communities, forest managers, and policy makers. To advance to a more sustainable and community-orientated forest management, it is essential that this process of cooperation between multiple actors be more simple, with enhanced accessibility and transparency of the future processes. As observed, engaging the public in expressing their position facilitates the identification of priorities that civil stakeholders consider essential when implementing forest policies. The results of participation can guide the shaping of forest management that aligns with the concerns and demands of society. Last but not least, the impact effort matrix provides a structured approach to decision-making, allowing stakeholders to strike a balance between immediate feasibility and long-term impact for the sustainable management of windbreaks and their associated benefits.

Conflict of interest. The authors declare that there is no conflict of interest.

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