

Article

Development of a Methodology for the Monitoring of Socio-Economic Indicators of Private Forest Owners towards Sustainable Forest Management: The Case of Lithuania

Mindaugas Škëma ¹, Asta Doftartė ², Dalia Perkumienė ^{2,*}, Marius Aleinikovas ¹, Aidanas Perkumas ³, Helder Fernando Pedrosa e Sousa ^{4,5}, Maria Alzira Pimenta Dinis ^{6,7,*} and Olegas Beriozovas ¹

- ¹ Institute of Forestry, Lithuanian Research Centre for Agriculture and Forestry, Instituto al. 1, LT-58344 Akademija, Lithuania; mindaugas.skema@lammc.lt (M.Š.); marius.aleinikovas@lammc.lt (M.A.); olegas.beriozovas@lammc.lt (O.B.)
 - ² Landscape Engineering and Forestry Department, Lithuanian Engineering University of Applied Sciences, Liepų Str. 1, LT-53101 Girionys, Lithuania; a.doftarte@kmaik.lt
 - ³ Faculty of Alytus, Kauno Kolegija Higher Education Institution, Pramones pr. 20, LT-50468 Kaunas, Lithuania; aperkum@gmail.com
 - ⁴ Departamento de Matemática, Universidade de Trás-os-Montes e Alto Douro, Quinta de Prados, 5000-801 Vila Real, Portugal; hfps@utad.pt
 - ⁵ Center for Computational and Stochastic Mathematics, Department of Mathematics, Instituto Superior Técnico, Universidade de Lisboa, Av. Rovisco Pais 1, 1049-001 Lisboa, Portugal
 - ⁶ Fernando Pessoa Research, Innovation and Development Institute (FP-I3ID), University Fernando Pessoa (UFP), Praça 9 de Abril 349, 4249-004 Porto, Portugal
 - ⁷ Marine and Environmental Sciences Centre (MARE), University of Coimbra, Edifício do Patronato, Rua da Matemática 49, 3004-517 Coimbra, Portugal
- * Correspondence: perkum@gmail.com (D.P.); madinis@ufp.edu.pt (M.A.P.D.)



Citation: Škëma, M.; Doftartė, A.; Perkumienė, D.; Aleinikovas, M.; Perkumas, A.; Sousa, H.F.P.e.; Pimenta Dinis, M.A.; Beriozovas, O. Development of a Methodology for the Monitoring of Socio-Economic Indicators of Private Forest Owners towards Sustainable Forest Management: The Case of Lithuania. *Forests* **2024**, *15*, 1657. <https://doi.org/10.3390/f15091657>

Academic Editors: Panagiotis P. Koulelis, Zacharoula S. Andreopoulou and Dimitris Fotakis

Received: 16 July 2024

Revised: 17 September 2024

Accepted: 18 September 2024

Published: 19 September 2024



Copyright: © 2024 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Abstract: The development of a monitoring system for the socio-economic indicators of private forest owners includes the comprehensive collection of various socio-economic data. These data encompass general information about private forests owners, the need for monitoring, periodicity, and other relevant factors. This holistic approach allows for a detailed assessment of the social and economic conditions of private forest owners, as well as the economic efficiency of their operations, ultimately aiming to achieve sustainable forest management. This research builds upon previous studies by the authors that investigated the need for monitoring of the socio-economic indicators of private forests and involved interviews with forest experts. Based on the data obtained from these earlier efforts, this study aims to present a refined methodology for monitoring of the socio-economic indicators of Lithuanian private forest owners. Based on the findings of this research, it is highly recommended that monitoring be implemented at the state level across the entire territory of the Republic of Lithuania. The results of this research show that the monitoring of the economic and social indicators of private forest owners benefits not only the owners but also the state and society as a whole. Residence size, property size, and association membership emerged as the most significant factors influencing the need for forest monitoring, while knowledge in forestry, distance to the forest, and gender showed weaker but still notable effects. The research results suggest that monitoring can help to ensure the sustainable management of forests and the maintenance of ecosystem services, in addition to contributing to the region's economic development. It is recommended that this monitoring be conducted every five years.

Keywords: development of monitoring system; private forest owners; social and economic indicators; sustainable forest management

1. Introduction

Forest monitoring in private forests typically involves collecting data on the economic activities, management practices, and socio-demographic characteristics of forest own-

ers. These data are used to inform policies and actions that aim to maintain and enhance the ecosystem services provided by forests. In contrast, state-owned forests benefit from more consistent management approaches and monitoring systems supported by public institutions and funding, leading to a more straightforward process for maintaining ecosystem services.

Private forests are vital for the delivery of ecosystem services such as air and water purification, climate change mitigation, and biodiversity conservation. Developing a monitoring system for the socio-economic indicators of private forest owners is essential to effectively understanding and analysing their activities [1,2].

The monitoring of socio-economic indicators among private forest owners is an essential component of sustainable forest management, particularly in Lithuania, where private ownership of forests plays a significant role in the overall landscape and economy. Forests cover approximately one-third of Lithuania's territory, and a substantial portion of these forests is privately owned. Understanding the socio-economic factors that influence the decisions and behaviours of these private forest owners is crucial in developing policies that support both sustainable forest management and the economic well-being of forest-dependent communities.

In Lithuania, private forest ownership is characterized by a diverse range of owners, from individuals with small forest estates to legal entities managing large forest areas. This diversity presents unique challenges in monitoring and analysing socio-economic indicators, as the motivations, management practices, and economic outcomes of these owners can vary significantly. Moreover, the transition from state-owned to privately owned forests, which began after Lithuania regained independence in 1990, has led to a complex and evolving landscape of forest ownership. The socio-economic profiles of private forest owners today are shaped by historical, cultural, and economic factors specific to Lithuania, making this topic particularly important to understanding the country's forest sector.

When making decisions about the rational and sustainable use of forests, we face various socio-economic factors that are becoming more and more complex. This situation related to the implementation of a monitoring system is determined by the changing needs of consumers, the increasing influence of non-state sectors, and the growth of private forest areas [3–6]. In this context, when discussing methods for monitoring the social and economic development of private forest owners, data must be obtained that are not only technically reliable but also relevant and accessible to interested parties. Such a system is useful both for private forest owners themselves and for society, as it allows for a deeper understanding and evaluation of forest management practices and their impact in the socio-economic context [5–8].

Depending on the goals and needs of private forest owners, a monitoring system can be developed at different levels, i.e., from simple indicators such as statistic data to more complex models that include various factors and their interactions [9,10]. Based on the monitoring results, private forest owners can perform an analysis of their operational efficiency and identify which aspects require improvement or changes. This can help optimize forest management processes to improve economic benefits and public well-being. Such a system also enables management authorities and political decision makers to obtain valuable information about the status and performance of the forest sector. This can also help to create consistent and effective policies and measures for forest owners to promote sustainable forest management. Finally, such a monitoring system can contribute to a better understanding and awareness of forest management in society by promoting dialogue and cooperation between forest owners, the public, the business sector, and other stakeholders. This is an important factor in increasing the sustainability of the forest sector [11–13].

2. Literature Review

A socio-economic indicator monitoring system for private forest owners is a necessary tool to determine the effectiveness and sustainability of their forest management processes,

identify social and economic indicators, and improve support measures and policies for forest owners. To create an effective monitoring system, it is necessary to carry out a detailed analysis, including the identification of social and economic indicators, the design of data collection and monitoring methodologies, the development of a communication strategy with forest owners, and the analysis of results [14–16]. It is also important to pay attention to social aspects, such as the demographic characteristics of private forest owners, the number and quality of jobs, forest care and management practices, understanding of sustainability principles, etc. These indicators can help to understand the social situation, needs, expectations, and possible difficulties of private forest owners in forest management and use [17].

Currently, only statistical data on private forests in Lithuania are publicly available, which include different social and economic indicators, such as the scale of forestry activities, wood utilization, income of forest owners, etc. [16,17]. However, such data need reorganization to make them more accurate and efficient, considering modern technologies and forest management challenges. For the implementation of a monitoring system of socio-economic indicators of private forest owners, closer cooperation with forest owners and other stakeholders can be sought based on their own experience and professional knowledge [1,18–20].

A comprehensive understanding of forest management policies in Lithuania is hindered by the lack of detailed information and an incomplete picture of the situation. This gap is largely due to insufficient monitoring of data on private forest owners and a scarcity of scientific research on the subject. Therefore, we cannot gain comprehensive insights into forest management or understand all the social and economic factors that influence the behaviour of forest owners and influence forest management. There is a lack of re-search providing accurate data on the behaviour of forest owners to improve and balance current and future forest management [12,13,16,21].

Policy makers and representatives of the forestry sector are increasingly concerned about the growing number and diversity of private forest owners in Europe. This phenomenon is alarming because of how intensively these private forests are managed. Given the increasing demand for forest products, including bioenergy, one of the priorities of forest policy is the mobilization of forest resources, especially from private forests [22]. It is also important to consider societal expectations with respect to forests and their owners—to provide not only wood services but also serve other purposes, such as their use for recreation, tourism, health support, and carbon dioxide absorption. To effectively manage forests, there is a need to categorize forest owners according to their actual or intended management behaviour, so researchers are working on improving private forest owner typologies, also known as non-industrial private forest owner typologies [21]. When formulating private forest policy, it is important to have the following comprehensive information: demographic data on private forest owners, the size of forest holdings, activities performed by forest owners, and farming and its changes [23].

Monitoring systems of socio-economic indicators of private forest owners include:

- Statistical information: It is important to have data on the number of private forest owners, the size of managed estates and forest areas, and tax indicators of forest estates. Such information helps to determine the total amount of private forests and their condition in the country [1,24].
- Socio-economic information: It is also important to obtain data on the social structure of forest owners, as well as their education, goals, problems, attitudes toward property, values, farming goals, motivation, types of behaviour, etc. With the help of this information, the needs and aspirations of private forest owners can be understood and considered [25–27].
- Monitoring the change in forest ownership: Change among private forest owners is a dynamic process. Forest holdings can be inherited, transferred to other families, or bought/sold to third parties. Therefore, it is important to continuously monitor this change to identify development trends and update forest policies to take account of new owners and their farming practices [28–30]. This information is essential for decision making regarding the development of forest policy and the successful man-

agement of private forestry. It allows for an understanding of the needs of private forest owners, adapting policies to different farming methods and needs, allocating sufficient resources, and supporting sustainable forestry development. Research on socio-economic data and perceptions of private forest owners is conducted to understand how private forest owners value and manage their forest assets and how this affects their quality of life and economic situation. Various scholars are involved in such studies and research; these studies cover areas related to socio-economic demographic analysis, including the collection of demographic data on private forest owners, such as age, gender, education, and income.

These data can help identify who the typical owner of private forests is and how their socio-economic characteristics can influence their actions [31–34]. Forest management and planning studies examine how private forest owners manage their forest assets and make decisions about logging, forest maintenance, regeneration, and other activities. They also examine what strategies and methods are used by owners in forest planning and management [29–31,34]. Forestry economics and profitability studies investigate the level of forestry entrepreneurship of private forest owners, as well as their return on investment, profitability, and economic utility. This may include analysis of forest valuation and accounting systems, profit and cost analysis, and other financial analyses [35,36]. Research on forest policy and law examines what legal and policy measures states use to encourage private forest owners to maintain and manage their forests' sustainably. The opinions and perceptions of private forest owners about forest policy, legislation, and other means of influence can also be analysed. All these studies help researchers to delve into the social and economic factors of private forest owners and to evaluate the sustainable forest management practices of private forest owners. This provides an opportunity to understand private forest owners as an important factor in forest development and protection.

This article aims to introduce a methodology that was developed for monitoring of the socio-economic progress of private forest owners in Lithuania, with a focus on promoting sustainable forest management. The outcome should be an efficient and dependable system for monitoring of the socio-economic indicators of private forest owners. This system will serve as a foundation in enhancing forest management policies, preserving forest resources, and fostering the sustainable development of forests in Lithuania. To ensure accurate and reliable data collection, the development of a monitoring system should include standardized and systematic methods and procedures that are adapted to the context and needs of private forest owners. In addition, it is important to ensure the confidentiality and privacy of data to obtain a true and objective picture of the activities and results of private forest owners.

This research has the potential to serve as a model for other countries with similar socio-economic contexts. Monitoring the socio-economic indicators of private forest owners is not only essential for the sustainable management of Lithuania's forests but also offers a valuable opportunity to deepen our understanding of forest ownership dynamics within a distinctive socio-economic and historical context. This research aims to contribute to the development of a monitoring system that can support the long-term sustainability of Lithuania's forest resources while also informing broader regional and global discussions on private forest ownership.

3. Materials and Methods

There are various ways to monitor economic and social data. They are used to obtain objective, research-based data about the current state and changes. Some of the more common monitoring methods include questionnaire surveys, the collection of statistical data, research and experiments, social network analysis, and focus group discussions [37–42]. The choice of monitoring method depends on what data need to be obtained and what research and analysis objectives are pursued. Questionnaire surveys, statistical data collection, research and experiments, social network analysis, and focus group discussions are

the most common and effective ways to obtain objective and accurate data on economic and social trends.

A quantitative survey was selected for this pilot research, seeking to understand the significance of the issue and assess the current situation accurately. This research method aims to elicit the experiences and attitudes of private forest owners with respect to forest management towards sustainability and monitoring needs. This research method was chosen for systematic data collection and analysis. The scope of the study is calculated according to Paniotto's formula.

$$n = \frac{1}{\Delta^2 + \frac{1}{N}}$$

where n represents the sample size, Δ represents the sample error size ($=0.05$), and N represents the size of the population under study.

Respondents in this pilot study were private forest owners. The sample had 95% reliability and a 5% error rate. To test the newly developed monitoring system for private forest owners, a pilot study with 252 respondents was conducted.

The survey was conducted from 4 September 2023 to 19 November 2023.

In this article, we present particular information about the prepared questionnaire. The modified questionnaire is presented in Appendix A. It consists of 2 general blocks; the first block is composed according to personal information, and the second block is composed according to monitoring needs with respect to the social and economic development of Lithuanian private forest owners. SPSS (Statistical Package for Social Science) version 24.0 was used for statistical analysis of research data. The following methods of data analysis were used:

- Descriptive statistics (frequency tables and data location characteristics). Frequency tables were used to determine the distributions of respondents' answers. Nominal variables are presented as percentages and frequencies. The mean (M) was derived from the positional characteristics of the data.
- Tests for establishing statistical relationships (Spearman). These tests are used to test hypotheses that state that there is a statistical relationship between variables. Spearman's correlation was used to determine the relationship between statement ratings and demographic factors. Data are considered statistically reliable when $p < 0.05$. The strength of relationships was interpreted using estimates [37].

To formulate a methodology for monitoring of the socio-economic development of private forest owners, experts were interviewed in a previous study [43]. This research identified the necessary stages for the development of a methodology to monitor the socio-economic progress of private forest owners. Based on this study, empirical research was prepared, which is necessary to create a methodology for monitoring of the social and economic development of Lithuanian private forest owners (Figure 1).

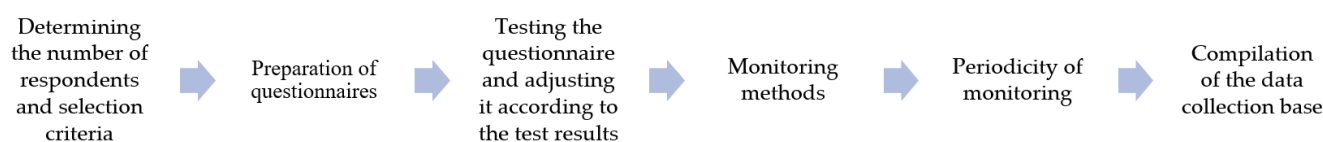


Figure 1. Methodology for monitoring of the socio-economic development of private forest owners.

The first step (see Figure 1), i.e., respondent selection, is a particularly important element of the research process when conducting surveys. When planning a survey study, it is important to make a reasonable decision about how many respondents need to be interviewed and how they will be selected and included in the study. The sample size for this study was determined based on the expert survey data of the previous study [43].

The second step (see Figure 1) was to prepare a questionnaire for private forest owners based on the insights of the experts selected for the study [43]. After analysing literature sources [7,43–46] and experts' interviews about the monitoring of social and

economic indicators of private forest owners, a questionnaire for private forest owners was created. The questions for private forest owners were divided into the following two groups: (1) general information about the forest owner and (2) information about the need for monitoring and forest policy development. The first group of questions includes general information about forest owners. In terms of socio-economic demographic analysis, such a study may include the collection of demographic data on private forest owners, such as age, gender, education, and income [47–49]. These data can help identify who the typical owner of private forests is and how their socio-economic characteristics can influence their actions and decisions [50–52]. The following general information about forest owners was collected: gender (male or female), place of residence (city or village), age (years), education (not completed secondary, secondary, or higher), knowledge of forestry (higher education in forestry, forestry experience, courses and seminars, public information tools, or have no knowledge), relations with organizations (member of forest owners' organization, member of other organizations, or not owned by anyone), nature of activity (manager, clerk, worker, farmer, unemployed, retired, or student), average monthly income (EUR/month). The second group of questions about the need for monitoring includes information about the need for monitoring of the socio-economic development of private forest owners, the benefits of monitoring socio-economic development, private forest owners' expectations with respect to this monitoring, motivation to participate in the monitoring, survey methods that can be used in monitoring, and how often surveys of private forest owners should be conducted.

The third step (see Figure 1) involved administering the survey to 252 respondents for testing and adjustment the questionnaire. The purpose of the survey was to check whether the questionnaire is appropriate and how it works in practice. All owners of private forests were potential participants in the sample. Non-probability quota sampling was used for this study. After analysing the experience of foreign countries [7,53–55] in the initial stage, with only statistical data, it is recommended that respondents be selected according to the following criteria: the country's administrative units (municipalities) and the size of the available forest holdings. To protect the identity of the interviewees and to obtain more appropriate answers, the questionnaires of the respondents were coded, so the questions were answered anonymously.

The fourth step (see Figure 1) involved using multiple methods to obtain survey feedback, namely a telephone survey, personal survey, postal survey, and electronic survey [56–58].

The fifth step (see Figure 1) determined the periodicity of monitoring based on data from the expert survey [43].

Finally, the sixth step (see Figure 1) involved recommendations for establishing a data collection base, namely creating a data repository, determining the data collection format, and ensuring the database's reliability and security [43].

4. Results

4.1. Testing and Validating the New Monitoring Method

Data collection and analysis were essential steps in evaluating the effectiveness and reliability of the newly proposed monitoring system. By applying the monitoring method to real-world data, we aimed to demonstrate how the system can accurately capture relevant socio-economic indicators of private forest owners. This process is a key component in developing any new monitoring tool, as it ensures that the method is practical, scalable, and capable of generating meaningful insights. In this part of the manuscript, we present the systematized and summarized results of the third through sixth steps (see Figure 1). As previously mentioned, the survey was administered to a group of 252 private forest owners who were interviewed in order to test and adjust the questionnaire used in this study. The purpose of the research is to check whether the completed questionnaire is adequate, to ensure a high quality of data, to present monitoring methods and periodicity, and to prepare the background for a data collection and compilation base.

4.2. General Information about Forest Owners

The summarized results of the pilot survey show that the number of women and men was almost evenly distributed; 48% of respondents were men, and 52% were women. The largest proportion of respondents was over 60 years old (35%) (40–60 years, 25%; 25–39 years, 30%; under 25 years, 10%).

Most of the respondents who participated in the study were city residents (70%) (small towns, 15%; villages, 15%).

A proportion of 14% of respondents had university-level higher education, 54% had non-university higher education, 15% had secondary education, and 17% had special secondary education. An analysis of the summarized results is presented in Table 1.

Table 1. Characteristics of respondents (%).

Variable	Category	Number of Respondents (%)
Gender	Male	48
Age	Up to 25 years	10
	25–39 years	30
	40–60 years	25
	>60 years	35
Residence size	Village	15
	Small town	15
	City	70
Knowledge in the field of forestry	Higher education in forestry	8
	Experience in the field of forestry education	55
	Courses and seminars and from mass media	12
Association membership	Hunters	4
	Forest owners/cooperative	21
	No forest-related organization or society	75

The respondents were asked about their knowledge in the field of forestry. Respondents' answers about their knowledge in the field of forestry were distributed as follows: 8% of respondents had a higher education in forestry, 55% of respondents did not have a forestry education but had work experience in the field of forestry, and 12% of respondents acquired knowledge from courses and seminars and from mass media (press, television, internet, etc.) 25%.

Private forest owners who participated in the study were also asked whether they belong to associations, societies, or organizations related to forests. After analysing the collected data, it was found that 4% of interviewees belong to a hunters' group, 21% are members of an association of forest owners/cooperative, and 75% do not belong to any forest-related organization or society.

The answers of the respondents to the question about what subjects they are engaged in were distributed as follows: 4% are top- or mid-level managers, 6% are specialists or clerks, 10% are workers or technical workers, 8% work under a business certificate or have individual activities, 32% are farmers, 10% are unemployed, 25% are pensioners, and 5% are students or pupils.

Respondents were also asked what their average monthly income is. A proportion of 17% interviewees stated that their monthly income is up to EUR 840 (minimum salary), the

income of 33% of the persons who participated in the study ranges from EUR 841 to 1200, 8% have an income of EUR 1201 to 3000, 17% have an income of EUR 1201 to 3000, and 25% of respondents did not answer this question.

4.3. Monitoring Need and Forest Policy Development

Analysing the second group of questions about the need for monitoring, private forest owners were asked their opinion of whether it is necessary to monitor the socio-economic development of private forest owners in Lithuania. A proportion of 61% of respondents supported this idea, 23% disagreed with the need for monitoring of the socio-economic development of private forest owners, and 15% of respondents had no opinion.

Essential expectations of private forest owners with respect to such monitoring are presented in Table 2.

Table 2. Relations between respondent preferences in forest activities and education, place of residence, age, gender, knowledge in the field of forestry, and association membership (statistical significance of change, $p < 0.05$).

Variable	Motivation to Participate in Monitoring	Permanent Member of the Group	The Need for Monitoring
Age	0.234	0.345	0.611
Gender	0.432	0.164	0.235
Place of residence	0.567	0.678	0.258
Knowledge in the field of forestry	0.576	0.867	0.773
Association membership	0.795	0.933	0.819

This analysis also proves that the following. Motivation to participate in monitoring and permanent group memberships are very important for people who live in cities. Indicators such “motivation to participate in monitoring”, “permanent group membership”, and “the need for monitoring” are highly valued among respondents with knowledge in the field of forestry and those with association memberships.

Association membership was found to be related to “motivation to participate in monitoring”, “permanent group membership”, and “the need for monitoring”.

The opinions of the interviewees about the benefits of monitoring the socio-economic development of private forest owners was divided as follows: 70% of the persons who participated in the study believed that it is useful not only for forest owners themselves but also for the state and society, 65% of respondents thought it can help to ensure sustainable forest management, under 52% believed it will maintain the provision of ecosystem services, and 41% respondents were of the opinion that it will contribute to the economic development of the region.

We also asked private forest owners if they had any other observations that were not listed in the questionnaire. After analysing the opinions of private forest owners about monitoring need and encouraging them to participate in the survey, the following four sub-themes were distinguished from the obtained results (Table 3):

- Obtaining information;
- Giving opinions;
- Privileges;
- The opportunity to participate in the development of private forest policy.

When monitoring the social and economic indicators of private forest owners, it is important to motivate the respondents. Maintaining motivation throughout the research process can help to ensure more active participation of respondents in surveys. It does not matter what methods are used to motivate and encourage respondents; the most important thing is to ensure the confidentiality of the respondents. After conducting the research, it

became clear that it is important for the respondents to receive feedback about the results of the research, so we recommend that the obtained monitoring results be made public and available to respondents [59,60].

Table 3. The sample (compiled by the authors based on the results of the proposed methodology for monitoring the socio-economic development of private forest owners).

Sub-Theme	Statements of Private Forest Owners
Obtaining information	"Increasing the knowledge bag"
	"Getting information"
	"Acquire knowledge, follow innovations and opportunities"
	"Knowing the results"
Giving your opinion	"Say your opinion"
	"Opportunity to express your opinion"
	"Sharing Experience"
	"I believe that forestry and nature conservation can be combined and we need to find a way to do that. And I think that these polls could at least help a little"
Privileges	"Free consultations in a forest plot"
	"Incentive gifts received for survey participation"
	"Priority scores when applying for aid"
	"Organization of training and courses (free of charge)"
Formation of private forest policy	"The desire for as much clarity as possible"
	"More people would know the needs of forest owners"
	"Improving the legal framework of forestry"
	"Perhaps my answers would serve to improve the prestige of forest owners in society, creating rules or laws for forest use"
	"I want to contribute to a more comprehensive understanding and management of private forest management"
	"Changes in forest management policy"
	"The opportunity to contribute to an important statistical study and to reflect/represent the practices applied in your holding (your decisions)"
	"The opportunity to keep a sharp mind for longer, to submit proposals to forest policy makers on forest use, restoration, development of protected areas and other issues through a survey questionnaire"

A proportion of 57% respondents expected the formation of sustainable private forest policy as a result of monitoring, 32% expected a contribution to sustainable forest development, 59% expected the prevention of climate change, and 78% expected community involvement and the promotion of social responsibility.

To investigate the need for monitoring, during the survey, the respondents were asked whether they would agree to be a permanent member of the group. A proportion of 17.3% of respondents agreed to participate in ongoing monitoring activities as a permanent member of the group. It is important that when forming a group of regular respondents, the principles of research ethics be followed, that respondents be informed about the objectives of the study, and that their personal data be stored and used only for that purpose.

A proportion of 87% respondents who agreed to participate in monitoring were motivated by privileges, 45% by the provision of consultations and information, 48% by personal motivation, and 65% by practical benefits. Encouraging and motivating respondents are very important in the process of conducting research. By encouraging respondents and ensuring their motivation, it is possible to increase the accuracy of answers, ensure good results, and reduce the number of refusals [55].

After summarizing the results of the respondents' answers, it can be said that the benefit of monitoring the economic and social indicators of forest owners are not only enjoyed by the owners themselves but also by the state and society. A proportion of 95% of

the respondents agreed with this statement, 82% of respondents stated that monitoring can help ensure sustainable forest management, 75% believed that the monitoring system for private forest owners can help maintain the provision of ecosystem services, and 68% of respondents agreed that such a system can contribute to the economic development of the region.

Based on the systematized survey data, a periodicity of monitoring of one year is recommended. A proportion of 17% of those surveyed indicated this frequency, 23% indicated once in 2 years, 10% indicated once in 3 years, 10% indicated once in 10 years, and 40% of survey participants recommend conducting surveys every 5 years.

4.4. Tested Survey Methods, Periodicity, and Background for Monitoring Database

During the study, all possible survey methods were tested. The following four main survey methods are distinguished depending on the method of administration: telephone survey, personal survey, postal survey, and electronic survey [31,37,59]. The telephone survey method can be used in the later stages of monitoring of private forest owners if a constant group of respondents is formed. The data of respondents were obtained from the Real Estate Register and cadastral database of the Public Enterprise Register Centre, indicating the status and institution name [43]. After using the available information, contact information was found on the Internet, i.e., contact phone number. Forest owners were interviewed, and the feedback evaluation was 100%. On average, the conversation lasted 45 min. The shortest questionnaire response time was 22 min, and the longest was 75 min.

Face-to-face evaluation of questionnaire feedback was provided by 35.8% of respondents. During the survey, 50 persons could not be found, 3 persons refused to participate in the survey, 19 persons stated that their forest property had been sold or otherwise transferred to others, and 5 persons included in the survey lists were deceased. The availability of the respondents was determined by their declared place of residence (i.e., city or village), the selected survey time in terms of the week (i.e., working day or weekend), and the day (standard working hours from 8:00 a.m. to 5:00 p.m. or after-work hours from 6:00 p.m. to 9:00 p.m.). The average travel distance to reach one respondent was 54.7 km, and the average duration of the conversation was 38 min. The shortest questionnaire response time was 19 min, and the longest was 60 min.

Online questionnaires were posted on the social media pages of the Lithuanian Private Forest Owners Association (PMSA) and the Lithuanian Forest and Landowners Association (LSMA). PMSA's social website is followed by 11,000 people, and LMSA has 8200 followers, of which 6500 belong to the association of forest owners. A total of 55 respondents answered the questionnaire, assuming that the questionnaire reached all association members on both social networks. With respect to questionnaire feedback, the reversibility was determined to be 0.85%. The average questionnaire response time was 10 min. The shortest questionnaire response time was 3 min, and the longest was 46 min. After analysing the applied survey methods based on respondent availability and feedback evaluation, it was found that the most appropriate and reliable method for obtaining information from legal entities is a telephone survey, while for individuals, a personal survey is preferred initially. The most economical survey methods are telephone or Internet surveys. Although personal surveys are the most demanding in terms of material costs, they are the best way to obtain objective, detailed, and accurate data and are suitable for the selection and formation of a permanent group of respondents.

After conducting a survey of forest owners and summarizing the obtained results, it became clear that, in the opinion of the respondents, the most acceptable method of surveying is via the Internet or by telephone. A proportion of 91% of the survey participants were in favour of and online survey, and 75 percent of the respondents were in favour of a telephone survey. According to the authors, when monitoring the social and economic indicators of forest owners, it is recommended to apply combinations of research methods, considering the status of the group of interviewed respondents.

Based on the research results, a correlation analysis was performed between the dependent variable (the need for a monitoring system for the socio-economic indicators of private forest owners) and eight independent variables (Table 4).

Table 4. The need for a monitoring system for the socio-economic indicators of private forest owners and correlations between the independent variables.

No.	Independent Variable	Correlation Coefficient	<i>p</i>
1.	Property size	0.461 **	0.000
2.	Distance from residence to forest property	−0.104 **	0.042
3.	Respondent age	−0.099 *	0.054
4.	Gender	−0.159 **	0.000
5.	Knowledge in the field of forestry	0.184 **	0.002
6.	Residence size	0.848 **	0.000
7.	Total income	0.065	0.204
8.	Belong to associations	0.311 **	0.000

* Significant at 10%; ** significant at 5%.

The following six independent variables were found to have significant correlations: property size ($p = 0.000$), distance from residence to forest property ($p = 0.042$), gender ($p = 0.000$), knowledge in forestry ($p = 0.002$), residence size ($p = 0.000$), and association membership ($p = 0.000$). A strong and reliable correlation exists between the need for forest monitoring and residence size ($r = 0.848$), with moderate correlations with property size ($r = 0.461$) and association membership ($r = 0.311$). Meanwhile, weaker but still reliable correlations were observed with knowledge in forestry ($r = 0.184$), distance from residence to the forest property ($r = -0.104$), and gender ($r = -0.159$) (see Table 4). In summary, the analysis shows that residence size, property size, and association membership are the most influential factors related to the need for forest monitoring. Knowledge in forestry, distance from the forest, and gender also play a role but with weaker correlations.

Periodicity of monitoring is extremely important, allowing for consistent and long-term data acquisition and adequate assessment of economic and social development; however, specific needs and circumstances must be considered. By combining different monitoring methods and properly planning the periodicity, it is possible to obtain accurate, clear, and necessary data for decision making with respect to business and social development. Both the experts from the previous study [43] and private forest owners who participated in the survey indicated monitoring of social and economic indicators should be carried out every 5 years.

Establishing databases for the collection and monitoring of respondent data is an important process that allows an organization to collect, organize, manage, and monitor information about the characteristics and behaviour of respondents [7]. This information can be used for a variety of purposes, such as strategic development, policy formulation, or performance evaluation. Based on the insights derived from the literature analysis, expert surveys [43], and respondent evaluations, the following eight steps are recommended to create a respondent database (Figure 2):

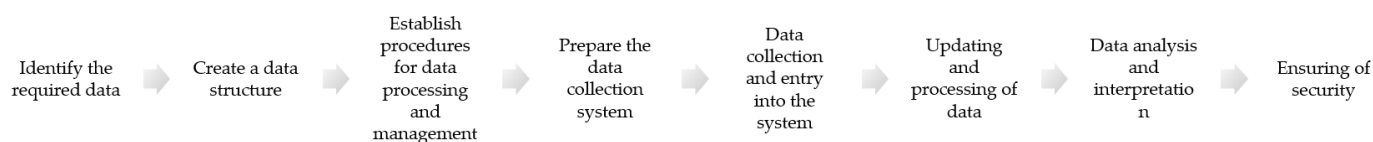


Figure 2. Steps for creating a respondent data collection database (compiled by authors based on the research results).

First, it must be determined what data need to be collected and stored. This may include respondents' personal information, demographic characteristics, behavioural data, etc. Once the required data are identified, a data structure must be created that is easy to understand and manage. When establishing data handling and management procedures, the first step is

to decide how the data will be collected, entered into the system, stored, and updated. This includes procedures and guidelines to help ensure data accuracy, integrity, and confidentiality. Then, the data collection system must be prepared. This includes creating a database or system to store respondent and monitoring data. This can be a database management system or popular tools such as Microsoft Excel or Access. Data collection and input into the system: Data can be collected in a variety of ways, such as by surveys, monitoring tools, or passive participant studies. The data must then be entered into the system in such a way as to ensure their accuracy and integrity. The database must be constantly updated whenever new data on respondents or monitoring results are available. This may include updating, changing, or deleting data if necessary. After completing the process of creating the database, the data can be used to analyse and interpret the respondents' characteristics, behaviour, and monitoring results. This can help an organization better understand its target audience and make research-based decisions. Respondent data must be protected from illegal actions. This may include encrypting datasets, passwords, or data backups; restricting access to data; and preventing unwanted data loss or corruption. Collecting respondent monitoring data is an important activity that allows organizations to obtain valuable information about their respondents' behaviour, activities, and future planning. Creating monitoring data storage databases is a complex process that requires properly prepared technological solutions.

The main five steps to be followed in the development of respondent monitoring data collection systems are outlined in Figure 3.



Figure 3. Steps in the development of a respondent monitoring data collection system.

To create a proper database, it is first necessary to determine what information the organization wants to obtain from respondent monitoring and how this information will be used. This will help determine the needs and structure of the base. It is important to provide easy-to-manage information for quality data collection, processing, and storage when designing a data collection system architecture. When creating databases, attention should be paid to the collection of respondent observation data, which can include a large amount of data, so it is important to create efficient data systems. This may mean creating a database, creating indexes, and implementing other means of organizing data. Respondent monitoring data are often sensitive and require certain safeguards. Measures should be put in place to ensure data security and privacy.

5. Discussion

The development of a well-structured methodology for monitoring of the social and economic progress of private forest owners is critical in establishing an effective system for tracking their development in Lithuania. Such a system plays a key role in ensuring the ongoing assessment of socio-economic indicators relevant to private forest owners, enabling the identification of challenges and the formulation of recommendations to enhance sustainable forest management policies. Furthermore, the implementation of a monitoring system for these indicators will assist authorities and stakeholders in gaining a deeper understanding of the strategies, needs, and challenges faced by private forest owners [41,43,53]. This could allow for more effective planning and the implementation of measures and programs to support and promote a sustainable forestry sector. The development of a monitoring system for the socio-economic indicators of private forest owners is a complex and long-term task that requires cooperation and dialogue with all parties involved in this sector to ensure sustainable management and use of forests and promote social and economic well-being [43].

When making decisions regarding the rational and sustainable utilization of forests, we encounter increasingly complex socio-economic factors that must be carefully considered and navigated. These factors encompass a wide range of economic, social, and environmental dimensions, each influencing the overall management and conservation strategies for forest resources [19,54]. This situation is shaped by evolving consumer demands, the expanding impact of non-state sectors, and the growth of privately owned forest lands. In this context, when discussing methods for monitoring of the social and economic development of private forest owners, it is essential to gather data that are not only technically reliable but also relevant and accessible to stakeholders [44,45]. When formulating private forest policies, it is necessary to know the most important information about the owners of private forests, as well as farming and its changes, in private forest estates [46].

Currently, data monitoring of private forest owners and the conducted scientific research provide only partial, unfocused, or incomplete information about forest management policy [61]. There is a lack of more detailed and comprehensive socio-economic data that could influence and improve forest management and the determinants of forest owners' behaviour and balance forest management now and in the future.

This study highlights the various benefits of monitoring the socio-economic indicators of private forest owners. One of the key advantages of such monitoring is its contribution to the evaluation of economic benefits, such as income and profits, generated from the management of this critical natural resource. Such insights are crucial for the planning and optimization of forest resource utilization, ultimately leading to an increase in the overall value of the forest. First, the benefits of monitoring of the economic-social indicators of private forest owners can be diverse. Such monitoring contributes to the assessment of economic benefits. By monitoring the economic indicators of the management of this natural resource, it is possible to assess the income and profit of forest owners [48]. Secondly, the monitoring of social indicators allows for an assessment of the forest's impact on local communities and society at large. Factors such as the aesthetic value of forested landscapes and the recreational potential of forests can be appraised, aiding in the formulation of forest use plans that align with the needs of the local community [49]. This can help to plan and optimize the use of forest resources and increase the value of the forest. The benefits of monitoring socio-economic indicators extend beyond individual forest owners, positively impacting the state and society at large. This approach contributes significantly to the promotion of sustainable forest management, the preservation of ecosystem services, and the fostering of regional economic development [50]. Lastly, by monitoring and analysing the socio-economic indicators of forest owners, valuable insights can be obtained into how legal and political measures influence private forest management. This information is instrumental in assessing the effectiveness of current legislation and policy implementation, thereby offering suggestions for enhancements when necessary.

By monitoring social indicators, it is possible to assess the impact of forests on the local community and society in general. For example, the aesthetic value of a forested landscape or the recreational potential of forests can be assessed. This can help to plan appropriate forms of forest use that meet the needs of the local community.

Forests provide many ecosystem services, such as air and water purification, mitigation of climate change variability, biodiversity conservation, etc. By monitoring forests, as well as socio-economic and ecological indicators, it is possible to assess how forest management contributes to the provision of ecosystem services [48–51]. This can lead to a more effective understanding of the functions of forest ecosystems and their impact on all forms of life. By monitoring and analysing the socio-economic indicators of forest owners, it is possible to obtain data on how legal and political measures affect the management of private forests. This can help assess the current effectiveness of legislation and policy implementation and provide suggestions for improvement in this area, if necessary.

As the analysis of the research results show, a monitoring system for the socio-economic indicators of private forest owners may include various indicators, such as general information about the forest owner, information about the forest estate, and activities of the owner

in the forest estate. Based on the data from the analysis of the survey results, it is recommended that monitoring be carried out every 5 years to obtain long-term and consistently comparable data on the development of the activities and management of private forests. Such periodic monitoring is carried out in many foreign countries to evaluate or achieve certain goals, determine the needs of economic and social policy, predict future trends, and make necessary decisions based on these data. A monitoring periodicity of every 5 years also avoids excessive data collection and administrative costs. It also gives analysts and policy makers enough time to evaluate the obtained results, identify long-term economic and social policy developments, and develop adequate and effective actions. However, it should be noted that the 5-year interval may be too long to analyse certain situations. Some economic and social indicators may change during such a period, which may complicate the interpretation of these data and the assessment of the current situation. Therefore, other follow-up intervals (e.g., 3 years or 10 years) may be available depending on specific needs and circumstances.

Another important step in the analysis of socio-economic data is the creation of databases for the collection of respondent data. Such databases would allow organizations to collect, organize, and manage information on the characteristics and behaviour of respondents and monitoring data.

The limitation of this research lies in its adaptation of the methodology for monitoring of the socio-economic indicators of private forest owners according to Lithuanian needs and standards, with a future vision in mind. There is also a possibility that not all persons who answered the questionnaire were forest owners. To achieve ambitious plans, similar studies are needed in other European countries, looking for similarities and differences to create a common European private forest monitoring system, which would help to adopt relevant legal acts, political decisions, and supporting programs so that European forests are sustainable and an ecological–economical balance is maintained. This common European private forest monitoring system should include various functions, such as forest condition monitoring and assessment, verification of the accuracy of wood origin and destination, sustainable forest planning and management, tracking of forest owners' incomes and expenses, monitoring of the scope and structure of forestry activities, etc. In addition, the monitoring system should be able to be integrated with existing national monitoring systems to obtain accurate data on the state and activity of forests across Europe. This would allow more effective planning and management of forest resources, as well as the implementation of sustainable forestry policy.

6. Conclusions

To effectively monitor the socio-economic indicators of private forest owners, it is essential to establish specific intervals and conditions for conducting surveys. Ensuring the representativeness of the data is also essential. Therefore, it is recommended that physical private forest owners be selected based on the size of their managed forest estate, applying the same criterion for legal entities. Surveys should be conducted anonymously using a structured questionnaire administered either through personal interviews or online.

The research results highlight that monitoring of the economic and social indicators of forest owners benefits not only the owners but also the state and society. According to respondents, such monitoring can promote sustainable forest management, maintain ecosystem services, and contribute to regional economic development.

To ensure high-quality monitoring, it is important to motivate respondents by clearly communicating the study's objectives and the potential benefits to participants. When respondents understand how they might benefit from the research, they are more likely to participate openly and provide detailed responses. Valuing their opinions and emphasizing the importance of their contributions can further encourage cooperation. Residence size, property size, and association membership are the most influential factors driving the need for forest monitoring, while knowledge of forestry, distance to the forest, and gender have weaker but still significant effects.

Additionally, the creation of a database for the storage of respondent and monitoring data is important. Such a system would facilitate the collection, processing, and management of data on respondent characteristics and behaviours, as well as monitoring results. This database would support both quantitative and qualitative data, including demographic information, behavioural insights, and opinions, all of which are critical for sustainable forest management.

Author Contributions: Conceptualization, D.P., A.D., M.A. and A.P.; methodology, A.D. and D.P.; validation, A.D. and D.P.; formal analysis, A.D., D.P., A.P. and M.Š.; investigation, M.A., A.P., A.D. and O.B.; resources, M.A.; data curation, A.D., D.P. and A.P.; writing—original draft preparation, D.P. and A.D.; writing—review and editing, D.P., A.D., M.Š., H.F.P.e.S. and M.A.P.D.; visualization, D.P., A.D., O.B. and A.P.; project administration, D.P. and A.D.; funding acquisition, M.A. and M.A.P.D. All authors have read and agreed to the published version of the manuscript.

Funding: This work was supported by the Ministry of Environment of the Republic of Lithuania (project number VPS-2022-6-SBMŪRP).

Data Availability Statement: Data are unavailable due to privacy or ethical restrictions.

Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A. Private Forest Owners Questionnaire

A. GENERAL INFORMATION ABOUT THE OWNER OF THE FOREST

1. You are (check the answer option):
Female ☐ Male ☐ I don't want to specify ☐
2. Your age (circle the answer option):
 - (a) up to 25 years
 - (b) 25–39 years old.
 - (c) 40–60 years old.
 - (d) older than 60 years.
 - (e) I don't want to specify.
3. Your place of residence (circle the answer option):
 - (a) city;
 - (b) small town;
 - (c) village;
 - (d) other (specify) _____
4. Your education (circle the answer option):
 - (a) high university education;
 - (b) non-university high education;
 - (c) secondary;
 - (d) special secondary education;
 - (e) incomplete secondary education;
 - (f) other (specify) _____
5. Your knowledge in the field of forestry (circle the answer option, there may be more options):
 - (a) higher/higher education in forestry/forestry;
 - (b) I do not have a forestry education, but I have work experience in the field of forestry;
 - (c) courses and seminars;
 - (d) mass media (press, television, internet, etc.);
 - (e) I don't know anything;
 - (f) other (specify) _____

6. Are you a member of associations, societies, etc. member of organizations that are related to forests and/or activities in them. (circle the answer option, there may be more options):
 - (a) hunters group;
 - (b) association of forest owners/cooperative;
 - (c) I do not belong to any forest-related organization, society, etc.;
 - (d) other (specify) _____
7. You are:
 - (a) top, mid-level manager;
 - (b) specialist, clerk;
 - (c) worker, technical worker;
 - (d) working under a business certificate/individual activity;
 - (e) farmer;
 - (f) unemployed;
 - (g) pensioner;
 - (h) student, pupil.
8. What is your average monthly income, before taxes, i.e., “on paper”? (circle the answer option) (personal income, not from the forest estate)
 - (a) up to 840 EUR (minimum salary);
 - (b) from 841 to 1200 EUR;
 - (c) from 1201 to 3000 EUR (average salary);
 - (d) 3001 EUR and more;
 - (e) I have no monthly income;
 - (f) I do not want to answer;
 - (g) other (specify) _____

B. OPINION ON THE NEED FOR MONITORING

9. In your opinion, is it necessary to monitor the socio-economic development of private forest owners in Lithuanian private forests?
 - (a) Yes;
 - (b) No;
 - (c) I don't know;
10. In your opinion, what are the benefits of monitoring the socio-economic development of private forest owners? (choose all the answers that are acceptable to you)
 - (a) it will be useful not only for the forests' owners themselves, but also for the state and society;
 - (b) it will help to ensure sustainable forest management;
 - (c) it will maintain the provision of ecosystem services;
 - (d) it will contribute to the economic development of the region;
 - (e) other (specify) _____
11. What do you expect from this monitoring?
 - (a) Formation of sustainable private forest policy;
 - (b) Contribution to sustainable forest development;
 - (c) Prevention of climate change;
 - (d) Community involvement and promotion of social responsibility;
 - (e) other (specify) _____
12. What would motivate you to participate in this monitoring?
 - (a) Privileges _____
 - (b) Provision of consultations and information;
 - (c) Personal motivation;
 - (d) Practical benefits;
 - (e) other (specify) _____

13. Would you agree to be a permanent member of the group?
 - (a) Yes;
 - (b) No;
 - (c) I don't know;
 - (d) other (specify) _____
14. How often do you think surveys of private forest owners should be conducted?
 - (a) once a year;
 - (b) once every 2 years;
 - (c) once every 3 years;
 - (d) once every 5 years;
 - (e) once every 10 years.
 - (f) other
15. Do you have any other observations that are not listed in this questionnaire? If so, please specify them.

References

1. Blanco, V.; Brown, C.; Holzhauer, S.; Vulturius, G.; Rounsevell, M.D. The importance of socio-ecological system dynamics in understanding adaptation to global change in the forestry sector. *J. Environ. Manag.* **2017**, *196*, 36–47. [\[CrossRef\]](#) [\[PubMed\]](#)
2. Riccioli, F.; Fratini, R.; Marone, E.; Fagarazzi, C.; Calderisi, M.; Brunialti, G. Indicators of sustainable forest management to evaluate the socio-economic functions of coppice in Tuscany, Italy. *Socio-Econ. Plan. Sci.* **2020**, *70*, 100732. [\[CrossRef\]](#)
3. Brukas, V.; Sallnäs, O. Forest management plan as a policy instrument: Carrot, stick or sermon? *Land Use Policy* **2012**, *29*, 605–613. [\[CrossRef\]](#)
4. Sotirov, M.; Sallnäs, O.; Eriksson, L.O. Forest owner behavioral models, policy changes, and forest management. An agent-based framework for studying the provision of forest ecosystem goods and services at the landscape level. *For. Policy Econ.* **2019**, *103*, 79–89. [\[CrossRef\]](#)
5. Liubachyna, A.; Secco, L.; Pettenella, D. Reporting practices of state forest enterprises in Europe. *For. Policy Econ.* **2017**, *78*, 162–172. [\[CrossRef\]](#)
6. Falcone, P.M.; Tani, A.; Tartiu, V.E.; Imbriani, C. Towards a sustainable forest-based bioeconomy in Italy: Findings from a SWOT analysis. *For. Policy Econ.* **2020**, *110*, 101910. [\[CrossRef\]](#)
7. Feliciano, D.; Bouriaud, L.; Brahic, E.; Deuffic, P.; Dobsinska, Z.; Jarsky, V.; Ficko, A. Understanding private forest owners' conceptualisation of forest management: Evidence from a survey in seven European countries. *J. Rural. Stud.* **2017**, *54*, 162–176. [\[CrossRef\]](#)
8. Weiss, G.; Lawrence, A.; Hujala, T.; Lidestav, G.; Nichiforel, L.; Nybakk, E.; Živojinović, I. Forest ownership changes in Europe: State of knowledge and conceptual foundations. *For. Policy Econ.* **2019**, *99*, 9–20. [\[CrossRef\]](#)
9. Wolfslehner, B.; Vacik, H.; Lexer, M.J. Application of the analytic network process in multi-criteria analysis of sustainable forest management. *For. Ecol. Manag.* **2005**, *207*, 157–170. [\[CrossRef\]](#)
10. Dressel, S.; Ericsson, G.; Sandström, C. Mapping social-ecological systems to understand the challenges underlying wildlife management. *Environ. Sci. Policy* **2018**, *84*, 105–112. [\[CrossRef\]](#)
11. Skulska, I.; Colaço, M.C.; Aggarwal, S.; Didier, H.; Monteiro, M.D.L.; Rego, F.C. Assessment of portuguese community forestry using the voluntary guidelines on the responsible governance of tenure and FAO community-based forestry framework. *Soc. Nat. Resour.* **2020**, *33*, 101–121. [\[CrossRef\]](#)
12. Rodriguez Franco, C.; Conje, J. The evolution of the dialogue and perspectives on sustainable forest management with special emphasis on the United States of America. *J. Sustain. For.* **2023**, *42*, 747–791. [\[CrossRef\]](#)
13. Pour, M.D.; Barati, A.A.; Azadi, H.; Scheffran, J.; Shirkhani, M. Analyzing forest residents' perception and knowledge of forest ecosystem services to guide forest management and biodiversity conservation. *For. Policy Econ.* **2023**, *146*, 102866.
14. Warziniack, T.; Allor, L.; Bunn, D.; McHale, M. Forests as social-ecological systems. In *Future Forests*; McNulty, S.G., Ed.; Elsevier: Amsterdam, The Netherlands, 2024; pp. 265–278.
15. Eggers, J.; Roos, U.; Lind, T.; Sandström, P. Adapted Forest management to improve the potential for reindeer husbandry in Northern Sweden. *Ambio* **2024**, *53*, 46–62. [\[CrossRef\]](#)
16. Tadesse, T.; Teklay, G.; Mulatu, D.W.; Rannestad, M.M.; Meresa, T.M.; Woldelibanos, D. Forest benefits and willingness to pay for sustainable forest management. *For. Policy Econ.* **2022**, *138*, 102721. [\[CrossRef\]](#)
17. Bowditch, E.A.; McMorran, R.; Smith, M.A. Right connection, right insight engaging private estate managers on woodland expansion issues in times of uncertainty. *Land Use Policy* **2023**, *124*, 106437. [\[CrossRef\]](#)
18. Makrickiene, E.; Brukas, V.; Brodrechtova, Y.; Mozgeris, G.; Sedmák, R.; Šálka, J. From command-and-control to good forest governance: A critical interpretive analysis of Lithuania and Slovakia. *For. Policy Econ.* **2019**, *109*, 102024. [\[CrossRef\]](#)

19. Haji, L.; Valizadeh, N.; Hayati, D. The role of local communities in sustainable land and forest management. In *Spatial Modeling in Forest Resources Management: Rural Livelihood and Sustainable Development*, 1st ed.; Shit, P.K., Pourghasemi, H.R., Das, P., Bhunia, G.S., Eds.; Springer International Publishing: Cham, Switzerland, 2020; pp. 473–503.
20. Kalinauskas, M.; Bogdzevič, K.; Gomes, E.; Inácio, M.; Barcelo, D.; Zhao, W.; Pereira, P. Mapping and assessment of recreational cultural ecosystem services supply and demand in Vilnius (Lithuania). *Sci. Total Environ.* **2023**, *855*, 158590. [\[CrossRef\]](#)
21. Roitsch, D.; Abruscato, S.; Lovrić, M.; Lindner, M.; Orazio, C.; Winkel, G. Close-to-nature forestry and intensive forestry—Two response patterns of forestry professionals towards climate change adaptation. *For. Policy Econ.* **2023**, *154*, 103035. [\[CrossRef\]](#)
22. Niedziałkowski, K.; Chmielewski, P. Challenging the dominant path of forest policy? Bottom-up, citizen forest management initiatives in a top-down governance context in Poland. *For. Policy Econ.* **2023**, *154*, 103009. [\[CrossRef\]](#)
23. Thomas, J.; Brunette, M.; Leblois, A. The determinants of adapting forest management practices to climate change: Lessons from a survey of French private forest owners. *For. Policy Econ.* **2022**, *135*, 102662. [\[CrossRef\]](#)
24. Pezdevšek Malovrh, Š.; Krajnc, N.; Triplat, M. Factors Influencing Private Forest Owners' Readiness to Perform Forest Management Services Within a Machinery Ring. *Small-Scale For.* **2022**, *21*, 661–679. [\[CrossRef\]](#)
25. Joshi, S.; Arano, K.G. Determinants of private forest management decisions: A study on West Virginia NIPF landowners. *For. Policy Econ.* **2009**, *11*, 118–125. [\[CrossRef\]](#)
26. Tiebel, M.; Mölder, A.; Plieninger, T. Conservation perspectives of small-scale private forest owners in Europe: A systematic review. *Ambio* **2022**, *51*, 836–848. [\[CrossRef\]](#) [\[PubMed\]](#)
27. Quiroga, S.; Suarez, C.; Ficko, A.; Feliciano, D.; Bouriaud, L.; Brahic, E.; Nybakk, E. What influences European private forest owners' affinity for subsidies? *For. Policy Econ.* **2019**, *99*, 136–144. [\[CrossRef\]](#)
28. Larsen, J.B.; Angelstam, P.; Bauhus, J.; Carvalho, J.F.; Diaci, J.; Dobrowolska, D.; Schuck, A. *Closer-to-Nature Forest Management. From Science to Policy*; European Forest Institute: Joensuu, Finland, 2022; Volume 12, pp. 1–54.
29. Stojanovski, V. Policy Processes in the Institutionalisation of Private Forestry in the Republic of North Macedonia. *Sustainability* **2022**, *14*, 4018. [\[CrossRef\]](#)
30. Westin, K.; Bolte, A.; Haeler, E.; Haltia, E.; Jandl, R.; Juutinen, A.; Schueler, S. Forest values and application of different management activities among small-scale forest owners in five EU countries. *For. Policy Econ.* **2023**, *146*, 102881. [\[CrossRef\]](#)
31. Juutinen, A.; Tolvanen, A.; Koskela, T. Forest owners' future intentions for forest management. *For. Policy Econ.* **2020**, *118*, 102220. [\[CrossRef\]](#)
32. Haugen, K.; Karlsson, S.; Westin, K. New Forest owners: Change and continuity in the characteristics of Swedish non-industrial private forest owners (NIPF owners) 1990–2010. *Small-Scale For.* **2016**, *15*, 533–550. [\[CrossRef\]](#)
33. Mook, A.; Dwivedi, P. Exploring links between education, forest management intentions, and economic outcomes in light of gender differences in the United States. *For. Policy Econ.* **2022**, *145*, 102861. [\[CrossRef\]](#)
34. Degnet, M.B.; Hansson, H.; Hoogstra-Klein, M.A.; Roos, A. The role of personal values and personality traits in environmental concern of non-industrial private forest owners in Sweden. *For. Policy Econ.* **2022**, *141*, 102767. [\[CrossRef\]](#)
35. Janová, J.; Hampel, D.; Kadlec, J.; Vrška, T. Motivations behind the forest managers' decision making about mixed forests in the Czech Republic. *For. Policy Econ.* **2022**, *144*, 102841. [\[CrossRef\]](#)
36. Deuffic, P.; Sotirov, M.; Arts, B. "Your policy, my rationale": How individual and structural drivers influence European forest owners' decisions. *Land Use Policy* **2018**, *79*, 1024–1038. [\[CrossRef\]](#)
37. Aithal, A.; Aithal, P.S. Development and validation of survey questionnaire & experimental data—a systematical review-based statistical approach. *Int. J. Manag. Technol. Soc. Sci. IJMTS* **2020**, *5*, 233–251.
38. Rassel, G.; Leland, S.; Mohr, Z.; O'Sullivan, E. *Research Methods for Public Administrators*; Routledge: Abington, UK, 2020.
39. Hennink, M.; Hutter, I.; Bailey, A. *Qualitative Research Methods*; Sage: Thousand Oaks, CA, USA, 2020.
40. Tracy, S.J. *Qualitative Research Methods: Collecting Evidence, Crafting Analysis, Communicating Impact*; John Wiley & Sons: Hoboken, NJ, USA, 2019.
41. Krueger, R.A. *Focus Groups: A Practical Guide for Applied Research*; Sage Publications: Thousand Oaks, CA, USA, 2014.
42. Eriksson, L.; Fries, C. Relations between structural characteristics, forest involvement, and forest knowledge among private forest owners in Sweden. *Eur. J. For. Res.* **2021**, *140*, 51–63. [\[CrossRef\]](#)
43. Perkumienė, D.; Doftartė, A.; Škėma, M.; Aleinikovas, M.; Elvan, O.D. The Need to Establish a Social and Economic Database of Private Forest Owners: The Case of Lithuania. *Forests* **2023**, *14*, 476. [\[CrossRef\]](#)
44. Eriksson, L.; Fries, C. The knowledge and value basis of private forest management in Sweden: Actual knowledge, confidence, and value priorities. *Environ. Manag.* **2020**, *66*, 549–563. [\[CrossRef\]](#)
45. Baranovskis, G.; Nikodemus, O.; Brūmelis, G.; Elferts, D. Biodiversity conservation in private forests: Factors driving landowner's attitude. *Biol. Conserv.* **2022**, *266*, 109441. [\[CrossRef\]](#)
46. Johnsson, F.; Beery, T. Outdoor recreation and the private forest owner: Place attachment, social values, and public access. *Front. Conserv. Sci.* **2023**, *3*, 1058557. [\[CrossRef\]](#)
47. Gaizauskaitė, I.; Valavičienė, N. *Socialinių Tyrimų Metodai: Kokybinis Interviu*; Registrų Centras: Vilnius, Lithuania, 2016.
48. Glastonbury, B.; MacKean, J. Survey methods. In *Handbook for Research Students in the Social Sciences*; Routledge: Abington, UK, 2020; pp. 225–247.
49. Meirte, J.; Hellemans, N.; Anthonissen, M.; Denteneer, L.; Maertens, K.; Moortgat, P.; Van Daele, U. Benefits and disadvantages of electronic patient-reported outcome measures: Systematic review. *JMIR Perioper. Med.* **2020**, *3*, e15588. [\[CrossRef\]](#)

50. Valli, R. Creating a questionnaire for a scientific study. *Int. J. Res. Stud. Educ.* **2017**, *6*, 15–27. [[CrossRef](#)]
51. Eggers, J.; Holmgren, S.; Nordström, E.M.; Lämås, T.; Lind, T.; Öhman, K. Balancing different forest values: Evaluation of forest management scenarios in a multi-criteria decision analysis framework. *For. Policy Econ.* **2019**, *103*, 55–69. [[CrossRef](#)]
52. Grošelj, P.; Zandebasiri, M.; Pezdevšek Malovrh, Š. Evaluation of the European experts on the application of the AHP method in sustainable forest management. *Environ. Dev. Sustain.* **2023**, *4*, 1–27. [[CrossRef](#)]
53. Korhonen, J.; Panwar, R.; Henderson, J.; Fernholz, K.; Leggett, Z.; Meyer, E.; Bhuta, A.A. Gaps in diversity representation and data insufficiencies in the US forest sector workforce analysis. *Trees For. People* **2024**, *15*, 100486.
54. Paluš, H.; Marcinek, L.; Šálka, J. Was stakeholder participation in the PEFC revision process successful in Slovakia? *For. Policy Econ.* **2024**, *158*, 103118. [[CrossRef](#)]
55. Sari, R.R.; Tanika, L.; Speelman, E.N.; Saputra, D.D.; Hakim, A.L.; Rozendaal, D.M.; van Noordwijk, M. Farmer Options and Risks in Complex Ecological-Social systems: The FORCES game designed for agroforestry management of upper watersheds. *Agric. Syst.* **2024**, *213*, 103782. [[CrossRef](#)]
56. Fernandes, M.E.; Simões, P. Private Forest owners' organizations adherence to policy tools. Insights from Portugal. *For. Policy Econ.* **2024**, *160*, 103147. [[CrossRef](#)]
57. Fassnacht, F.E.; White, J.C.; Wulder, M.A.; Næsset, E. Remote sensing in forestry: Current challenges, considerations and directions. *For. Int. J. For. Res.* **2024**, *97*, 11–37. [[CrossRef](#)]
58. Brandstedt, E.; Busch, H.; Lycke, E.; Ramasar, V. Winds of change: An engaged ethics approach to energy justice. *Energy Res. Soc. Sci.* **2024**, *110*, 103427. [[CrossRef](#)]
59. King, S.; Agra, R.; Zolyomi, A.; Keith, H.; Nicholson, E.; de Lamo, X.; Brown, C. Using the system of environmental-economic accounting ecosystem accounting for policy: A case study on forest ecosystems. *Environ. Sci. Policy* **2024**, *152*, 103653. [[CrossRef](#)]
60. Ghazoul, J.; Schweizer, D. *Forests for the Future: Restoration Success at Landscape Scale—What Will It Take and What Have We Learned*; ETH Zurich: Zürich, Switzerland, 2021.
61. Loomis, J.J.; Souza, F.D.A.; Angel, M.; Fabbri, A. Technology-enhanced community forest management in tropical regions: A state of the art. *J. Environ. Manag.* **2024**, *350*, 119651. [[CrossRef](#)] [[PubMed](#)]

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.