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# DEVELOPMENT OF SOCIAL FORESTRY GOVERNANCE RESEARCH FOR SUSTAINABLE FOREST MANAGEMENT: BIBLIOMETRIC ANALYSIS

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**Abstract**

Research on social forestry governance in supporting sustainable forest management continues to grow along with increasing attention to the issues of deforestation, climate change, and empowerment of forest communities. However, this research development is still scattered across various themes, so an analysis is needed to map the structure of knowledge and the direction of the study's development comprehensively. This study aims to analyze publication trends, dominant themes, and the conceptual structure of research related to social forestry governance using a bibliometric approach. Research data was obtained from the Scopus database with a publication range of 2014–2024 using the keywords social forestry, community forestry, forest governance, and sustainable forest management. A total of 294 publications were analyzed using Bibliometrix, Biblioshiny, and VOSviewer software through co-occurrence analysis, thematic maps, and Multiple Correspondence Analysis (MCA). The results show that the trend of scientific publications has experienced a significant increase, especially after 2018. Dominant themes in the research include forest management, community forestry, forest governance, sustainability, ecosystem services, and conservation. The analysis also shows that social forestry research is developing in a multidisciplinary manner, focusing on collaborative governance, community participation, environmental sustainability, and institutional strengthening in forest management. Thus, social forestry governance plays a crucial role in supporting sustainable forest management through the integration of social, economic, and ecological aspects.

**Keywords:** Bibliometrics, Social Forestry, Forest Governance, Sustainable Forest Management, Vosviewer.

## INTRODUCTION

The issue of sustainable forest management is a global concern as pressure increases due to population growth., triggering deforestation, land degradation, climate change, and exploitation of natural resources that threaten the sustainability and function of forests (FAO, 2018; Gupta et al., 2026). Forests play a vital role as providers of environmental services, carbon sinks, biodiversity protectors (Jelibseda et al., 2024), and as a pillar of social and economic life for communities (Purwandari & Herdianto, 2024). However, forest cover loss continues to occur in many developing countries due to the use of forest land for other purposes, such as agriculture, infrastructure development, and extractive industries (Faria & Almeida, 2016; Leberger et al., 2020), which results in a decline in environmental quality and an increased risk of ecological disasters and socio-economic instability (Burki et al., 2021). Furthermore, climate change worsens the function of forest ecosystems through increasing temperatures, changing rainfall patterns, droughts, and forest fires (Seidl et al., 2017; Praveen et al., 2025). On the other hand, forests play a strategic role in mitigating and adapting to climate change through their capacity as carbon sinks and stores. Therefore, sustainable forest management is a crucial agenda in supporting the achievement of sustainable development goals (Prins et al., 2023). Sustainable forest management emphasizes a balance between ecological, social, and economic aspects; not only conservation but also the sustainability of community livelihoods (Prins et al., 2023; Natho & Hudson, 2024), and therefore must be implemented through institutional strengthening, economic


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efficiency, and local community participation (Ariyanto, 2024). This approach is evolving from a centralized system to a community-based one, including the concept of social forestry.as a response to tenurial conflicts and unequal access, by granting management rights to communities to improve welfare while maintaining forest sustainability (Wahyu et al., 2020; Rukminda et al., 2020; Ramadhani et al., 2024). Social forestry has been proven to increase vegetation cover, reduce deforestation, strengthen local economies, and improve institutional capacity and community resilience to climate change (Santika et al., 2017; Wasongko et al., 2024). However, its implementation still faces challenges in forestry governance, which include aspects of policy, institutions, stakeholder coordination, transparency, and community participation in decision-making (Rakatama & Pandit, 2020; Wong et al., 2020). Weak institutional capacity, conflicts of interest, limited mentoring, and poor cross-sectoral coordination remain major obstacles to the success of social forestry programs (Widiyanto et al., 2025).

In line with the challenges of social forestry governance, collaborative governance has become a crucial approach involving government, communities, the private sector, academics, and NGOs to strengthen sustainable forest management (Sitorus, 2025; Sariyadi et al., 2025). This approach increases participation, adaptability, effectiveness, and legitimacy of forestry policies (Assche et al., 2021). In Indonesia, social forestry has become an instrument for agrarian reform and welfare improvement through various schemes, but it still faces constraints such as institutional capacity, market access, mentoring, and policy synchronization (Pambudi, 2023; Jain et al., 2023). With increasing attention to this issue, social forestry studies have developed rapidly, focusing not only on conservation but also encompassing community empowerment, climate change, the green economy, and collaborative governance, thus becoming a multidisciplinary study (Larson et al., 2021; Sariyadi et al., 2025; Wasongko et al., 2020). Although research related to social forestry and forest governance continues to grow, it remains scattered across diverse themes and approaches. Therefore, it does not yet provide a comprehensive picture of the direction of research development, the relationships between topics, or themes with research gaps. Therefore, bibliometric analysis is necessary to map the development of scientific publications, identify research trends, patterns of scientific collaboration, and the direction of research development on social forestry governance to support sustainable forest management in the future.

## RESEARCH METHODS

This study applies bibliometric methods to assess and map the development of scientific publications and research gaps related to social forestry governance in supporting future sustainable forest management (Chen et al., 2014). This approach is used to systematically and objectively uncover patterns of knowledge development, research dynamics, and intellectual structures. The analysis process follows the steps recommended by Donthu et al. (2021) and Rahman (2023), as shown in Figure 1.

### Time and Place

This research is a literature review-based study utilizing secondary data obtained from the Scopus database through a structured search using predetermined keywords. Data collection was conducted in May 2026. The entire dataset was analyzed using VOSviewer software to visualize bibliometric networks and systematically identify collaboration patterns, research trends, and topic clusters.

### Population and Sample

Based on the results of data extraction, 294 scientific publications related to social forestry were obtained with the involvement of 1,086 authors, which indicates a fairly high level of research collaboration with an average value of co-authors per document of 4.14.


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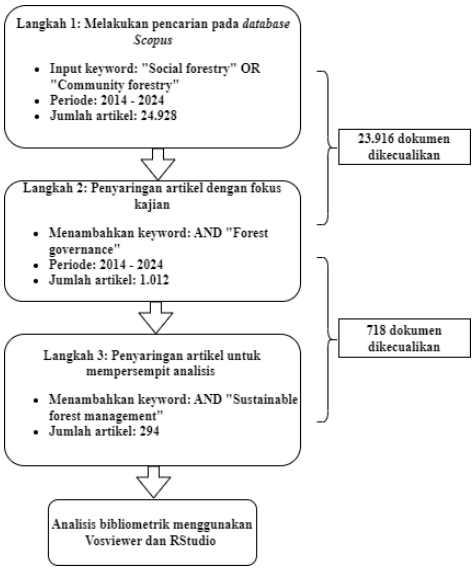
Table 1. Overview of Scopus data used for social forestry in sustainable forest management

| Description | Amount |
|---|---|
| Publication Type | |
| Article | 218 |
| Book | 1 |
| Book chapter | 31 |
| Conference paper | 10 |
| Editorial | 4 |
| Erratum | 2 |
| Note | 2 |
| Review | 26 |
| Total Publications | 294 |
| Total Authors | 1,086 |
| *Author of single-authored docs* | 33 |
| Writing Collaboration | |
| Single-authored docs | 34 |
| Co-Authors per doc | 4.14 |
| Annual growth percentage | 43.2% |
| Average citations per document | 19.05 |

Furthermore, this research topic has experienced quite rapid development, with an annual publication growth rate of 43.2%. Meanwhile, the average citation rate per document of 19.05 indicates that publications in the field of social forestry have made a significant contribution and are of scientific relevance in supporting the development of sustainable forest management studies.

## Types and Methods of Data Collection

The initial literature search was conducted using the query TITLE-ABS-KEY ("social forestry" OR "community forestry") AND ("forest governance") in the Scopus database. The search yielded 1,012 scientific publications on a global scale. The data collection steps are presented in Figure 1 below. 1.




Picture1Stages of searching and filtering articles in the Scopus database

The data analysis in this study was conducted using a bibliometric approach to identify research development patterns and map the knowledge structure related to social forestry governance in supporting sustainable forest management. The validated bibliographic data was then standardized using the Bibliometrix package in RStudio to maintain metadata consistency. The data was then exported in CSV format and visualized using VOSviewer software.

The data validation stage includes checking for duplication, verifying metadata, and selecting documents based on relevance to the research topic. Next, a standardization process is carried out by aligning variations in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author names, institutions, and keywords through term normalization and combining synonyms using the Bibliometrix package in RStudio. This stage aims to improve metadata consistency and reduce potential analysis bias. *Dataset*The data were then analyzed using VOSviewer to identify publication trends, co-authorship patterns, and conceptual linkages through keyword co-occurrence analysis. The global analysis used a minimum occurrence threshold of 10, while the Indonesia-specific analysis used a minimum occurrence threshold of 2 due to the relatively limited number of available publications, namely 38 documents. The analysis results were used to map the knowledge structure, research developments, as well as dominant themes and research gaps related to social forestry in supporting sustainable forest management.

## RESULTS AND DISCUSSION

### Mapping Social Forestry Research Trends in Sustainable Forest Resource Management

The growth trend of scientific publications on social forestry governance during the 2014–2024 period, presented in Figure 2, shows an upward trend, although it fluctuates in certain years. The increase in the number of publications, which peaked in 2020, indicates that social forestry is receiving increasing academic attention as part of efforts to achieve sustainable forest management, community empowerment, and climate change mitigation. This high level of research interest is also influenced by the development of social forestry policy implementation in Indonesia, which encourages studies related to institutions, community participation, and sustainable forest management.

According to Supriatna et al. (2024), social forestry is a crucial instrument for improving community welfare while preserving forests. Therefore, social forestry has become a focus of research in the field of forestry and sustainable development. Furthermore, research by Rijal (2024) explains that the increasing study of social forestry governance is also related to the need to evaluate various implementation challenges in the field, such as institutional capacity and the effectiveness of forest area management.

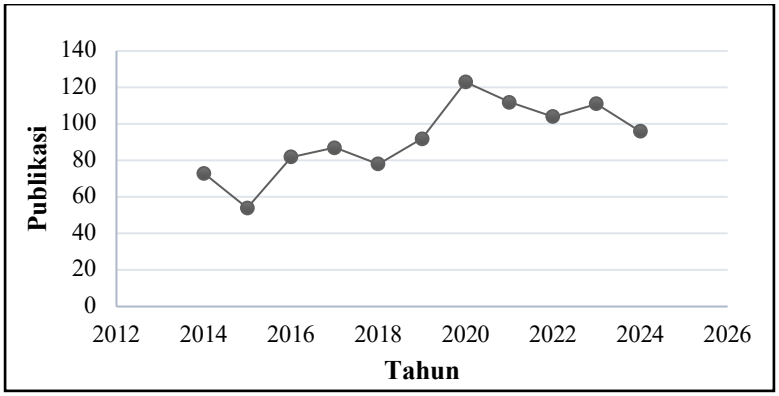


Figure 2. Growth trends in scientific publications on social forestry governance
Source: Scopus (2026)

The trend of scientific publications related to social forestry governance shows a fairly consistent increase during the 2014–2024 period.Figure 3)The increase in publications after 2018 reflects growing academic attention to the role of social forestry in supporting sustainable forest management, resolving tenure conflicts, and community well-being. This finding aligns with research by Moeliono et al. (2020), which emphasized the importance of community-based forest management approaches in supporting sustainable development.

This increasing publication trend also indicates the need to evaluate the effectiveness of social forestry policy implementation in Indonesia. Several recent studies highlight that the success of social forestry programs is heavily influenced by local institutional capacity, community participation, access to mentoring, and government policy support. Research by Maryudi et al. (2022) states that the main challenges facing social forestry in Indonesia remain related to institutional governance and the sustainability of community businesses, necessitating strengthened collaboration among stakeholders in sustainable forest management. These findings demonstrate that the high number of publications not only reflects growing academic interest but also demonstrates the continued need for research to support the optimization of social forestry governance in Indonesia.


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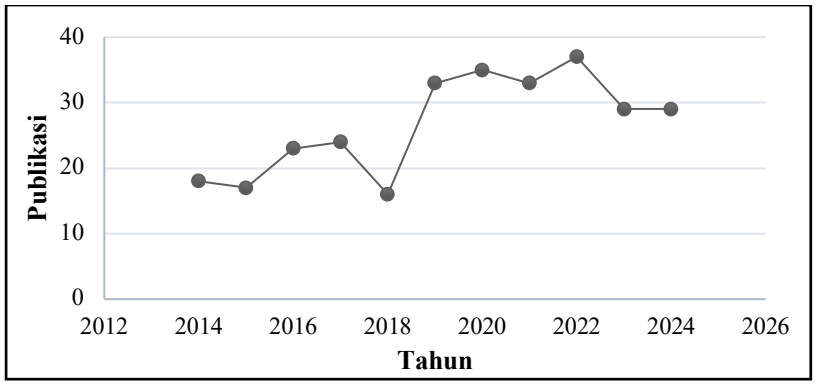


Figure 3. Growth trend of scientific publications on social forestry governance to support sustainable forest management
Source: Scopus (2026)

Continuing the temporal trend analysis, the distribution of publications based on publication sources is presented in Figure 4. The figure shows the distribution of the most relevant sources in scientific publications related to the analyzed topic. The most dominant publication source comes from the journal Forest Policy and Economics with 32 documents, followed by Forests with 24 documents. Next, the International Forestry Review recorded 15 documents, and Land Use Policy with 11 documents. Other journals include Environmental Management (9 documents), IOP Conference Series: Earth and Environmental Science (8 documents), and Ecology and Society, Journal of Sustainable Forestry, Land, and Small-scale Forestry (7 documents each). These findings indicate that studies on social forestry and sustainable forest governance are mostly published in journals that focus on forestry policy, land use, and environmental sustainability.

This pattern indicates that research related to social forestry is concentrated in highly reputable journals focusing on policy, forestry economics, and forest resource governance. The dominance of Forest Policy and Economics and Forests indicates that this issue is widely discussed in the context of policy analysis and forest management sustainability. This aligns with recent literature, which emphasizes that modern forestry studies are increasingly directed toward a multidisciplinary approach that integrates governance, economics, and environmental sustainability aspects to support sustainable forest management (Arts et al., 2024; Garcia et al., 2018).

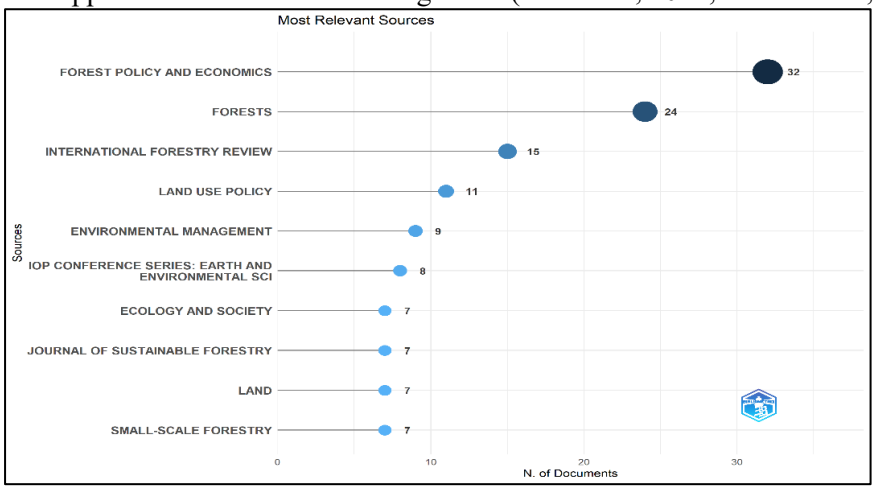


Figure 4. Scopus-indexed periodicals that publish research related to social forestry governance to support sustainable forest management
Source: Biblioshiny data processing using Scopus database (2026)

Next, an analysis of the authors' countries of origin, as shown in Figure 5, was conducted to determine the distribution of research contributions from various regions and to examine the forms of international collaboration on the research topic. Country information was obtained through author affiliation metadata in the Scopus database and analyzed using the full counting method. This approach counts each country listed in a publication as a full contribution, regardless of the order or role of the authors in the article. This means that if an article is written by authors from more than one country, each country involved still receives a single publication contribution count.

This method is widely used in bibliometric research because it is considered to provide a more comprehensive depiction of the level of country involvement and international collaboration networks (Donthu et al., 2021; Van Eck & Waltman, 2010).

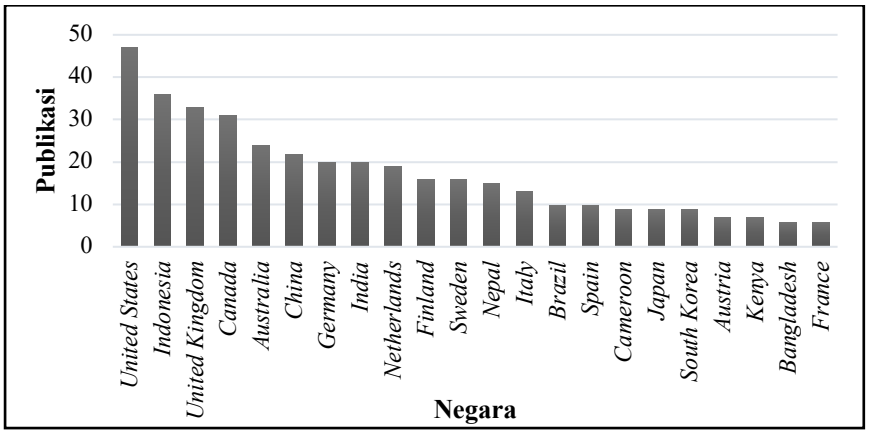


Figure 5. Publication contributions based on author's country of origin
Source: Scopus (2026)

Next, the author productivity analysis is presented in Figure 6. Author productivity trends based on publication year in bibliometric analysis aim to identify the development of authors' scientific contributions in a research field over time, thereby demonstrating the dynamics of scientific growth, the level of research consistency, and the development patterns of specific study topics. This analysis helps identify the most active authors, periods of increased publication productivity, and the intensity of scientific collaboration within the academic community. Furthermore, author productivity trends are also used to evaluate the evolution of a research field and identify the influence of global issues, research policies, and academic developments on the number of publications produced (Lotka, 1926; Donthu et al., 2021).

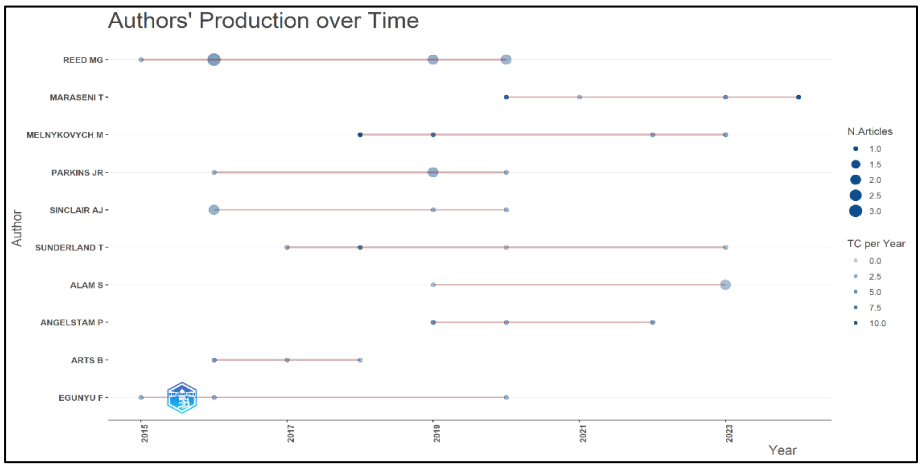


Figure 6. Author Productivity Trends Based on Publication Year
Source: Biblioshiny data processing using Scopus database (2026)

The author affiliation analysis shown in Figure 7 in the bibliometric study aims to identify institutions or agencies that contribute to the development of a research field through scientific publications. This analysis is used to evaluate the level of institutional productivity, academic collaboration patterns, and the institution's role in supporting scientific development and research innovation. Affiliation data was obtained from the Scopus database and analyzed using a full counting approach, where each institution involved in a publication receives equal weight regardless of the author's position, including the corresponding author.

The analysis shows that Seoul National University experienced the most significant increase in publications since 2021 and became the institution with the highest number of publications in 2024. Meanwhile, the University of Saskatchewan and the Center for International Forestry Research demonstrated relatively stable and consistent productivity trends. Furthermore, Wageningen University & Research and the University of British Columbia also


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demonstrated growing publication contributions. In the context of social forestry governance, these institutional productivity trends reflect the important role of universities and research institutions in supporting sustainable forest management, policy strengthening, community empowerment, and developing research collaborations in the forestry sector (Fitria et al., 2021).

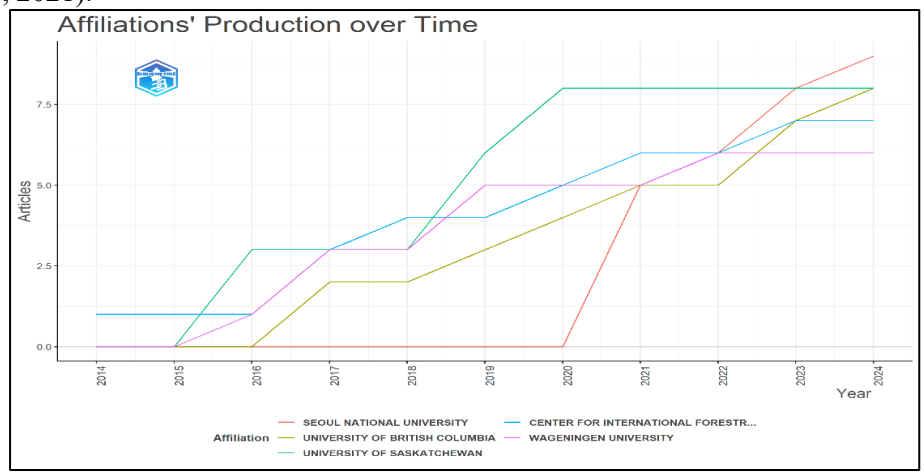


Figure 7. Institutional Productivity Trends in Scientific Publications related to social forestry governance to support sustainable forest management
Source: Biblioshiny data processing using Scopus database (2026)

**Development of Scientific Publications related to Social Forestry in Supporting Sustainable Forest Management**

The development of research topics on social forestry governance was analyzed through a keyword co-occurrence approach using VOSviewer software, with the visualization results presented in Figure 8. The analysis in this study used an all-keywords approach, namely a combination of author keywords and index keywords through the "all keywords" option in the software. This approach was applied to obtain a broader scope of research themes and is representative of the development of the literature being reviewed because it is able to integrate the author's perspective with the indexing system in scientific databases.

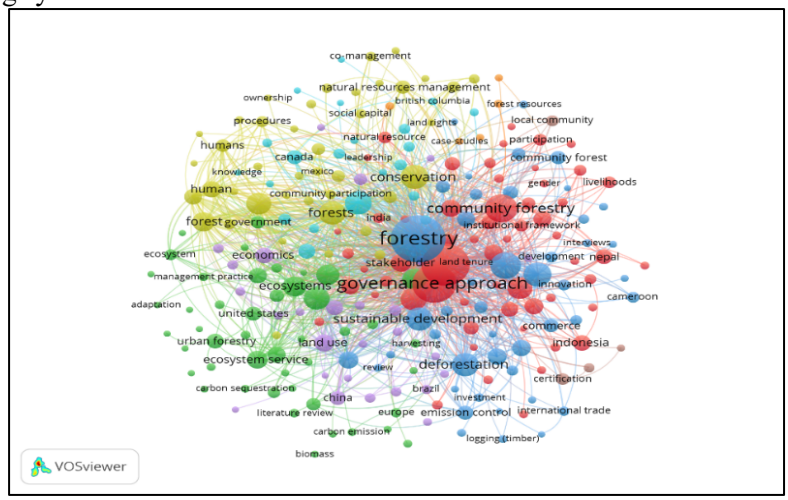


Figure 8. Visualization of the development of research topics based on Co-Words for social forestry governance
Source: Results of processing the Scopus database (2026) using VOSviewer

The visualization of keyword co-occurrence shows that social forestry governance research is developing multidisciplinaryly. The dominance of keywords such as forestry, community forestry, governance approach, sustainable development, stakeholders, ecosystem services, land tenure, and deforestation reflects that social forestry studies focus not only on forest management but also encompass social, economic, institutional, and environmental sustainability aspects in an integrated manner. This finding aligns with research by Jamika et al. (2023). The dominance of the keywords governance approach, institutional framework, and stakeholder indicates that institutional governance is a primary focus in social forestry research, particularly regarding institutional capacity,


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community participation, and stakeholder support. This aligns with the findings of research conducted by Pasaribu & Dewi (2025), which found that institutional governance and business governance significantly influence the effectiveness of forest management through improving the performance of Forest Farmer Groups (KTH). Furthermore, research by Bimantara & Samsu (2025) confirmed that good institutional governance can support the sustainability of forest management by communities, although there are still obstacles in administration, reporting, and forms of community empowerment.

The emergence of keywords such as community participation, social capital, and local community demonstrates the importance of the social dimension in social forestry governance, particularly regarding social trust, community networks, and collaboration between actors. This aligns with research by Hasnawir et al. (2023), which states that the success of community-based forest management is strongly influenced by the level of social trust, community networks, and collaboration between actors. Furthermore, the correlation between the keywords ecosystem services, conservation, deforestation, and sustainable development indicates that social forestry research also focuses on ecological sustainability and reducing forest degradation (Satria et al., 2023).

The keywords land tenure, policy, and collaborative governance indicate that current research on social forestry governance focuses on strengthening policies and resolving tenure conflicts through collaborative approaches. As explained by Abimanyu (2023) in his research, social forestry is seen as capable of providing legal access to communities in managing forest areas while simultaneously reducing agrarian conflicts. Furthermore, the collaborative governance approach is increasingly being studied because the success of forest management is considered dependent on synergy between the government, communities, and other stakeholders (Satria & Hermianto, 2020). Therefore, the results of this analysis show that the current trend in research on social forestry governance is developing towards a collaborative, participatory, and sustainable approach that simultaneously integrates ecological, economic, social, and institutional aspects.

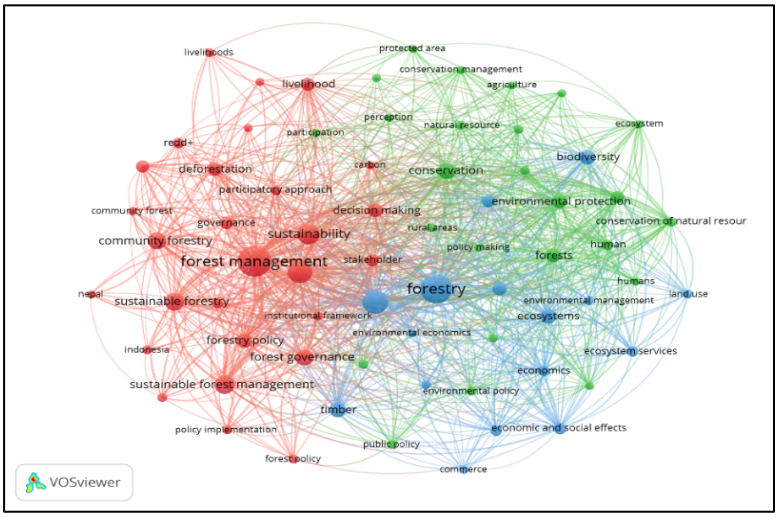


Figure 9. Visualization of the development of research topics based on Co-Words for social forestry governance in supporting sustainable forest management
Source: Results of processing the Scopus database (2026) using VOSviewer

Based on the analysis of social forestry governance in supporting sustainable forest management, presented in Figure 9, it shows a strong relationship between keywords such as forest management, community forestry, forest governance, and sustainability, as the red cluster indicates the research focus on community-based forest management and sustainable governance. This keyword relationship indicates that the success of social forestry is influenced by community participation, forestry policies, and institutional strengthening. This finding is supported by research by Maryudi et al. (2022), which states that the successful implementation of social forestry is strongly influenced by local institutional capacity, collaboration between stakeholders, and community participation in forest management decision-making. Furthermore, research by Fisher et al. (2021) also shows that the community forestry approach can increase the effectiveness of forest governance by strengthening community access rights and reducing tenure conflicts. In the green cluster, the keywords conservation, biodiversity, environmental protection, and ecosystem indicate that research is evolving toward environmental protection and natural resource conservation. The interrelationships between these keywords reflect increasing attention to the ecological function of forests in supporting environmental sustainability. This aligns with research by Oldekop et al. (2019), which explains that social forestry contributes to biodiversity conservation and reduced deforestation rates through active community

involvement in forest management. Meanwhile, the blue cluster is dominated by the keywords forestry, ecosystems, ecosystem services, and economic and social effects, demonstrating the relationship between forest management and economic, social, and ecosystem service benefits. This indicates that social forestry research is oriented not only toward ecological aspects but also toward improving community welfare and the economic impacts of sustainable forest management. These findings are reinforced by research by Gilmour (2016), which states that community-based forest management can provide economic benefits through the utilization of forest products and environmental services while maintaining ecosystem sustainability. Recent research by Hajjar et al. (2021) also shows that social forestry governance plays a crucial role in supporting sustainable development through the integration of social, economic, and environmental aspects in forest resource management.

Table 2. Research topic clusters for social forestry governance in supporting sustainable forest management

| *Cluster* | *Item* | *Link* | *Total link strength* | *Occurrence* |
|---|---|---|---|---|
| ***Cluster 1*** | *Forest management* | 71 | 974 | 142 |
| | *Governance approach* | 71 | 648 | 81 |
| | *Sustainability* | 70 | 402 | 62 |
| | *Sustainable forestry* | 66 | 358 | 51 |
| | *Sustainable forest management* | 61 | 332 | 56 |
| | *Forest governance* | 65 | 263 | 42 |
| | *Forestry policy* | 59 | 240 | 33 |
| | *Stakeholder* | 68 | 238 | 24 |
| | *Community forestry* | 60 | 237 | 45 |
| | *Livelihood* | 60 | 210 | 27 |
| | *Deforestation* | 55 | 179 | 29 |
| | *Local participation* | 46 | 149 | 22 |
| | *Governance* | 47 | 146 | 25 |
| | *Carbon* | 47 | 111 | 11 |
| | *Institutional frameworks* | 51 | 106 | 12 |
| ***Cluster 2*** | *Conservation* | 68 | 384 | 42 |
| | *Environmental protection* | 67 | 364 | 31 |
| | *Forests* | 63 | 312 | 31 |
| | *Human* | 59 | 229 | 18 |
| | *Conservation of natural resources* | 51 | 213 | 15 |
| | *Ecosystem* | 43 | 137 | 11 |
| | *Environmental policy* | 49 | 140 | 13 |
| | *Natural resources* | 52 | 141 | 14 |
| | *Procedures* | 49 | 138 | 10 |
| | *Public policy* | 52 | 140 | 14 |
| | *Protected area* | 46 | 111 | 11 |
| | *Rural area* | 47 | 90 | 12 |
| ***Cluster 3*** | *Forestry* | 71 | 967 | 127 |
| | *Sustainable development* | 71 | 596 | 84 |
| | *Ecosystems* | 61 | 311 | 35 |
| | *Timber* | 61 | 281 | 36 |
| | *Biodiversity* | 58 | 256 | 34 |
| | *Ecosystem service* | 61 | 224 | 26 |
| | *Climate change* | 54 | 209 | 25 |
| | *Economic and social effects* | 52 | 188 | 20 |
| | *Forest ecosystem* | 45 | 147 | 18 |

Table 2 presents a grouping of research topics based on cluster analysis, where each cluster represents a set of keywords that are highly related through co-occurrence in scientific publications. This grouping reflects


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conceptual patterns and key themes developing within the analyzed field of study. Each item or node represents a specific keyword, while the node size indicates the frequency of occurrence of the keyword in the research documents. The relationship between keywords is visualized through connecting lines (links) that indicate the level of interconnection between items in the same publication. The thicker the line and the closer the nodes are, the stronger the relationship between the keywords.

The analysis results show that cluster 1 consists of 31 items, cluster 2 includes 25 items, and cluster 3 consists of 18 items. However, the visualization displayed only shows a few items with the highest total link strength (TLS) values, so the analysis focuses more on keywords that have the most dominant relationships and play a significant role in the research network. The TLS value describes the total strength of a keyword's relationship with other keywords in the bibliometric network, so it can be used to identify various central themes that influence research development. Thus, this analysis not only shows the intensity of a topic's emergence but also explains the conceptual connections between themes in the scientific literature without directly demonstrating causal relationships. This approach is commonly used in bibliometric studies to map knowledge structures, identify dominant themes, and systematically observe the direction of research development, as described in the studies of Neesham Donthu et al. (2021) and Van Eck & Waltman (2017).

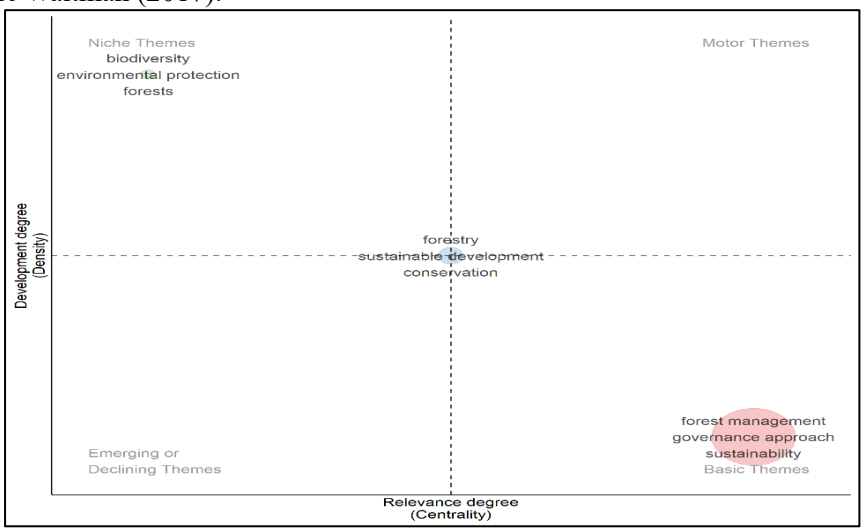


Figure 10. Mapping of various research topics based on density and centrality
Source: Results of processing the Scopus database (2026) using Biblioshiny and R-Studio

This study maps the interrelationships between research themes based on the theme's relevance level in the knowledge network (centrality) and the theme's development level (density), as shown in Figure 10. This visualization is a thematic map in bibliometric analysis used to identify the position, role, and dynamics of the research theme's development based on these two indicators. This mapping was generated using Bibliometrix software with the help of Biblioshiny to view the development of research topics temporally and conceptually. The analysis shows that the development of research topics on social forestry governance in supporting sustainable forest management has a diverse theme structure based on their level of interconnectedness and maturity. The themes of forest management, governance approach, and sustainability are in the Basic Themes quadrant, indicating that these themes have a high level of relevance and serve as the primary basis for research, although their development still requires more in-depth study. This position indicates that aspects of governance, sustainability, and forest management are a central focus in social forestry research.

Furthermore, the themes of forestry, sustainable development, and conservation are located in the center of the map with moderate centrality and density. This position indicates that these themes serve as bridges between studies and support the integration of social, economic, and environmental dimensions in sustainable forest management. The presence of these themes reflects the importance of sustainable development and conservation as a foundation for developing a social forestry system focused on the sustainability of forest resources. On the other hand, the themes of biodiversity, environmental protection, and forests are located in the Niche Themes quadrant, indicating that these themes have been well-developed and have a high degree of specialization, but their connection to the main research theme is still relatively limited. This indicates that studies on environmental protection and biodiversity have been discussed in depth, but their integration with aspects of social forestry institutional governance still requires further strengthening.


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Overall, the results of this thematic mapping show that the direction of social forestry research development tends to focus on strengthening governance, sustainable forest management, and integrating ecological and social aspects into forest resource management. This type of thematic mapping approach is commonly used in bibliometric studies to understand the structure of knowledge, identify the position of a theme within the research network, and analyze topic developments more comprehensively, as described in the research by Donthu et al. (2021) and Zupic & Cater (2015).

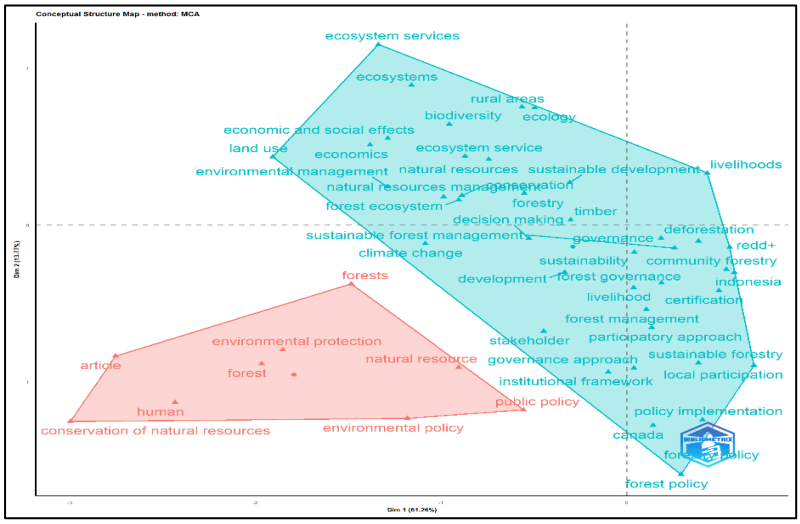


Figure 11. Conceptual structure of scientific publications related to social forestry governance in supporting sustainable forest management

Source: Results of processing the Scopus database (2026) using Biblioshiny and R-Studio

In addition to thematic mapping, this study also uses Multiple Correspondence Analysis (MCA) to describe the conceptual structure of the literature on social forestry governance in supporting sustainable forest management as shown in Figure 11. The analysis was conducted with the help of the Bibliometrix tool through processing author keyword data obtained from the Scopus database, then analyzed based on the relationship between keyword occurrences simultaneously (co-occurrence). The MCA method was used because it has the ability to simplify complex and high-dimensional categorical data into a two-dimensional visual form. Thus, the relationship between research themes can be identified and interpreted more easily. The visualization results show the formation of two main clusters, generated automatically by the software algorithm used based on the proximity of keywords, without any subjective intervention by the author. Interpreted, the proximity between keywords reflects a high level of conceptual relatedness, while the separation between clusters indicates the differentiation of study focus. This approach is commonly used in bibliometric analysis to systematically uncover knowledge structures (Aria & Cuccurullo, 2017; Donthu et al., 2021).

The conceptual structure map shows that scientific publications on social forestry governance in supporting sustainable forest management fall into two main clusters. The first cluster (in blue) is dominated by the themes of ecosystem services, sustainable development, forest management, governance approaches, community forestry, and policy implementation. This cluster illustrates that recent research focuses on the integration of forest governance, community participation, and sustainable development in forest resource management. The link between the terms ecosystem services and sustainable forest management indicates that social forestry is viewed not only as a conservation effort but also as a strategy to improve community welfare through the sustainable use of ecosystem services. This aligns with research that suggests collaborative governance and community participation are crucial factors in the success of sustainable forest management (Donthu et al., 2021; Garcia et al., 2018).

Meanwhile, the second cluster (in red) focuses on environmental protection, conservation of natural resources, environmental policy, and natural resources. This cluster shows that some research still places social forestry within the perspective of environmental protection and natural resource conservation. The relatively separate position of these themes from the first cluster indicates that conservation studies tend to develop as a specific ecological approach, while recent research has shifted more toward participatory governance, public policy, and community socio-economic sustainability. Therefore, the results of this conceptual mapping demonstrate a shift in research focus from traditional conservation approaches to more adaptive, collaborative, and sustainable development-oriented social forestry governance.


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## CONCLUSION

Based on the results of the analysis related to the study of social forestry governance in supporting sustainable forest management using the bibliometric method that has been carried out, this study identifies several main conclusions related to the development of the governance study, namely:

1. The development of research on social forestry governance shows a continuing upward trend and is developing multidisciplinaryly. Bibliometric analysis shows that scientific publications related to social forestry governance in support of sustainable forest management experienced a significant increase during the 2014–2024 period. This increase reflects the growing academic attention to issues of community-based forest management, environmental sustainability, climate change, and the socio-economic empowerment of forest-dwelling communities. Furthermore, research developments are not only focused on forestry aspects, but also encompass dimensions of institutional governance, public policy, environmental conservation, and integrated sustainable development.
2. The main research themes are dominated by forest governance, sustainability, and community participation in forest management. Co-occurrence analysis and thematic maps show that keywords such as forest management, community forestry, forest governance, sustainability, and ecosystem services are central themes in the research network. The interconnectedness between these themes indicates that the successful implementation of social forestry is strongly influenced by institutional strengthening, community participation, collaborative governance, and support for sustainability-oriented forestry policies. Meanwhile, issues of environmental conservation, biodiversity protection, and ecosystem services have also emerged as important elements in supporting sustainable forest management.
3. The direction of research developments indicates a shift toward a collaborative and sustainable governance approach. The results of conceptual structure analysis using Multiple Correspondence Analysis (MCA) show that current social forestry research is shifting from a traditional conservation approach to a more adaptive, participatory, and collaborative forest governance approach. Recent research places greater emphasis on the integration of social, economic, environmental, and institutional aspects in forest resource management. Thus, social forestry governance is seen as having a strategic role in supporting sustainable forest management by strengthening synergies between stakeholders, improving community welfare, and protecting the ecological functions of forests in a sustainable manner.

Bibliometric analysis of various literature also shows that social forestry governance to support sustainable forest management is evolving toward a more collaborative, participatory, and multidisciplinary approach through the integration of institutional, social, and economic aspects, as well as natural resource and environmental conservation. This is reflected in the dominant themes related to forest governance, community forestry, sustainability, and ecosystem services, which demonstrate the important role of communities, policies, and institutional governance in maintaining the sustainability of forest resources.

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