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Article

Global Scientific Production on Stakeholder Engagement in Community Forestry: A Bibliometric Analysis

Whisnu Febry Afrianto*

Ecosystem and Biodiversity Indonesia (Ecosbio), Datengan, Kediri 64151, East Java, Indonesia
* Correspondence: whisnuafrianto@apps.ipb.ac.id

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Abstract. Community forestry is a concept that presents management and utilization rights to local communities through empowering communities in sustainably managing forest resources and engaging them in forest conservation movements. This study aims to investigate the scope of stakeholder engagement in community forestry using a bibliometric review. Understanding stakeholders' participation in community forest management through a 30-year bibliometric analysis is essential for achieving historical insights, deciding conflicts, and discussing global forest landscape topics. The data was obtained from the Scopus database. Analysis of references with 808 publications and an annual publication growth rate of 6.49% (1981 – 2023) was used to identify the most significant sources of stakeholder engagement in global trends. Topic areas with titles, keywords, and abstracts in stakeholder engagement in community forestry themes were utilized as a reference for exploring search results. This present study analysed bibliometrics using VOSviewer and Biblioshiny. The publication reached the highest number with 64 publications in 2020. Peter A. Minang was the most productive author in the discipline, with an h-index of 9, total publications of 9, and worldwide citations of 394 from 2005 to 2023. The United States of America (USA) dominated the most publications on this topic. Furthermore, Tribhuvan University was the most relevant affiliated institution. The most productive journal in this field was Forest Policy and Economics. This investigation delivers scholarly novelty in evaluating Global Community Forestry publications, which are practically and theoretically essential to regulators, academia and industry professionals. These findings are important as a foundation for several suggestions for future stakeholder engagement in community forestry research.

Keywords: Biblioshiny, H-index, publications, Scopus, VOSviewer

INTRODUCTION

Community forests have become an essential part of the livelihoods and well-being of over half a billion people, particularly in developing countries (Baynes et al., 2015). Community forestry is a concept or program that entrusts forest management and utilization rights to local communities through empowering communities to manage and conserve (Schusser, 2013). The definition of community forest may vary by country or region, depending on existing policies and regulations (Schusser et al., 2015). However, community forestry generally involves active participation in forest management, such as utilization (tree planting, maintaining, and harvesting) and biodiversity conservation activities (Charnley & Poe, 2007). Community forestry has become the concern of many scientists because many countries have applied for this form of forest tenure (Bullock & Lawler, 2015; Alemagi et al., 2022).

Stakeholder involvement in community forestry management plays a crucial role in the success and sustainability of forestry practices (Schusser et al., 2016; Piabuo et al., 2018). Communities can participate

in decision-making pertaining to the management of forest resources, the creation of policies, and the execution of forestry programs through an efficient stakeholder engagement process that involves government, non-governmental organizations, and the business sector (Yami et al., 2020). In this case, stakeholders are essential in achieving sustainable development goals and balancing ecological, social, and economic interests in community forestry management. Stakeholder involvement in community forestry has become common and proliferated in the last few decades (Paudyal et al., 2017; Sapkota et al., 2020). A bibliometric analysis of community forestry research in Canada showed that most papers were related to social science research and that stakeholder engagement was important for nature-based solutions (Bullock & Lawler, 2015).

A bibliometric analysis, namely data analysis to evaluate scientific publications, was carried out to understand the current state of publication on stakeholders' engagement in community forestry (Jankovský et al., 2021; Huang et al., 2022; Su et al., 2022). The Scopus database's bibliometric data is necessary for providing pertinent information to address research problems (Aznar-Sánchez et al., 2019). The authors used machine learning by RStudio and VOSviewer to identify scholarly data. It contributes to the academic community by addressing research gaps, explaining methods, and offering unique insights that can aid researchers and students. Policymakers can benefit from this study as it provides valuable information for decision-making, particularly in addressing real-world issues within community forestry and improving policy outcomes. Industry professionals will find practical applications in this research, which can enhance their practices, sustainability efforts, and overall efficiency, supported by real-world examples and scenarios. In this study, "engagement" refers to local communities' active participation and involvement in organizing and using forest resources. The coverage of engagement is comprehensive, encompassing actions such as tree planting, maintenance, harvesting, and biodiversity conservation in all kinds of community forestry. Our research aims are to identify (1) the growth of publications, citations, and authors related to the topic of stakeholder engagement on community forestry, (2) the most influential authors, articles, affiliations, and countries related to the topic of stakeholder engagement on community forestry, (3) current trending topic related to the topic of stakeholder engagement on community forestry, and (4) is the interaction between the authors, their affiliates and their country concerning to the topic of stakeholder engagement on community forestry. Our goal is for this study to serve as a primary reference for obtaining reliable and comprehensive information about research on stakeholder engagement in community forestry.

MATERIAL AND METHODS

Data Sources

In this study, we utilized the Scopus literature database, focusing on the search period from 1981 to 2023. These dates were selected to capture a comprehensive view of the evolution of research on stakeholder engagement in community forestry, beginning with the initial studies in the field and extending to the most recent publications. Our search strategy included terms related to community forestry and stakeholder engagement (Table 1). There were 944 publication records in the initial search. However, we excluded 126 records based on document type, as this study limited our search to peer-reviewed journal articles from academic journals to produce empirical and high-quality studies. We only included articles written in the English language, thus excluded 20 records in various other languages. We only used the article in English because it is a standard and obtained procedure in bibliometric investigation. It provides more comprehensive accessibility and knowledge within the international academic society. Utilizing English in bibliometric analysis encourages collaboration, knowledge dissemination, and the integration of results into the broader scholarly discourse. At the same time, the local language may have its significance in specific contexts. We only included peer-reviewed articles from journals in our analysis, excluding a total of 215 records (126 records that were not peer-reviewed articles and 89 records that were from non-journal sources). Therefore, in this study, we used 808 documents on stakeholder engagement in community forestry globally.

Table 1. Search terms used in the bibliometric analysis

Category	Search Terms
Community Forestry	"community fores*"
	"country fores*"
	"town fores*"
	"ecofores*"
	"municipal fores*"
Stakeholder Engagement	"engagement"
	"participation"
	"perceptions"
	"perspectives"
	"involvement"
	"collaboration"
	"preferences"

The symbol (*) includes 'forest' and 'forestry'

Data Analysis

We carried out a performance analysis in the bibliometric analysis to assess the contributions of research items to the topic area (Donthu et al., 2021a). Three crucial matrices were examined using performance analysis, such as publication metrics, citation metrics, and citation-publication metrics (Donthu et al., 2021b). The performance analysis is generally used in most reviews because it presents the backgrounds of institutions, authors, journals, and countries in the topic issues (Donthu et al., 2021a,b). There are two indicators in research to identify performance analysis: impact and productivity measures that examine the number of citations (including self-citation) and publications (Aria & Cuccurullo, 2017).

Furthermore, we used science mapping to create bibliographic maps that describe scientific topics organized intellectually, theoretically, and socially (Cobo et al., 2011). The analysis is visualized through a bibliometric map and an illustrated picture of the map (van Eck & Waltman, 2010). The indicators measured in science mapping were co-author analysis, co-citation analysis, citation analysis, and co-occurrence (Aria & Cuccurullo, 2017). Co-authorship analysis depicts author patterns and connections between co-authors (Donthu et al., 2020). Citation analysis is a fundamental scholarly collection technique based on the premise that citations image the scholarly associations between publications formed when one publication publishes another (Donthu et al., 2020). Co-citation analysis defines the total of periods two papers are cited concurrently. The higher frequency means stronger connection (Liu et al., 2015). Co-occurrence analysis shows publications' conceptual or knowledge structure (Donthu et al., 2021a).

VOSviewer and RStudio were used for bibliometric analysis in this study because they provide comprehensive results. We utilized Biblioshiny with the machine learning computer language RStudio for statistical computing and visual analysis. (Aria & Cuccurullo, 2017). In addition, van Eck & Waltman (2018) developed VOSviewer, a piece of software used at the Center for Science and Technology Studies (CWTS), Leiden University, to generate graphical networks of various bibliometric analyses, such as co-citations, co-occurrence, and co-authorship analysis.

RESULTS

Overview and Descriptive of Bibliometric Analysis

The descriptive statistics of the bibliometric data used in this investigation are shown in Table 2. The bibliometric data sample from Scopus used in this study included peer-reviewed articles published in scholarly journals from 1981 to 2023, with a total of 808 documents and 2045 authors. Research on stakeholder engagement in community forestry for more than three decades in the Scopus database had experienced an annual publication growth rate of 6.49% (1981 – 2023). Fig. 1 shows the number of yearly stakeholder engagement publications on community forestry in Scopus and their annual average citations. Publications began in 1981, with a sharp increase in 2020 (64 publications). In 2020-2022, during the

COVID-19 pandemic, there were also three studies regarding the relationship between community forests and COVID-19.

Table 2. Descriptive statistics of stakeholder engagement on community forestry topic

Description Main Information About Data	Results
Timespan	1981:2023
Sources	261
Documents	808
Annual Growth Rate %	6.49
Document Average Age	10.05
Average citations per doc	22.17
References	1
Document Contents	
Keywords Plus (ID)	2629
Author's Keywords (DE)	2046
Authors	
Authors	2045
Authors of single-authored docs	150
Authors Collaboration	
Single-authored docs	163
Co-Authors per Doc	3.16
International co-authorships %	36.92

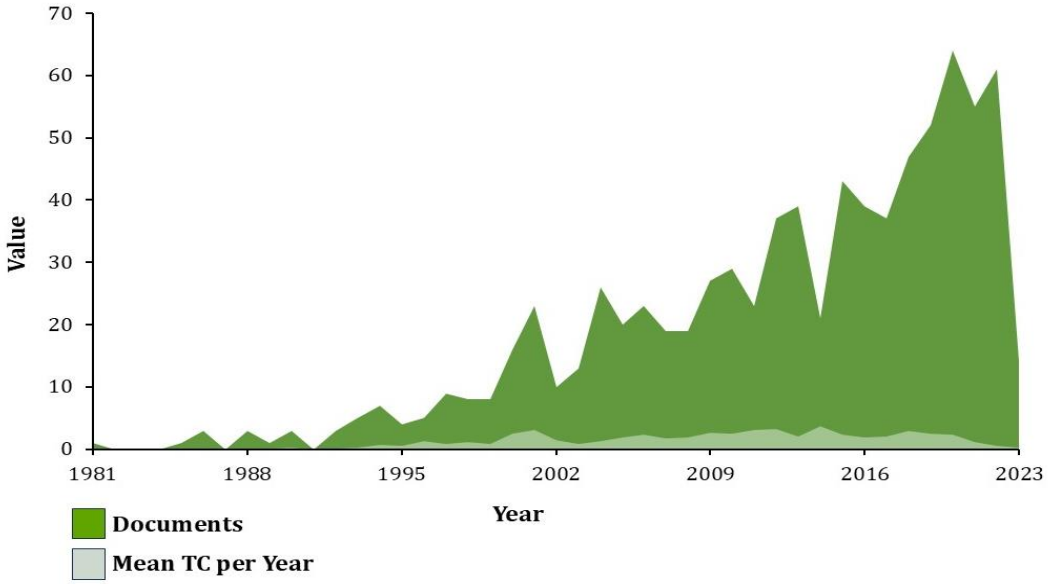

Figure 1. Annual academic productions and average citations used for stakeholder engagement on community forestry

Fig. 2 depicts the ratio of authors for keywords and sources in the 808 sample manuscripts in the stakeholder engagement on community forestry themes. The Sankey chart shows the most significant contributors of stakeholder engagement to community forestry-themed research, particularly the authors, their keywords, and publishing outlets. Baral H and Minang PA mainly contributed to the theme of stakeholder engagement on community forestry in connection with the upward-flowing keyword (i.e., community forest).

Figure 2. Sankey graph of authors, keywords and sources of stakeholder engagement on community forestry

Description of Publication Analysis

Analysis of references with publication media based on 808 publications was used to identify the most significant publication sources on stakeholder engagement in community forestry. The rank of the journals was based on indicators such as g, m, and h-index, citations total (CT), and the number of journals representing impactful references. Journal ranking is based on the h-index value, the higher the journal's position. Table 3 displays the top ten most significant references based on effect measurements, the numeral of publications. It showed all local citations on the theme of stakeholder engagement on community forestry themes. Forest Policy and Economics had the highest impact measurement: g-index 20, h-index 25, and m-index. This journal was also the leader in publications (56 articles) and citations (1553 citations). Based on the publication year, Society and Natural Resources was the oldest journal in publishing this topic research when it started in 1994. It displays the law of allocation among the top ten references, which are mostly articles about community forestry stakeholder engagement in certain periodicals.

Table 3. Top 10 journal stakeholder engagement on community forestry topic and Bradford's Law

Sources	h_index	g_index	m_index	PT	CT	PYS
Forest Policy and Economics	25	37	1.087	56	1553	2001
Society and Natural Resources	17	27	0.567	27	825	1994
International Forestry Review	16	32	0.64	51	1089	1999
Ecology and Society	12	17	0.545	17	668	2002
Forests	12	19	0.923	27	391	2011
Land Use Policy	12	20	1.091	25	437	2013
World Development	11	14	0.478	14	1407	2001
Journal of Environmental Management	10	12	0.526	12	499	2005
Arboriculture and Urban Forestry	9	14	0.5	14	209	2006
Ecological Economics	9	11	0.529	11	477	2007

Bradford's Law in Fig. 3 determines ten journals, i.e., Forest Policy and Economics, International Forestry Review, Forests, Society and Natural Resources, Small-Scale Forestry, Journal of Sustainable Forestry, Ecology and Society, Forestry Chronicle, and Arboriculture and Urban Forestry as the essence sources for this topic.

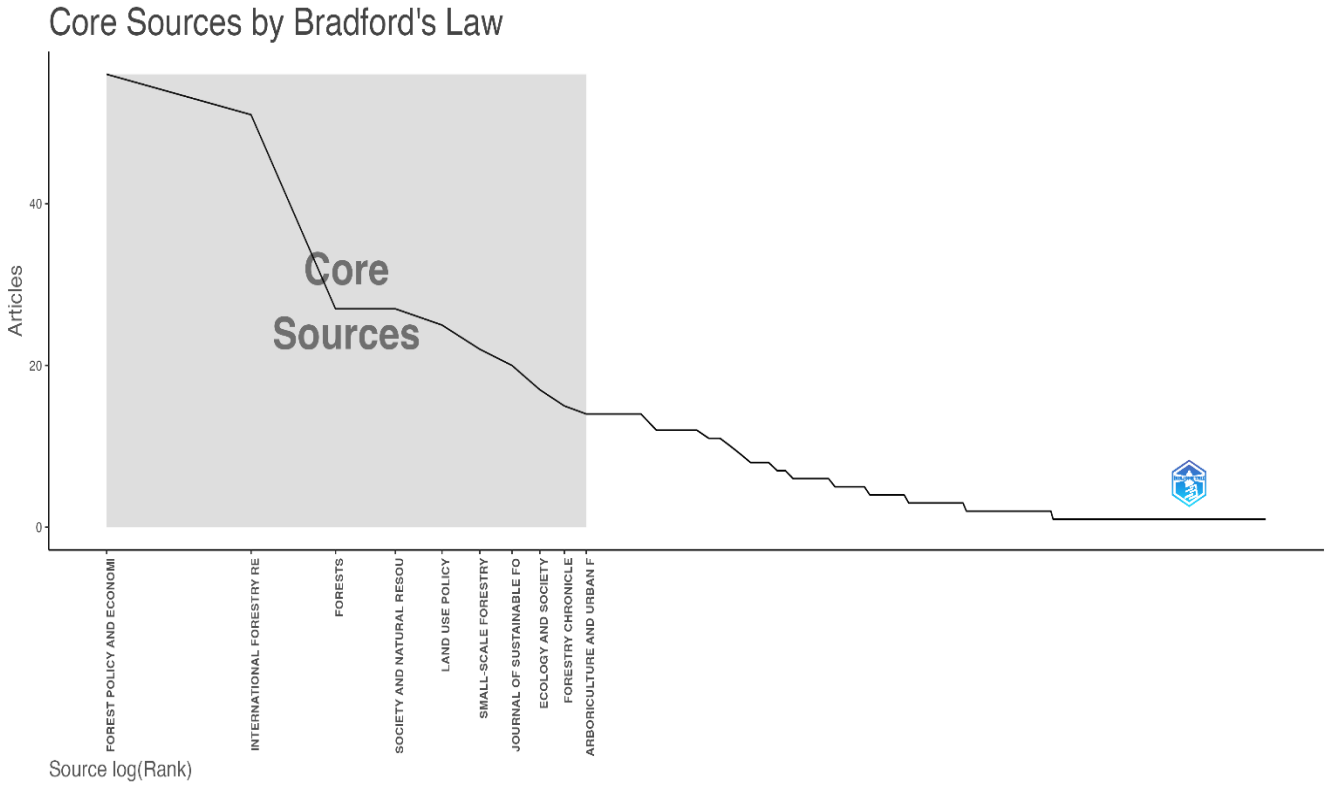

Figure 3. Bradford's Law Scattering of the publications of stakeholder engagement on community forestry

Author Analysis

The findings demonstrated that the top 10 authors are the most persuasive based on impact metrics, the volume of publications, and regional citations (Table 4). Author ranking is based on the h-index value, the higher the author's position. Peter A. Minang is the most significant author on all impact measurement variables, with an h-index of 9 and a g-index of 9, and 394 publications. However, regarding total citations, Bina Agarwal has the publication with the highest number of citations (n= 1405). In addition, the authors' essential collaborations are depicted in Fig. 4. This figure shows the six important groups of authors in the publication of stakeholder engagement in community forestry. An analysis of authors highlighted 21 authors, 6 clusters, 26 links, 37 total link strength, normalization used association, nodes weight used links. Cluster 2 green showed the important co-authorship in this theme.

Table 4. Top 10 authors of stakeholder engagement on community forestry topic

Element	h_index	g_index	m_index	PT	CT	PYS
Peter A. Minang	9	9	0,474	9	394	2005
Makoto Inoue	6	6	0,375	6	71	2008
Bina Agarwal	5	5	0,208	5	1405	2000
Himlal Baral	5	6	0,833	6	89	2018
Geoff Cockfield	5	5	0,625	5	123	2016
Peter Cronkleton	5	6	0,357	6	205	2010
Divine Foundjem-Tita	5	5	0,833	5	120	2018
Tek Narayan Maraseni	5	5	0,5	5	198	2014
Erik Meijaard	5	5	0,625	5	110	2016
Ram Pandit	5	6	0,385	6	153	2011

Note: PT (publications total), CT (citations total), and PYS (publication year start).

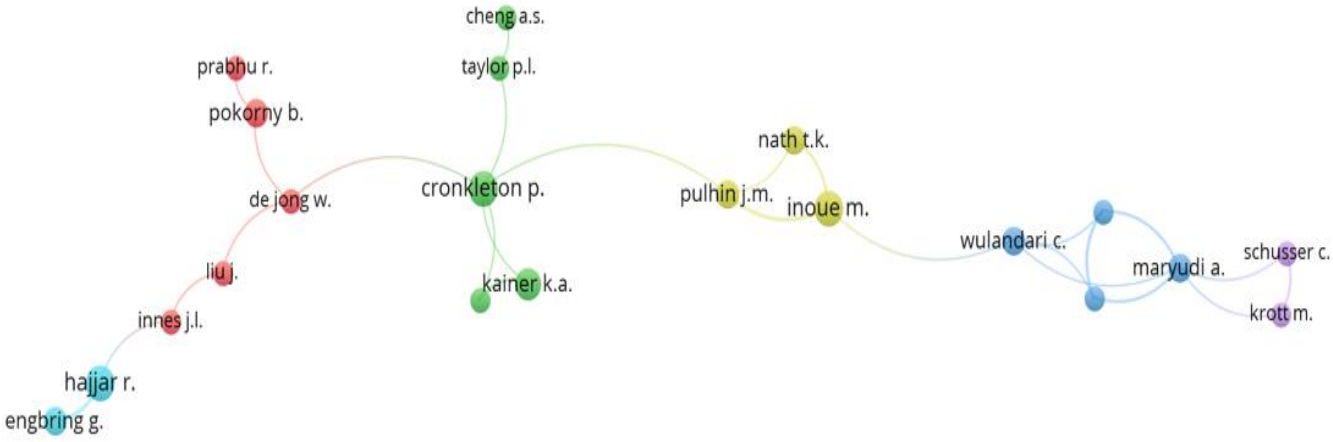

Figure 4. Co-authorship visualization, the larger the node indicates the greater the connection weight

Fig. 5a shows the top ten countries and the USA had been the leading country. Moreover, the top 10 affiliates had a total of issued articles varying from 13 to 30 articles. Tribhuvan University was the most dominant institution for scholarly publications on this theme (30 articles). It was followed by Center for International Foretsry Research, University of British Colombia, and University of Queensland respectively, with 26, 26, and 24 publications (Fig. 5b).

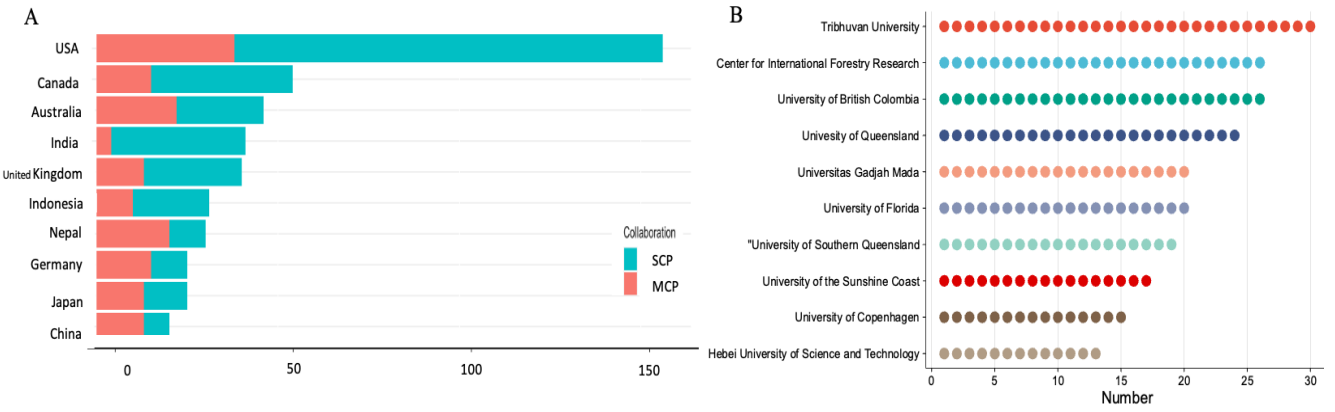

Figure 5. Top 10 most relevant affiliations (A) and countries (B) of stakeholder engagement on community forestry topic

Document Analysis

Table 5 shows that in global cited (GC) and local cited (LC). Agarwal (2001) had the highest total citations in GC and LC, which was 734 and 49, respectively. In GC, the second and third highest were Porter-Bolland et al. (2012), and Agarwal (2009), with 447 and 253 citations, respectively. In addition, Porter-Bolland et al. (2012) were in ranking second and third in LC with 27 and 24, respectively. Fig. 6 illustrates the citation and the frequency of citations of the manuscripts. The analysis used 8 items (minimal 50 citations), 8 clusters, and 61 links. The more prominent nodes represent the higher citations acquired by a manuscript from the journal. Visualizing the sample citation analysis shows that Agarwal (2001) from the journal World Development has the most important nodes.

Table 5. Top 10 manuscripts; GC: global citations, LC: local citation 1983-2023

Author, Year, and Sources	Title	GC	LC
Agarwal (2001), World Dev	Participatory Exclusions, Community Forestry, and Gender: An Analysis for South Asia and a Conceptual Framework	734	49
Porter-Bolland et al. (2012), For Ecol Manage	Community managed forests and forest protected areas: An assessment of their conservation effectiveness across the tropics	447	24
Agarwal (2009), Ecol Econ	Gender and forest conservation: The impact of women's participation in community forest governance	253	17
Agarwal (2000), Camb J Econ	Conceptualising environmental collective action: why gender matters get access Arrow	248	8
Fernandez-Gimenez et al. (2008), Ecol Soc	Adaptive management and social learning in collaborative and community-based monitoring: a study of five community-based forestry organizations in the Western USA	242	7
Castro and Nielsen (2001), 2001, Environ Sci Policy	Indigenous people and co-management: implications for conflict management	226	4
Wollenberg et al. (2000), Landsc Urban Plann	Using scenarios to make decisions about the future: anticipatory learning for the adaptive co-management of community forests	200	0
Mehta and Kellert, (1998), Environ Conserv	Local attitudes toward community-based conservation policy and programmes in Nepal: a case study in the Makalu-Barun Conservation Area	197	9
Bowler et al. (2012), Frontiers Ecol Envir	Does community forest management provide global environmental benefits and improve local welfare?	190	18
Dare et al. (2004), Impact Assess Project Appraisal	Community engagement and social licence to operate	184	0

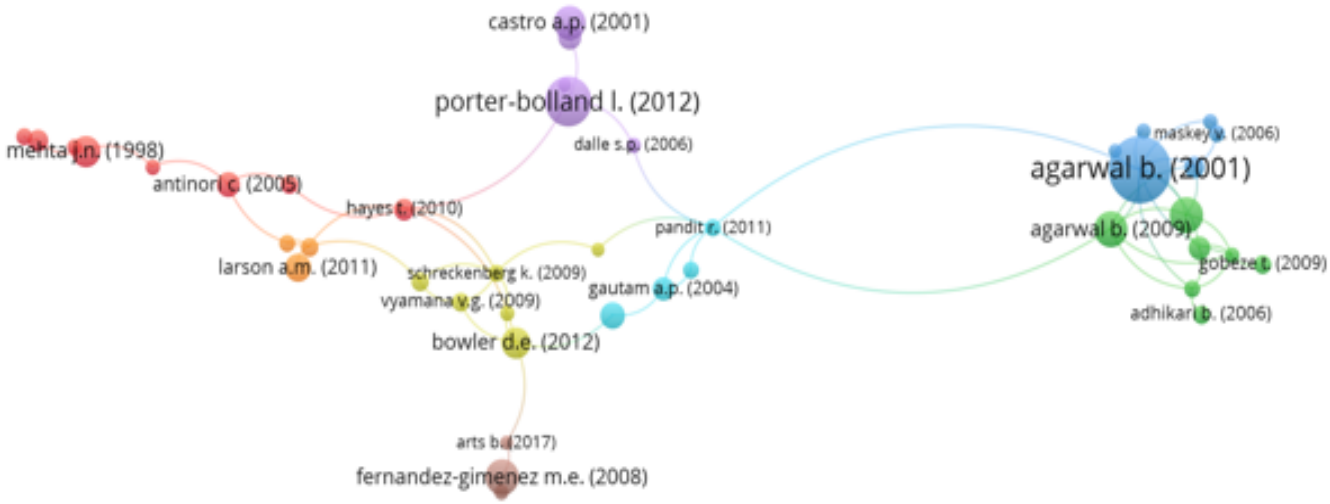

Figure 6. Visualization of the sample's citation analysis, the larger the node indicates the greater the connection weight

Keyword Analysis

This analysis reveals essential topics in stakeholder's engagement on community forestry themes. Fig. 7 illustrates the keyword co-occurrences from the sample used in this study. There was 21 keywords within 50 minimum occurrences, 210 links, 4111 total link strength, and three clusters. The bigger nodes indicate the more words are frequently discovered in the paper. The positively utilized keyword 'Community Forest'

in the purple cluster had the most prominent node, which means it is the most significant word for research on stakeholder engagement in community forestry.

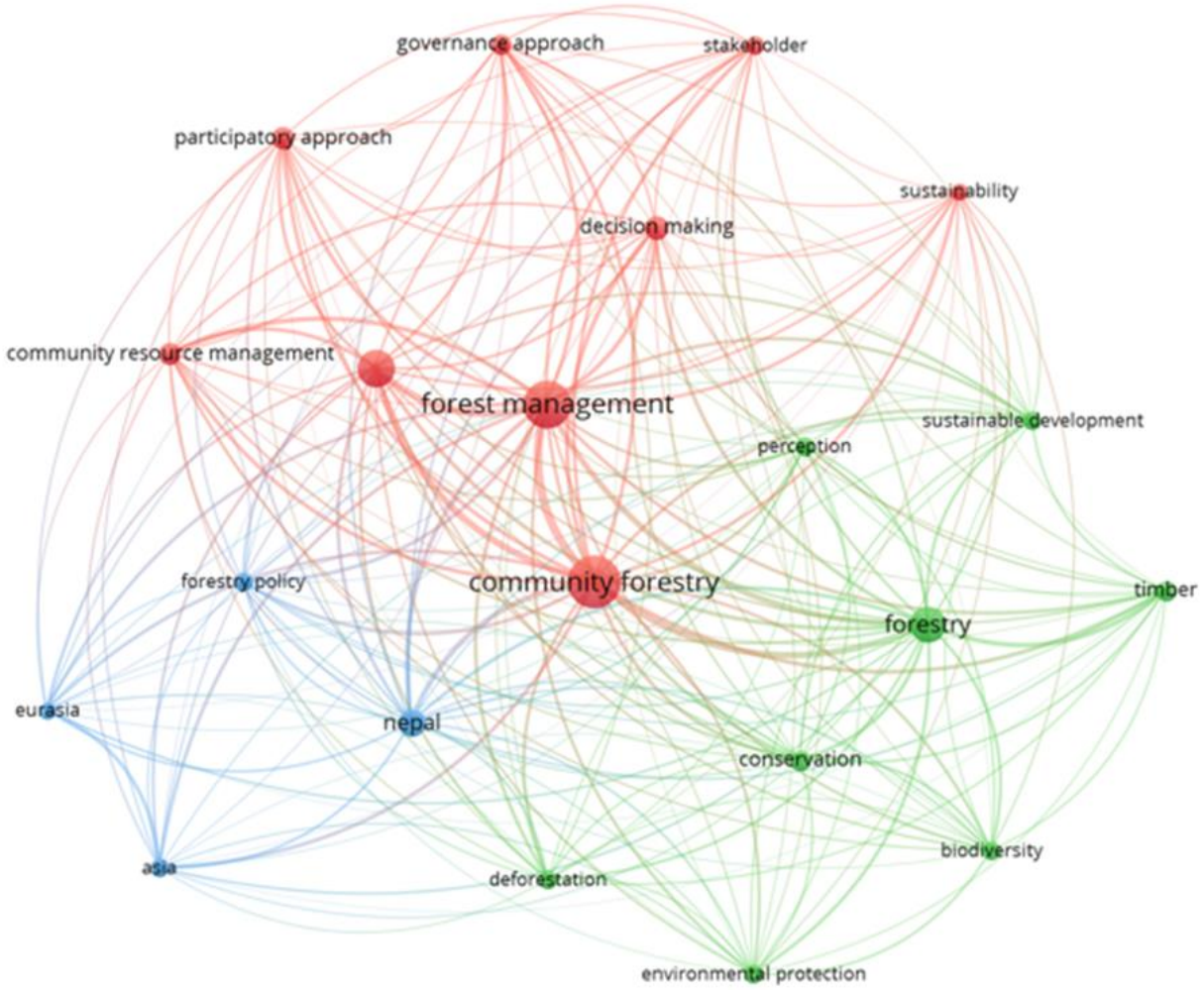

Figure 7. Keywords co-occurrences of stakeholder engagement on community forestry topic, the larger the node indicates the greater the connection weight

The global trend topics discovered from the author keywords in publishing samples from the journals published are shown in Fig. 8. The beginning and ending years of a word occurrence were shown by the blue line. Meanwhile, the median word occurrence frequency was indicated by the blue circle. The biggest of the process means the highest manifestation of the word. The longest blue line was the participatory approach from 2006 to 2018 ("Local Participation) and 2007-2019 ("Forest Management"). The enormous circle was forest management and community forestry. The keywords in the top panel indicated the most current keywords utilized by the authors in the current publications. These keywords abutment the thematic map symbolized the most critical stakeholder engagement issues on the community forestry theme.

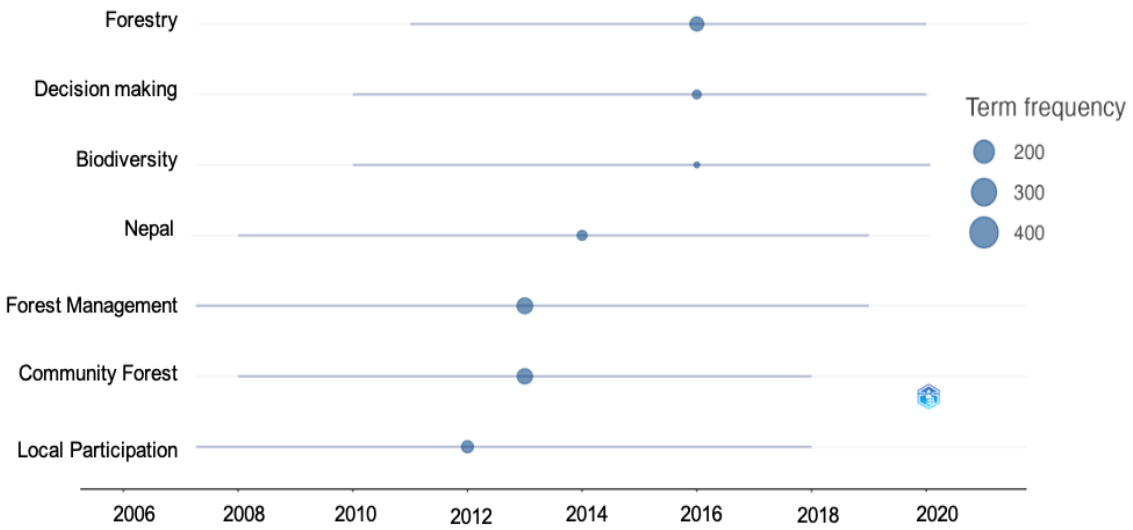

Figure 8. Trend topics generated of stakeholder engagement on community forestry topic

According to the contribution of the number of references, this study demonstrated the relationships between the examined documents. The journal-published samples were clustered using normalized citations in this literature review. This normalization was required to correct the situation where previously issued publications have more time to increase citations compared to recently published studies. Moreover, a specific area essential and current topic were documented with at least five citations, so 569 met the threshold. Fig. 9 with 20 items, 4 clusters, 83 links, 287 total link strength shows the bibliographic coupling of the sample 808 documents. The normalized citation for each assignment was elevated to a greater degree the more significant the nodes. Fig. 6, 9, and Table 5 show that Agarwal (2001) "Participatory Exclusions, Community Forestry, and Gender: An Analysis for South Asia and a Conceptual Framework" is one of the most important articles.

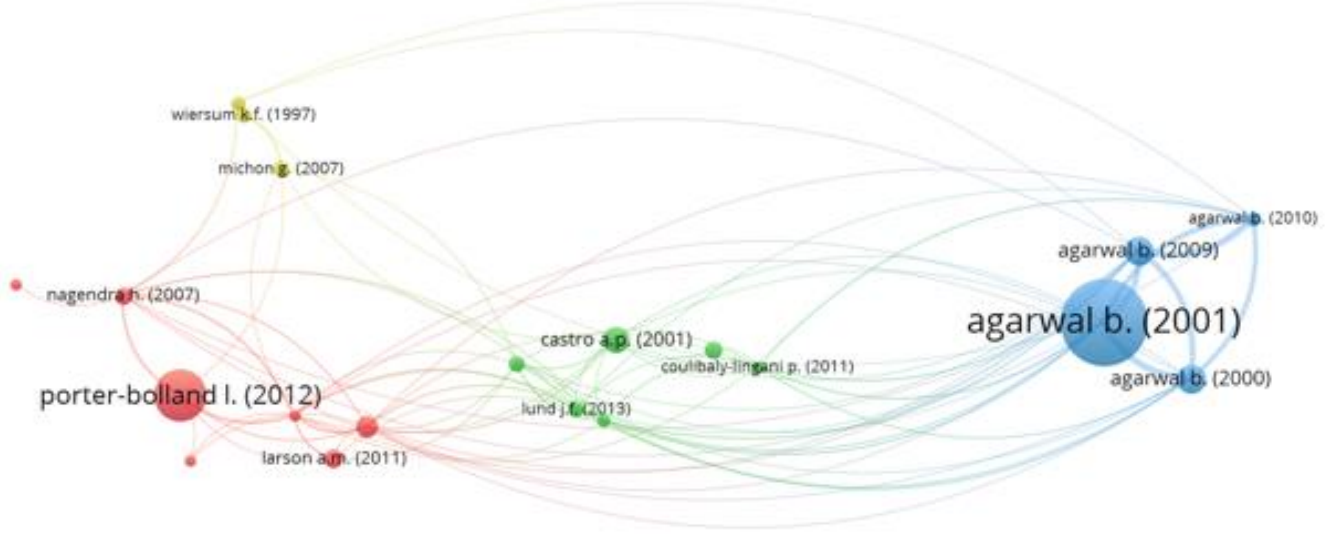

Figure 9. Bibliographic Coupling of stakeholder engagement on community forestry topic, the larger the node indicates the greater the connection weight

DISCUSSION

The publication of stakeholder engagement in community forestry was relatively high in 2023. In the case of stakeholder engagement in community forestry, there was a decrease in attention in 2014, but its rapid

growth since 2015 made it the most critical research subject (Dupuits, 2015). According to Tahamtan et al. (2016), the trend of citation topic is influenced by several factors, i.e., impact citations, such as the journal impact factor, international cooperation, and number of authors.

During the COVID-19 pandemic, Beck et al. (2022) revealed that e-planning can be an approach to forest management during a pandemic. There are several observable linkages and implications between COVID-19 and community forestry. Some of the negative consequences of the COVID-19 pandemic are on the agriculture, environment, and ecotourism sectors because they were entirely closed (Chirwa et al., 2021). Restrictions on movement and economic activity implemented during a pandemic can hinder efforts to control and monitor illegal practices such as logging and poaching (Laudari et al., 2021). This lack of oversight during the COVID-19 pandemic increases the risk of forest degradation and habitat destruction, which can negatively impact biodiversity and the availability of forest resources (Golar et al., 2020; Oranu et al., 2022). On the other hand, this pandemic has underlined the importance of community forestry as a source of life and food security for local communities (Koodoh et al. 2021; Atin & Lintangah, 2023).

Community forestry offers a potential solution for effectively combining supporting local livelihoods and conserving forests (Chomba et al., 2015; Putraditama et al., 2021). Its growth is influenced by various factors, including collaborative efforts with forest stakeholders, capacity building, financial investments, and non-financial incentives (Minang et al., 2019). Agarwal (2001) had the highest GC and LC scores in his study of gender and inclusive community forests. Agarwal (2001) explains how participatory institutions in South Asia can exclude essential groups such as women. It provides a typology of participation, the effects of such exclusion on gender equality and effectiveness, and a conceptual framework for analyzing the process of gender exclusion. Too often, women experience exclusion in decision-making, access to resources, and benefits from community forestry (Mwari, 2018). It is essential to address this gender gap by ensuring women are active in all aspects of community forest management (Coleman & Mwangi, 2013). Women's active involvement in decision-making, planning, and execution of community forest-related activities can result in long-lasting advantages for forest management (Giri & Darnhofer, 2010). So, it is important to encourage gender inclusion, give women more authority in forest management, and ensure that everyone has equal access to opportunities and resources. A strong basis for sustainable development and the protection of natural resources will be established by honoring women's traditional knowledge, acknowledging their contribution to the sustainability of natural resources, and raising awareness of gender issues in community forests (Partasasmita et al., 2019). The advantageous effect of women presence in conservation action show that women contribute better to protecting forests and have better regulatory compliance (Agarwal, 2001; Agarwal, 2009). Community-managed Forest, according to Porter-Bolland et al. (2012), had fewer fluctuating yearly deforestation rates than protected forests. Chhetri et al. (2013) argue that household conditions influence community participation in community forestry regarding social, economic and biophysical terms.

Most of the literature studied community forestry research focusing on South Asia (Nepal and India), although some studies also explored other areas, such as Africa, Southeast Asia, and Latin America (Clare & Hickey, 2019). According to Rakatama & Pandit (2020), in Indonesia, studies on social forests focus more on social and economic aspects and less on environmental aspects. Apart from that, the studies still focus on certain regions, such as the western region (Java, Sumatra and Kalimantan). According to Poudyal et al. (2020), the Nepal government launched the Scientific Forest Management (SciFM) program, which has been running for 7 years. This program has a positive impact on the supply of forest products, the local and national economy, and the potential for change in the region, a modality based on learning and knowledge. According to Humphries et al. (2020), when viewed from a financial aspect, community forest management (CFM) implemented in Brazil shows major improvements in efficiency and financial feasibility due to increased profits from labor input, consistent with the learning-by-doing model, doubling the value of labor wages to local communities, and generate other substantial economic benefits.

Aria et al. (2022) state that thematic analysis can be most helpful in mapping the sampled keywords into four critical quadrants. The relationship between community-based forestry and forest management is closely intertwined. By being interconnected, community-based forests and forest management support each other to achieve conservation goals, community welfare, and environmental sustainability (Nugroho et al., 2019). Local participation in the green cluster means active community involvement in community-

based decision-making, planning, and enactment of forest-related activities. In the forest context, local communities have rich knowledge and valuable experience managing forest resources (Appau & Derkyi, 2022). Involving the community in the decision-making strategy can result in more sustainable solutions and can avoid conflicts that may arise (Furness et al., 2015). Incentives will also increase local community participation in managing community forests. (Apipoonyanon et al., 2020).

A symbiotic relationship is created between sustainable livelihoods and sustainable forest management through a community-based forest approach (Barnes et al., 2017; Mawa et al., 2021; Shahi et al., 2022). Community forests provide opportunities for local communities to develop and manage sustainable sources of livelihood. Through active participation in forest management, communities can use forest resources wisely, thereby maintaining the sustainability of natural resources and obtaining long-term economic benefits (Chand et al., 2015). Thus, sustainable resource utilization and diversification can improve local people's livelihoods. On the other hand, sustainable livelihoods also contribute to the success of community forests. Through developing alternative livelihoods and economic diversification, local communities can reduce pressure on forest resources and create incentives to protect and preserve forests sustainably (Boedhihartono, 2017). By having stable and diverse incomes, communities will be more motivated to participate in forest conservation efforts, reduce illegal activities such as illegal logging, and strengthen sustainable management practices (Nurrochmat et al., 2019). The symbiotic relationship between sustainable livelihoods and community forestry supports each other, creating a positive cycle in which communities and forests mutually reinforce each other to achieve long-term sustainability.

CONCLUSION

VOSviewer and Biblioshiny software was used to conduct bibliometric analysis in the topic stakeholder engagement on community forestry with Scopus databases as a sample data source. The number of publications from 1981 to 2023 were of 808 documents and 2045 authors with an annual publication growth rate of 6.49% (1981 – 2023). Peter A. Minang published the highest number of articles and the highest h-index and g-index. The USA had the highest number of publications on this topic. The most relevant affiliation institution was Tribhuvan University. Forest management and community forestry were topics that have consistently concerned scholars. Forest Policy and Economics was the most productive journal in this topic. The relationships between the sampled papers are displayed using a bibliographic coupling analysis, which groups the references into eleven clusters. Agarwal (2001) was one of the most important articles. Community forestry has been examined worldwide, and some existing literature has stated that community forestry can combine conservation with economic growth and cultural values to benefit the local communities. Stakeholder engagement in community forestry is increasingly acknowledged as an advantageous means.

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CONFLICTS OF INTEREST

The authors declare there is no conflict of interest related to financial funding and authorship order for this article.

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