



Trajectory of researches on farmers participatory sustainable resource management during the last five decades: A bibliometric analysis

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ABSTRACT

Natural Resources and Farming are inseparably related. Sustainable natural resource management has received huge attention from researchers, scholars, and policymakers due to the rampant use of chemical fertilizers, in brief, with the introduction of industrial agriculture. In the last few decades, emphasis has been placed on the active participation of farmers in sustainable resource management. Considering the importance of this research area, a bibliometric analysis was performed to determine the trends of research in this area over the last five decades. The open-source software, i.e., lens.org, was used to study the research trends in this domain. Since 2000, research in this area has been increasing, peaking in 2021, after which it has gradually started to decline. The leading university in this area is Wageningen University & Research (333), followed by INRAe (190), University of Oxford (106), and Chinese Academy (104) out of a total of 15,399 scholarly works. From these 15,399 scholarly articles, the major sources are journals (75%), books (8.1%), book chapters (6.3%), dissertations (3.5%), reports (3.2%), and preprints (2.3%). The top fields of study were business (4947), geography (4514), agriculture (3173), economics (2650), and environmental planning (2462). Amongst the nations that have a major contribution in this research domain are the United States (1872), United Kingdom (1513), Australia (665), Canada (609), China (395), India (366), South Africa (364), and Brazil (204).

Keywords: Agriculture, India, Farming, Lens.org, Natural Resources

INTRODUCTION

Bibliometrics is a branch of Scientometrics quantitative techniques to measure research impact across different scientific disciplines, including agricultural science, environmental science, sustainable development, etc. The long time frames bibliometric analysis provides opportunities to unearth research progression starting from the genesis of a thought to its full-fledged development. In the case of farmer participatory sustainable resource management, the bibliometric analysis

shows how sustainable resource management, precision agriculture, and smart farming and smart management towards sustainable goals (Cherubin *et al.*, 2022) over the last five decades can effectively be analysed using bibliometric techniques for quantification and evaluation of scientific output of this area (Salinas-Rios and Lopez, 2022). Participatory sustainable resource management in bibliometric analysis is very limited; however, similar studies show how effective this technique can be. For instance, a bibliometric study on global

sourcing, circular ecofriendly supply chain management has identified key research areas, trends over time, and leading authors. This show bibliometric analysis in sustainable agriculture is quite worthy (Jia and Jiang, 2018; Zhang *et al.*, 2023) for participatory resource usage (Rejeb *et al.*, 2022) and sustainable rural development (Salinas-Rios and Lopez, 2022; Rusdiyana *et al.*, 2024) to formulate evidence-based policies and promote interdisciplinary partnership among different institutions (Sutiharni *et al.*, 2024) in line with the UN SD Goals and other international policy strategies (Contreras *et al.*, 2025; Huzenko and Kononenko, 2024). Objectives of this study were to assess the trend and key contributors of research on farmers' participatory sustainable resource management so as to examine the thematic structure and collaboration patterns in the field.

MATERIALS AND METHODS

For the systematic analysis of past research on farmers participatory sustainable resource management (FPSRM) over the last five decades, a bibliometric research design was used. Lens.org is an open, free online searching platform for obtaining metadata on scholarly literature reviews. It is a rich repository of patents, scholarly works, profiles, classifications, etc., ensuring broad disciplinary and geographical coverage. A comprehensive search was done using relevant keywords related to farmers' participation, sustainable resource management, agriculture, and natural resources. Only scholarly works that were published in English were recorded, and duplicate records were discarded from the database to ensure data consistency. The final data sets include book chapters, books, journal publications, dissertations, reports, preprints, publications of conferences, symposiums, etc. Descriptive bibliometric indicators were recorded, including scholarly work over time, publication types, top institutions logo grid, most active authors, top field of study, geographical distributions of research and top journals. The final dataset comprised 15,399 documents, including journal articles, books, book chapters, dissertations, reports, conference papers, and preprints. The network-based collaboration and knowledge structure analyses were performed through VOSviewer. For co-authorship analysis, authors were analysed individually, while in the case of keyword analysis co-occurrence, all the keywords were considered and counted fully,

with the minimum occurrence threshold set to five. Bibliographic coupling was implemented to assess the common intellectual underpinnings of the notable publications. Collectively, these techniques facilitated the comprehensive and rigorous quantitative exploration of the trends, themes, and collaboration patterns in the FPSRM scholarship.

RESULTS AND DISCUSSION

The bibliometric analysis scientifically mapped the logical evolution, patterns of collaborative scholarly works and structural dynamics. Over the last five decades, participatory approaches in sustainable resource management have moved from community-centric rural development research to globally renowned contexts aligned with climate resilience, inclusive governance agendas and sustainability. Exploring this trajectory needs not only thematic exploration but also quantitative assessment of research productivity, knowledge networks and institutional engagement.

Trend and key contributors of research on farmers' participatory sustainable resource management

Scholarly work over time and publication types

Three broad phases of development were noted in the research of farmers' participatory sustainable resource management. The number was low during the 1970s-1990s, indicating this approach was emerging with limited empirical study. Research was published in books, reports and limited journal articles. However, a gradual increase was noted from 2000 to 2015. Showing recognition of community-based resource management, sustainable agriculture and participatory governance. The maximum publications were noted as journal articles, followed by books and book chapters, which indicates methodological refinements and academic engagement. The sharp rise in publications, especially growing journal articles after 2015, reflects recognition of the area of community-based management, sustainable agriculture and participatory engagement (Figure 1). The distribution of different types of research documents shows the scientific orientation of sustainable resource management. The overwhelming presence of journal articles (75%) depicts the strong peer review. The presence of book chapters (6.3%) and books (8.1%) shows the development of concepts and the foundation of ideas during the earlier phases

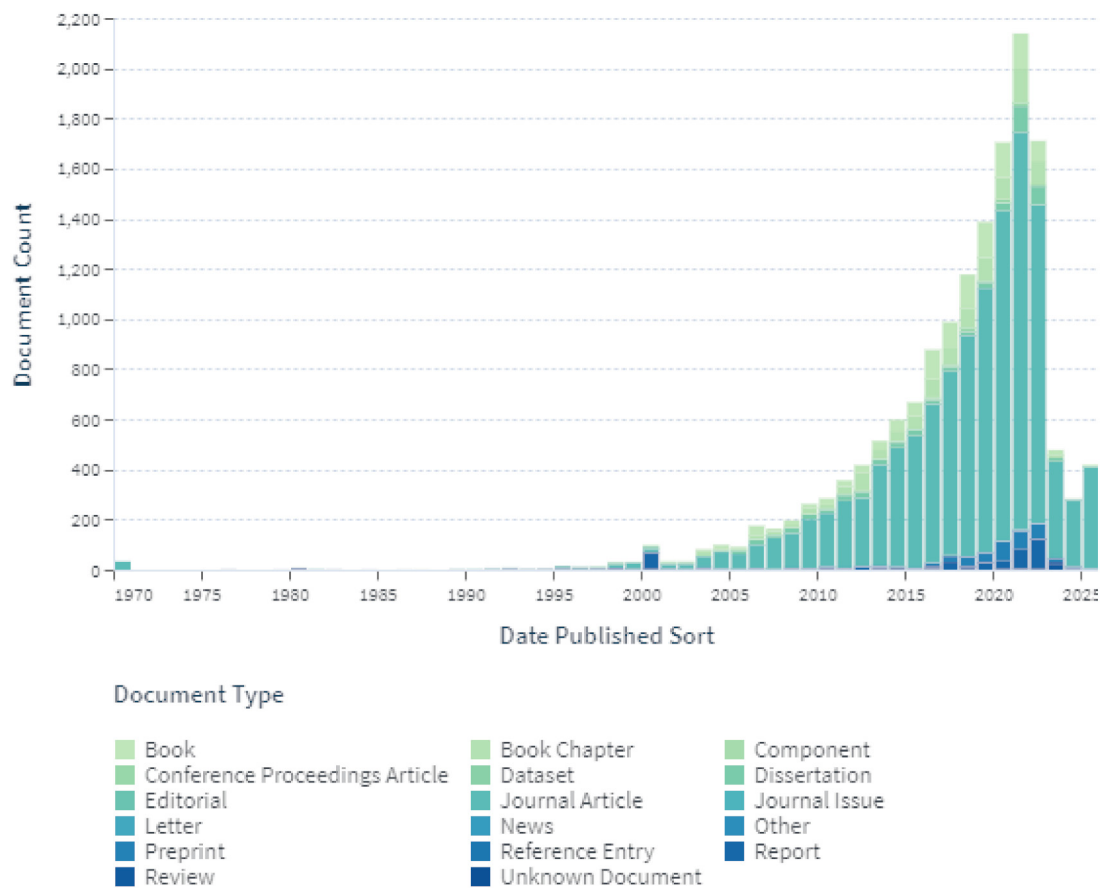


Fig. 1. Scholarly work over time on research on farmers' participatory sustainable resource management

of the genesis of this area. The existence of dissertations (3.5%) reflects early-career growing interest among the students and research scholars. The growing interest of policymakers, planners, and development agencies is noted in the published report (3.2%). Conference proceedings (0.64%) suggest interdisciplinary dialogue among different stakeholders. Ultimately, diversified publications establish a balance between academic rigours and reinforcing this field in addressing complex sustainability and governance challenges (Figure 2).

Top Institution logo grid and most active authors

Global-level and interdisciplinary-level analysis of research work on Farmers' Participatory Sustainable Resource Management was conducted. The leading institution in this research area is Wageningen University and Research Centre (333) for their longstanding dominance in participatory research, sustainability science, and agricultural systems. Involvement from policy and development

research is evident from the high number of contributions from the aforementioned European institutions: INRAE (190), University of Oxford (106), University College London (103), University of Leeds (102), and University of Bonn (79). The Chinese Academy of Sciences (104) shows the extent of research contributions from the Asia region. Research Diversification is evident in the different agro-ecological and socio-economic contexts of the world. The University of British Columbia (84) and Cornell University (90) are North American institutions reflecting interest in community-based resource management and rural development. The field's development and applied research dimensions are noted by ICRISAT (74) and the International Livestock Research Institute (82). Overall, this institutional spread reflects a robust, globally connected research landscape integrating science, policy and practice (Figure 3).

Focusing on the most prolific researchers reveals the intellectual current leading scholarship on

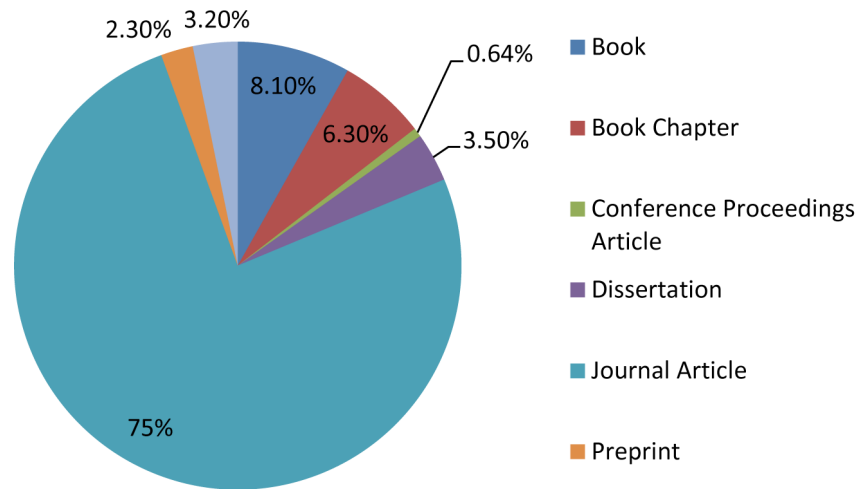


Fig. 2. Publications types on researches on farmers participatory sustainable resource management

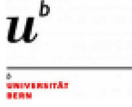
 Wageningen ... 333	 Inrae 190	 University of ... 106	 Chinese Aca... 104	 University C... 103
 University of ... 102	 University of ... 95	 Cornell Univ... 90	 University of ... 84	 University of ... 83
 International... 82	 University of ... 79	 Australian N... 78	 International... 74	 University of ... 70

Fig. 3. Top Institution logo grid on research on farmers' participatory sustainable resource management

Farmers' Participatory Sustainable Resource Management. Lindsay C. Stringer is the most prolific contributor of record with 20 documents, illustrating continuous involvement with areas of participatory governance, sustainability, and the land–resource nexus. Following her, Martin (13) and Mabhaudhi (12) focus on the integration of community-based approaches with food security and climate-adaptive

resilience. A strong cluster of authors-Jeroen C. J. Groot, Pablo Tittonell, and Terry Sunderland (each 11)- showcases the interdisciplinarity of the field. vanEtten, Lavorel, Sieber, and Rist (each 10) demonstrate the importance of the field's innovative, socio-ecological, and participatory integrating dimensions. Authors Dougill, Morgera, Giller, and Duru (each 9) maintain the focus of the field on

policy, agronomy, and governance. Overall, this authorship pattern illustrates a unified yet diverse community of scholarship on participatory sustainability (Figure 4).

Top fields of study and Global distribution of research output

Strong interdisciplinary research was noted based on the analysis of the top fields of study. The most dominant fields of study were business (4,947), geography (4,514), political science (4124), agriculture (3173), and economics (2,650), highlighting the prominence of institutional dynamics, governance frameworks, and spatial analysis in participatory resource management frameworks. The interrelationship of natural systems, human behaviour and community participation is reflected through the strong presence of the subjects Environmental planning (2462), Environmental Resource Management (2445), Biology (2400), Sociology (2311) and Sustainability (2145). The existence of Ecology (2012), and law (2012) depicts a regulatory framework, innovation and digital consideration. In brief, the findings reveal the spread of this participatory sustainable resource management in multi-domains viz. social, environmental, economic and technological sciences

(Figure 5). The global distribution of research output on Farmers' Participatory Sustainable Resource Management is uneven. The most dominant research output is for the United States and China, all collectively producing over 100 documents. The

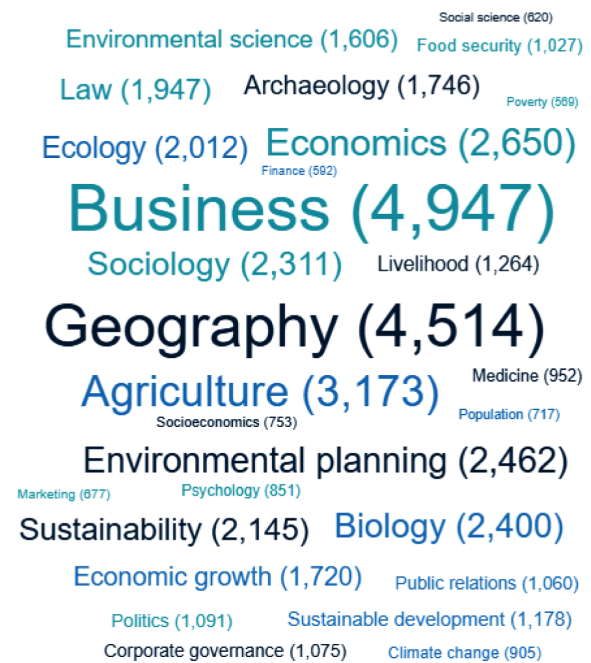


Fig. 5. Top fields of study on research on Farmers' Participatory Sustainable Resource Management

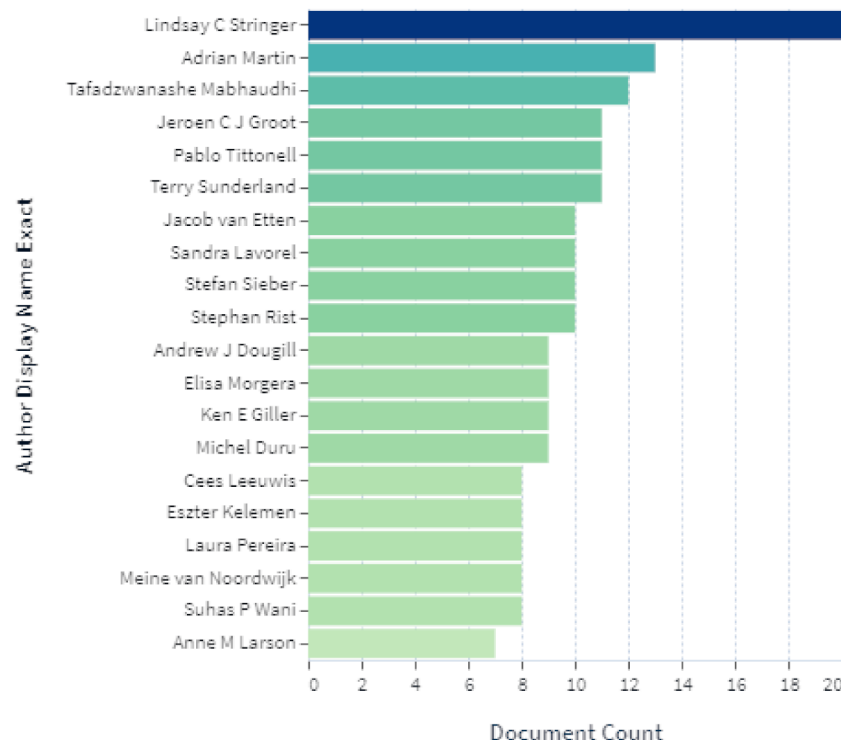


Fig. 4. Most Active authors on research on farmers' participatory sustainable resource management

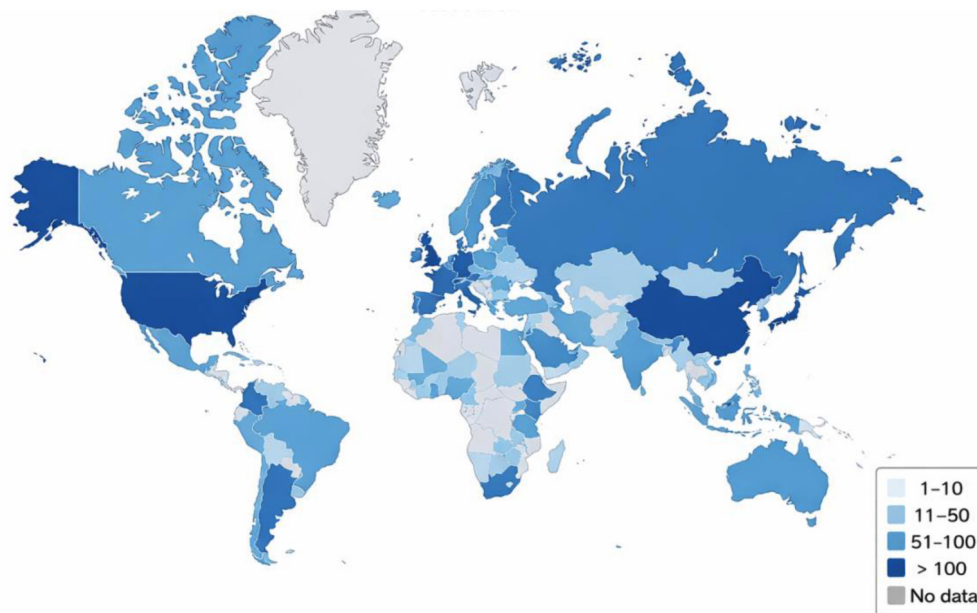


Fig. 6. Global distribution of research output on farmers' participatory sustainable resource management

research output is a reflection of the importance of research institutions, ongoing funding for research in agriculture and environmental sciences, and policies on participation, sustainability, and climate adaptivity. Many Western European countries, with about 51–100 documents, continue to support European dominance with influence on the advancement of theory and methodologies on Participatory Resource Governance. Most countries in Latin America, Southeast Asia, and Africa have research output of only 11 to 50 documents, which is still true of a higher number of publications in the described regions. The rise in research output is a positive sign of engagement, often through collaborative international partnerships and development-oriented research. Countries in the 1–10 documents category and those with no recorded data indicate underrepresentation, likely linked to limited research capacity or publication visibility rather than lack of relevance (Figure 6).

Thematic structure and collaboration patterns in the field

Top Journal and Co-authorships analysis

The dominant sources inform the channels influencing the scholarship on Farmers' Participatory Sustainable Resource Management. Sustainability is the most prolific outlet (1,001 documents). This reinforces the outlet's prominence

in interdisciplinary research involving the environment, society, and policy. Zenodo is also a prolific (343) outlet, demonstrating the contribution of open-access repositories to swift knowledge dissemination and research driven by empirical data. The journals *Land* (257) and *Water* (207) show specific focus on land governance, the distribution of resources, and participatory approaches to the management of water resources. The presence of some high-impact multidisciplinary journals like *PLOS ONE* (164) and *Scientific Reports* (62) signifies the increasing methodological sophistication and global reach of the field. Within the applied agricultural and ecological sciences, the emerging *Frontiers in Sustainable Food Systems* (127), *Forests* (109), and *Agronomy for Sustainable Development* (58) are notable. The *International Journal of the Commons* (103), *Journal of Political Ecology* (67), and *Journal of Agriculture, Food Systems, and Community Development* (64) are some of the social science journals that cover the themes of governance, equity, and community activism. Collectively, this diverse source distribution reflects a mature, multidisciplinary field bridging sustainability science, natural resource management, and participatory development (Figure 7). Analysis of co-authorship shows a full, interlinked, densely packed web of authors for the past 50 years for the study of Farmers' Participatory Sustainable Resource Management (FPSRM). Using

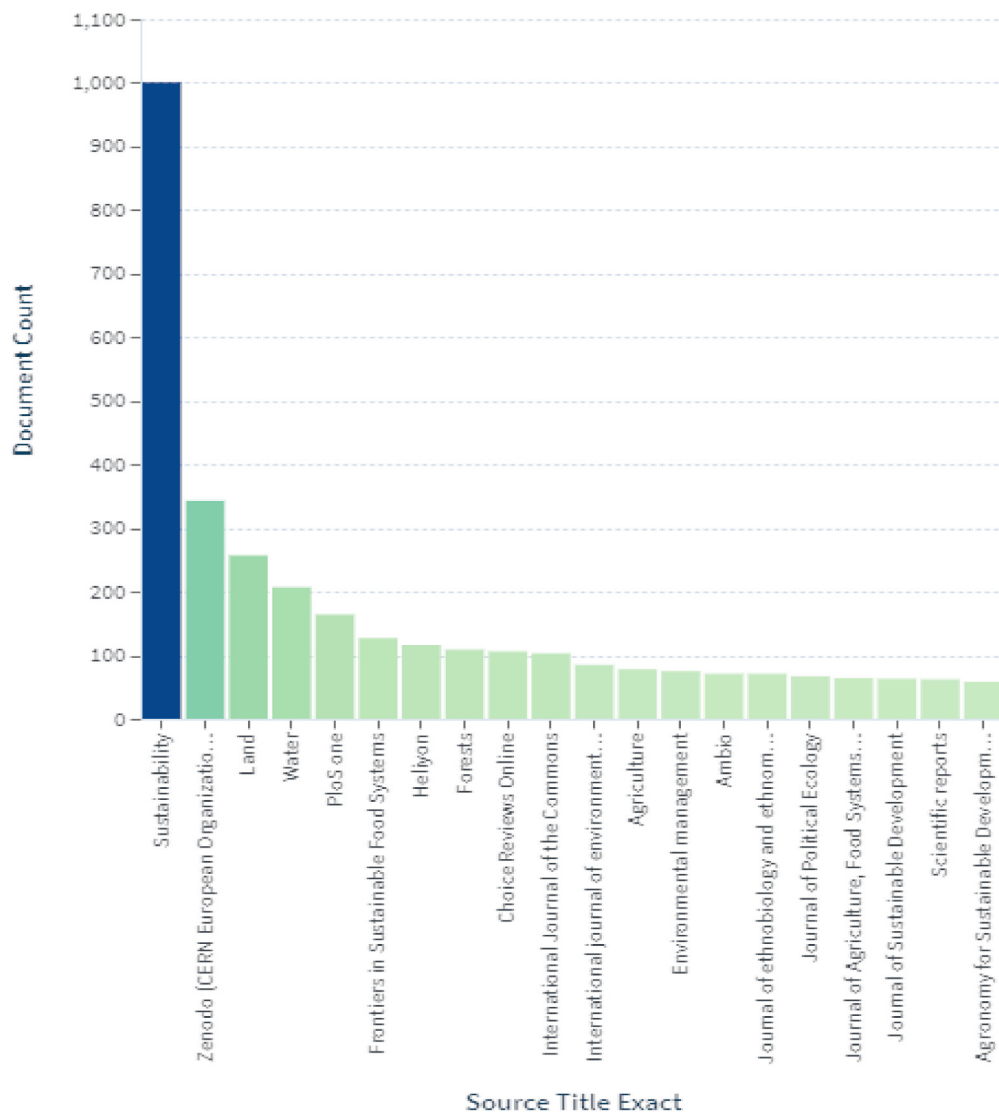


Fig. 7. Top journals on researches on farmers' participatory sustainable resource management

author as the unit of analysis (max 25 authors per document, min 2 documents per author, citation threshold applied), the core clusters are dominated by the most frequent collaborators in the field of study, revealing core contributors of the strongest author clusters in the VOSviewer mapping process. Key contributors are Stefan Sieber, Pablo Tittonell, Ken E. Giller, Suhas P. Wani, Jules Pretty, and Kevin Bardosh. They occupy the most central locations for the core clusters, resulting in the most positioning, impact, and influence for the FPSRM in the field of study. Collaboration at the International and Interdisciplinary level is shown in the central cluster of the core. This core integrates all three branches of agroecology and sustainability science, and participatory development. For the most

part, Peripheral nodes show the regionally situated contributors, who, for the most part, are adding connections to the core. The core's volume illustrates that the average FPSRM studies in the field show collaborative scholarship that is advancing the FPSRM. The research as a whole shows a mature research field stretching the expanding FPSRM domain of study (Figure 8).

Co-occurrence of keywords and Bibliographic coupling

Graphing all the keywords collected with the data up to the end of October 2023, and with the co-occurrence analysis having a magnitude of five, the keywords floating research on Farmers' Participatory

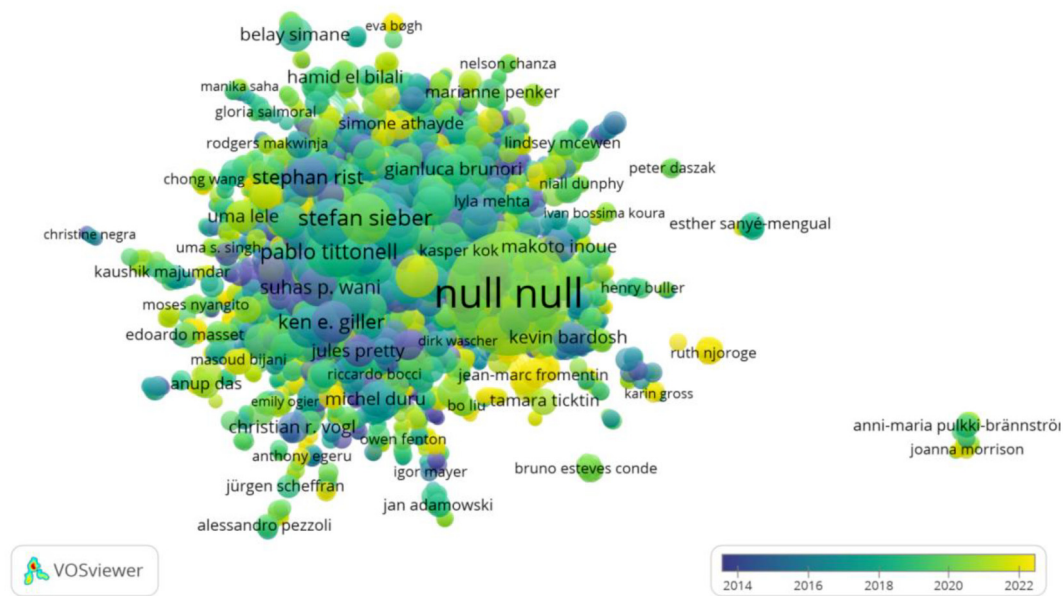


Fig. 8. Co-authorship analysis on researchers on farmers participatory sustainable resource management.

Sustainable Resource Management shows that the majority of the keywords floating in the network were highly interconnected and highly frequent and were the network's main keywords. These were the keywords "climate change," "sustainability," "humans," "development," "ecosystem," and "poverty." This shows that the most prevalent themes in the research were of the socio-ecosystem and development association. Four of the more distinct, but still interconnected, clusters in the network reflect the most prevalent themes of the research. Climate change adaptation and land degradation; sustainability, governance and property rights; the human dimension, which includes participation, qualitative research, and public health; and agro-ecology, which includes livestock, ethnobotany, plant breeding, and farming systems. The strong association of the keywords "humans" and "sustainability" confirms the participatory and people-centred approach of the FPSRM. The overall results show that the FPSRM is evolving with a more integrated approach to climate change that encompasses environmental, social, and agricultural aspects (Figure 9).

The bibliometric coupling method outlines the intellectual history and thematic alignment in the research of Farmers' Participatory Sustainable Resource Management. Several distinct clusters identify important knowledge pathways as anchored in the most prominent works. In the blue cluster, with Fikret Berkes (2004) and Ghazala Mansuri

(2004) at the helm, the focus is on community-based management of natural resources, collective action, and the roles of institutions. The yellow cluster with Carl Folke (2005), John Morton (2007), and Hallie Eakin (2006) is about resilience, social-ecological systems, and climate change adaptation. The green cluster, led by Jules Pretty (2011), Bekele Shiferaw (2011) and Miguel A. Altieri (2011), covers agroecology, sustainable intensification, and participatory innovation. The red cluster, Jeffrey Sayer (2013), and Unai Pascual (2014) focus on landscape governance, ecosystem services, and integrated approaches to conservation and development. Strong links between clusters in theory and practice integration across resilience, participation, and governance confirm the multidisciplinary and conceptually integrated progression of FPSRM scholarship (Figure 10).

CONCLUSION

This bibliometric analysis delivers a complete outline of the evolution of research on Farmers' Participatory Sustainable Resource Management (FPSRM) over the last five decades. The findings prove a clear evolution from early conceptual and descriptive studies toward an advanced, interdisciplinary, and policy-relevant research domain. The sharp growth in publications after 2015 reflects heightened global concern for climate change, sustainability transitions, and the Sustainable Development Goals, with farmer



Future studies face the potential of evaluating the quality, depth, and results of farmer participation in the management of resources as opposed to describing participation. Impact studies that focus on participatory models and their correlations to social, economic, and environmental impacts are needed. Global South, especially underrepresented areas, requires more research capacity building and more South–South and South–North collaboration. On the research front, the incorporation of digital methodologies, geospatial methodologies, and participatory data systems methodologies is needed. Empirical evidence that promotes the inclusion of

farmers in governance, as well as the incorporation of gender and local knowledge, will be needed to promote the participation of farmers in governance. Strengthening the science–policy–practice interface will be crucial in turning FPSRM research into practice.

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