

Mapping political ecology in Indonesia: A bibliometric analysis of trends, themes, and research gaps (1962–2025)

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Abstract

The environmental crisis in Indonesia has developed into a complex structural problem involving power relations between the state, corporations, and communities in the management of natural resources. The political ecology approach provides a critical perspective that examines the social, political, and economic dimensions of these dynamics. Although political ecology studies on Indonesia are growing, bibliometric studies that map the knowledge structure, research networks, and thematic evolution in international literature are still limited. This gap means that there is no comprehensive picture of the direction of research and dominant themes in political ecology studies on Indonesia. This study aims to map the development of the literature on political ecology in Indonesia through a bibliometric approach based on the Scopus database for the period 1962–2025. The analysis uses VOSviewer and Bibliometrix (R Studio) software to reveal publication trends, knowledge structures, collaboration networks, and thematic evolution. The results show a significant increase in publications since 2010, with more than 60% of documents published in the period 2015–2025. The dominant keywords include governance, sustainability, and climate change, as well as issues of environmental justice and indigenous peoples. Thematic visualizations show a shift in studies from natural resource governance to progressive issues such as urban political ecology and feminist political ecology. These findings provide insight into the direction of political ecology research in Indonesia and can serve as a basis for determining research priorities on issues of environmental justice, resource conflicts, and the transformation of environmental governance towards greater inclusivity and sustainability.

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1. Introduction

The environmental crisis in Indonesia is not only an ecological issue but has become a complex structural problem. This topic also concerns the relationship between the state, corporations, and society (Craig, 2020; Martin-Ortega et al., 2022; Maxton-Lee, 2018; Tomsa & Bax, 2023). Over the last two decades, Indonesia has experienced several significant environmental phenomena, including massive deforestation, large-scale plantation expansion, mining resource exploitation, coastal reclamation, urban environmental degradation, and prolonged agrarian conflicts (Austin et al., 2019; Numata et al., 2022). Ironically, many projects that contribute to environmental damage often gain legitimacy through state policies within the framework of national development (Nurhidayah & Alam, 2020; von Lüpke et al., 2025). This situation shows that the environmental crisis in Indonesia cannot be understood solely as a technical or ecological problem, but rather as a phenomenon closely related to the dynamics of power, development policies, and broader economic and political structures.

Over the last two decades, the concept of political ecology has emerged as a crucial framework in environmental studies, particularly in developing countries such as Indonesia (Arsyad et al., 2021; Ibrahim et al., 2023). Political ecology not only examines the relationship between humans and the environment but also critiques the power relations, policies, and political-economic dynamics that shape access, control, and distribution of natural resources. This approach is becoming increasingly relevant amid growing agrarian conflicts, resource exploitation, and development policies that often overlook the importance of ecosystem sustainability and social justice. Several studies show that the political ecology approach can explain how development policies, economic interests, and power relations shape natural resource management practices that are often unbalanced (Putri et al., 2026; Rafael et al., 2026; Sihidi et al., 2026).

Within this context, the political ecology approach serves as a critical lens for comprehensively examining environmental issues (Arsyad et al., 2021; Berdej et al., 2019; Devine & Baca, 2020; Ibrahim et al., 2023; Peluso & Vandergeest, 2020). Political ecology not only questions the ecological impact of an activity but also examines how power relations, political structures, and economics influence the production, distribution, and environmental impacts of that activity. This approach rejects the technocratic narrative that attributes environmental damage to a technical failure or a lack of local capacity (Arsyad et al., 2021; Berdej et al., 2019; Devine & Baca, 2020; Ibrahim et al., 2023; Kodir, 2019; Lukas & Peluso, 2020; Peluso & Vandergeest, 2020). In contrast, political ecology emphasizes that environmental crises are often the result of political decisions, power imbalances, and the dominance of certain ideologies that shape the relationship between humans and the natural world. However, most of these studies still focus on specific case studies and different disciplinary approaches, so that understanding of the overall development of knowledge in the field of political ecology remains relatively fragmented.

In Indonesia, political ecology has become an increasingly popular approach in academic studies, especially in the field of economics (Abdurrahim et al., 2023; Adebayo et al., 2023; Belsky, 1994; Elmhirst et al., 2017; Otten et al., 2020), environmental studies (As-syakur et al., 2023; Cole et al., 2024; Elmhirst et al., 2017; Evers et al., 2017; Hein et al., 2018; Lynch & Turner, 2022; Yang, 2024), anthropology, and political science (Azni, 2022; Goh, 2020; Ibrahim et al., 2023; Macrae, 2012; Pye & Radjawali, 2017; Saputra et al., 2025), policy (Arifanti et al., 2022; Fox et al., 2009; Lukas & Peluso, 2020; Macrae, 2012; Pichler, 2015). Several studies have examined the role of state power, corporations, the military, and local elites in the creation of environmental crises (Ley, 2016; Purnomo et al., 2022; Thung, 2018). However, although these studies have been widely published in various national and international journals, there has not been a single study that systematically maps the development of knowledge about political ecology in Indonesia in a quantitative and structured manner. In this context, the bibliometric approach becomes particularly relevant for assessing the extent to which political ecology has developed as a field of study in Indonesia, in terms of the number of academic researchers, thematic trends, and the direction of scientific topics that are being formed and will continue to evolve.

The bibliometric approach allows researchers to systematically map the structure of knowledge, scientific collaboration networks, and thematic evolution in a field of research based on data. Through the analysis of citations, co-keywords, and author collaboration networks, this method can provide an overview of how a field of science is developing, who are the important academic actors, and which research themes are most dominant and evolving over time. Thus, this approach can complement political ecology studies, which have so far mostly used a qualitative approach based on case studies.

This study aims to map the political ecology literature that discusses Indonesia through a bibliometric approach based on the Scopus database. Scopus was chosen because it provides broad multidisciplinary coverage, reliable citation indexing, and extensive access to peer-reviewed international journals relevant to environmental governance and political ecology research. By utilizing the analysis tools, namely VOSviewer and Bibliometrix (R Studio), this study aims to reveal publication trends and patterns, as well as dominant keywords and thematic dynamics that have developed during the period from 1962 to 2025. The theme of this period aims to capture developments over the past five decades, including the New Order form, decentralization, the period of interest, as well as development policies, and the transition to a green economy, which the state claims is a priority in development.

Using a bibliometric approach, this study will provide an objective picture of how political ecology is developed and studied by the scientific community, international actors, and domestic researchers. This study will also identify the extent to which concepts such as environmental justice, resource conflicts, the role of indigenous peoples, and resistance to extractive projects are discussed in academic literature. At the same time, this study is also expected to reveal gaps that have not been widely explored, both in terms of region, methodological approach, and subjects of focus.

This research is important not only for the advancement of science but also as a foundation to encourage more equitable research that supports vulnerable groups affected by the environmental crisis. In a global context where climate change and sustainability issues are increasingly becoming significant concerns, understanding the map of political ecology studies in Indonesia will be crucial for shaping more progressive environmental policy, advocacy, and educational directions.

2. Method

This study uses a bibliometric approach to analyze the development of political ecology research in Indonesia using the Scopus database. Data were retrieved from Scopus on 15 January 2025 and exported in RIS format including full records and cited references for further analysis. The search was conducted using the main keyword "political ecology" combined with the keyword "Indonesia" using the AND operator with the query TITLE-ABS-KEY ("political ecology" AND "Indonesia"). The use of these keywords was intended to ensure precision in identifying studies that explicitly discuss political ecology in the Indonesian context. The research

period covers all years available in the database. The search results yielded 194 documents, which were included in the analysis. The dataset represents international scientific publications on political ecology related to Indonesia indexed in Scopus.

To ensure the relevance of the data, the documents obtained were reviewed by examining the titles, abstracts, and keywords. This process was carried out to identify possible duplications and documents that were not relevant to the research focus. The types of documents analyzed were English-language publications. This selection aimed to ensure the quality and accessibility of the research in an international academic context and to facilitate database-based bibliometric analysis. However, this limitation has the potential to exclude some studies published in Indonesian and is one of the limitations of this study.

Bibliometric analysis was performed using VOSviewer and Bibliometrix (R Studio) software to identify publication trends, keyword networks, and thematic clusters in political ecology studies. The analysis process included data collection, initial dataset verification, descriptive analysis of publication trends, and bibliometric network analysis. VOSviewer was used to visualize the co-occurrence network of keywords and form thematic clusters, while Bibliometrix was used to analyze the dynamics of publication development and the evolution of research themes.

In the keyword network analysis, a minimum threshold for keyword occurrence was applied to identify the most relevant terms in the dataset, resulting in a clearer visualization of thematic clusters. The main focus of the analysis was on publication trends and thematic dynamics in political ecology studies. With this approach, the study provides an overview of the direction of research development and the potential for developing environmental politics studies in Indonesia.

3. Results and Discussion

3.1. Publication of Political Ideology in Indonesia

The number of publications on political ecology in Indonesia from 1962 to 2025 shows a very dynamic development (Figure 1). In the early period, particularly from the 1960s to the 1990s, the number of publications was relatively low and did not exhibit a significant trend, reflecting the limited attention to this issue among academics. However, starting in the early 2000s, particularly after 2010, there was a noticeable acceleration in the growth of publications, indicating an increase in interest and awareness of environmental, social, and political issues in Indonesia. This increase continued into the last decade with a significant spike. This development has also been influenced by increased attention to various environmental issues in Indonesia, such as deforestation, agrarian conflicts, and increasingly complex natural resource management in the context of sustainable development. This suggests that political ecology has become a highly relevant and rapidly evolving field of study, in response to the increasingly complex challenges of sustainability and natural resource management in Indonesia. This also shows how political ecology is increasingly gaining an important place in national and international academic research and discourse.



Figure 1. Political Ecology Publication Trends in Indonesia (1962-2025)

Source: Scopus, 2025

A bibliometric analysis of political ecology publications reveals that Indonesia holds one of the top positions among the 10 countries with the most research contributions in this field (Figure 2). In addition to Indonesia, countries such as the United States, the United Kingdom, Australia, and several other European countries are also included in the list, with a significant number of publications. The difference in the number of publications reflects the varying levels of attention and research activity between countries, where countries with greater academic resources and high environmental awareness tend to produce more scientific works. This

pattern reflects the broader global political ecology research landscape, where countries in the Global North often dominate knowledge production while countries in the Global South, including Indonesia, frequently become key empirical sites due to their complex environmental governance challenges. Indonesia's prominent position reflects the growing national academic focus on political ecology issues, along with the complexity of social and environmental problems faced at local, regional, and global levels. These data highlight the significance of Indonesia's role in the global political ecology discourse, as evidenced by its growing and diverse research contributions.

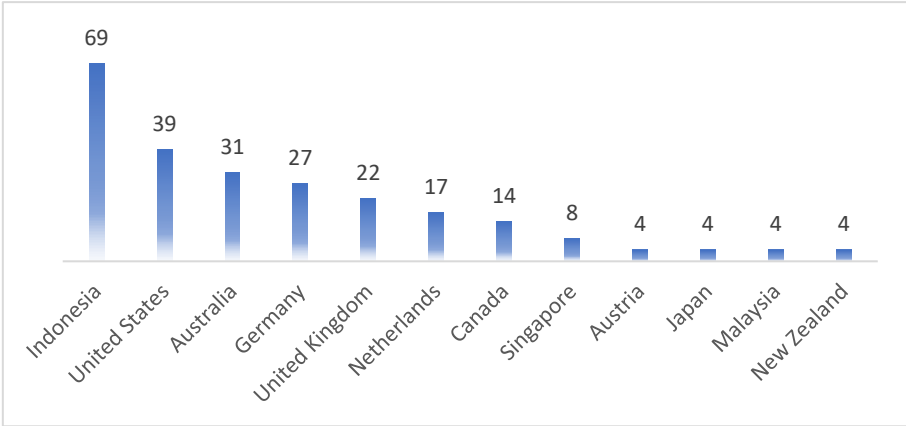


Figure 2. Country of Origin of Authors related to Political Ecology in Indonesia (1962 - 2025)

Source: Scopus, 2025

In the study of political ecology in Indonesia, several authors stand out as the most productive and influential contributors to this literature (Figure 3). Authors such as Großmann, K., and Peluso, N.L., are at the top of the list with the most publications, followed by other authors, including Faust, H., Fisher, M.R., and Kooy, M. In addition, several authors from Indonesia, such as Sahide, M.A.K., Astuti, R., and Dharmawan, A.H., are also noted for their significant contributions to the development of political ecology research in Indonesia. The presence of these authors shows the collaboration between international and national researchers that enriches academic discourse in this field. This pattern also reflects the formation of international research networks in political ecology, where influential scholars play an important role in shaping key debates, research agendas, and knowledge production related to environmental governance and resource conflicts in Indonesia. This data confirms that the field of political ecology is not only developing quantitatively but is also supported by academic figures who consistently produce scientific works with diverse scopes and perspectives. The high interest of authors outside Indonesia shows that ecological issues in Indonesia are a global concern.

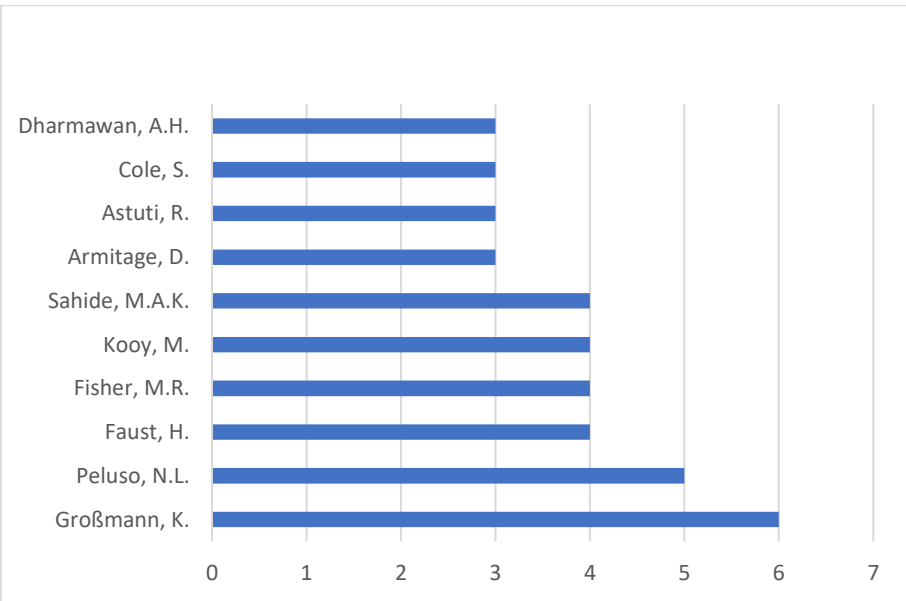


Figure 3. 10 Most Political Ecology Writers in Indonesia (1962 - 2025)

Source: Scopus, 2025

3.2. Main Research Cluster Analysis and Mapping Study

To provide an overview of the relationship between keywords in this study, a co-occurrence analysis was carried out using the VOSviewer software. The results of the network visualization are presented in Figure 4.

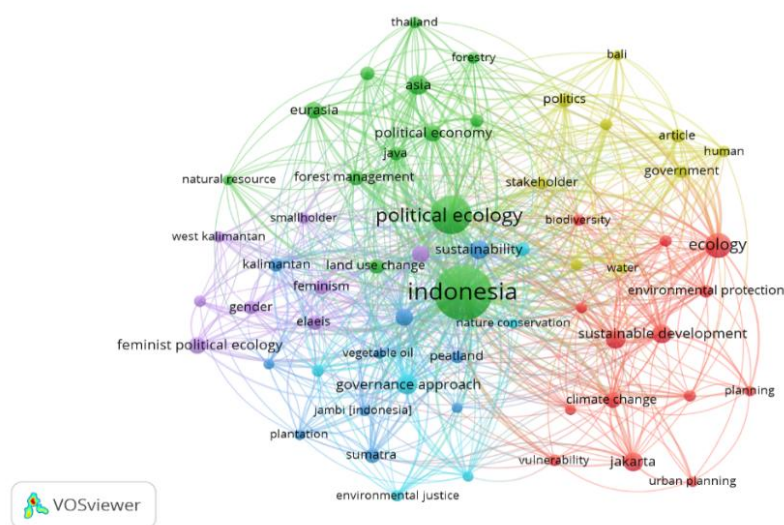


Figure 4. Network Visualization Occurrence
Source: Vosviewer, 2025

Figure 4 is a visualization of the co-occurrence network with keywords from “Political Ecology” in Indonesia, generated using VOSviewer software. This visualization displays the relationships between keywords that frequently appear together in a single document, with the size of the node (circle) indicating the frequency of occurrence of the keyword. The lines (edges) indicate the relationship between words. Different colors in this network indicate clusters or topic communities that are thematically closely connected, reflecting related subthemes or research areas. These clusters also illustrate the evolving knowledge structure of political ecology research in Indonesia, where earlier studies focused on natural resource management and political economy, while more recent discussions increasingly incorporate themes such as governance, sustainability, and environmental justice.

In the visualization, the keywords "Indonesia" and "Political Ecology" dominate as the central nodes of the network. This indicates that both are main themes often studied together with other keywords. The existence of words such as "sustainability," "governance approach," and "climate change," which have strong connections with many other terms, indicates that aspects of sustainability and governance are important elements in the discourse of political ecology in Indonesia. These keywords form a strong and broad node, representing the interdisciplinary and complex nature of environmental studies in Indonesia.

The green cluster, for example, groups keywords such as "political economy," "forestry," "forest management," "Eurasia," and "natural resource," indicating a research focus on natural resource politics and forest governance. Meanwhile, the red cluster contains terms such as "ecology," "sustainable development," "environmental protection," and "climate change," which describe ecological approaches and sustainable development policies, especially in the context of climate change and urban planning. This shows that the realm of political ecology is also closely related to ecological studies and global environmental policies.

Interestingly, there are purple and light blue clusters containing keywords such as "feminist political ecology," "gender," "feminism," and regional names such as "West Kalimantan," "Sumatra," and "Jambi." This suggests a particular emphasis on gender issues, environmental justice, and local context in the research. The involvement of concepts such as "plantation," "smallholder," and "land use change" demonstrates that agrarian conflicts, land management, and their impacts on local communities are crucial aspects of Indonesia's political ecology.

Overall, this map indicates that research on political ecology in Indonesia is closely tied to issues encompassing sustainability, climate change, environmental governance, and social and gender justice. The dominance of themes such as "governance," "sustainability," and "climate change" reflects the contemporary direction of this study, which is increasingly inclusive of multidisciplinary approaches. This visualization illustrates not only the density of research but also the potential for collaboration between topics, as well as opportunities for research exploration in areas or sub-themes that are still rarely touched on, such as

"environmental justice" or "urban planning" in the local context of Indonesia. Figure 5 shown a overlay visualization.

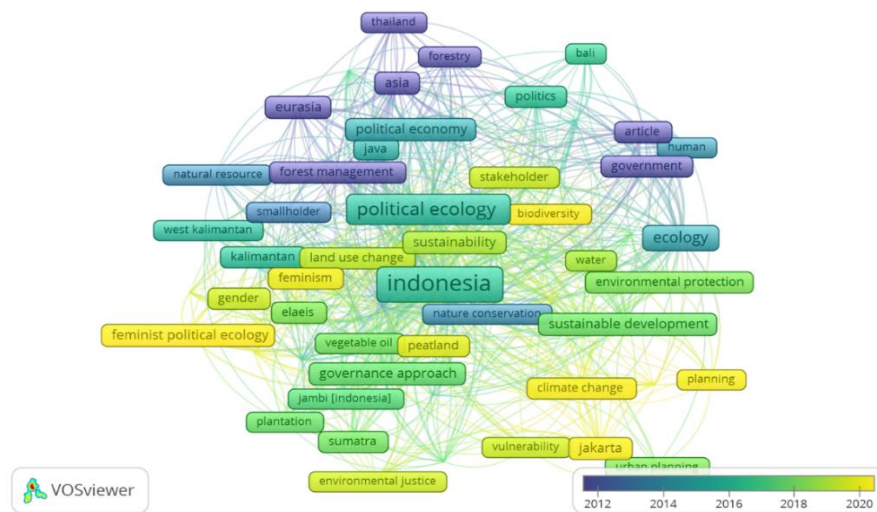


Figure 5. Overlay Visualization

Source: Vosviewer, 2025

Figure 5, an overlay visualization of the Political Ecology in Indonesia study generated using VOSviewer, provides a comprehensive picture of the dynamics of keywords that developed over the period from 2012 to 2020. The colors in the visualization indicate the temporal dimension of the emergence of keywords, where purple and blue represent older publications (around 2012–2014), while green and yellow mark newer keywords (2018–2020). Keywords such as forestry, forest management, natural resources, and political economy were dominant at the beginning of the study, indicating the initial focus was still on structural aspects and conventional natural resource management. This pattern is closely related to Indonesia's socio-environmental context, including deforestation pressures, forest governance reforms, and recurring land-use conflicts that have shaped academic attention to resource management issues.

Over time, there has been a shift in themes towards more progressive and complex issues. Keywords such as sustainability, governance approach, nature conservation, and environmental protection began to gain ground in the mid-period (2015–2017), indicating an increased focus on sustainable development and participatory environmental governance. In the Indonesian context, the regions of Kalimantan, Sumatra, and Jambi have begun to be mentioned more frequently, indicating an increased interest in areas experiencing environmental pressures due to the expansion of extractive industries and plantations.

In the latest period (2018–2020), various key terms related to yellow have emerged, including climate change, planning, vulnerability, environmental justice, and feminist political ecology. This shows a shift in the discourse of studies towards a more inclusive and intersectional approach. Issues such as gender inequality, environmental justice, and social vulnerability have begun to be raised in political ecology studies. Urban areas such as Jakarta have begun to take center stage, expanding the scope of political ecology from rural or forest areas to metropolitan areas that are socially and ecologically complex.

Overall, this visualization (Figure 2) suggests that Political Ecology studies in Indonesia are shifting from a focus on resource management to a critical approach centered on social justice, social movements, and adaptation to climate change. This finding opens up opportunities for further research that integrates the perspectives of urban political ecology, gender and climate justice, and governance of environmental transformation. Researchers and policymakers can use this map as a reference to formulate research agendas and policy interventions that are more responsive to contemporary socio-environmental dynamics. Next, density map can be seen in Figure 6.

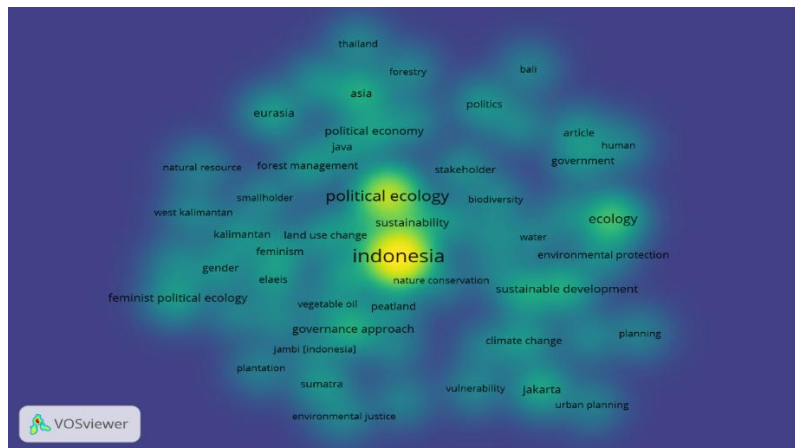


Figure 6. Density map

Source: Vosviewer, 2025

Figure 6 is a visualization of the keyword density map generated using VOSviewer software. The main focus of this map is the keyword "Indonesia," which is displayed in the largest font size and is positioned at the center of the area with the brightest color intensity (yellow), indicating that this word is the central or main theme in the analyzed dataset. Other keywords such as "political ecology," "ecology," "sustainable development," and "governance approach" appear with a fairly large size and a fairly bright color area, indicating that these topics have high frequency and strong relevance in the context of studies or research related to Indonesia and political ecology. While these dominant themes indicate areas of research saturation, the surrounding lower-density keywords also reveal emerging opportunities for further exploration, particularly in topics related to environmental justice, local governance, and socio-ecological resilience

Additionally, there are clusters of closely related words, such as "feminist political ecology," "gender," "feminism," and "environmental justice," which indicate an emphasis on the social and environmental justice dimensions in this study. Other clusters that are quite prominent relate to specific geographic and ecological aspects such as "Kalimantan," "West Kalimantan," "Jambi," "Sumatra," and terms related to natural resource management such as "forest management," "peatland," "vegetable oil," and "plantation." This indicates that this research or study is not only general but also raises specific issues related to regions and natural resources in Indonesia.

Other keywords, such as "politics," "stakeholder," "government," and "policy," are also scattered around the center, indicating discussions related to policy aspects and the actors that play a role in environmental governance and sustainable development. Meanwhile, terms such as "climate change," "sustainability," "biodiversity," and "environmental protection" emphasize the study's focus on global and local environmental issues, as well as efforts to protect and sustain ecosystems in Indonesia.

Overall, this map provides an overview of the studies and literature analyzed, which are highly focused on the relationship between ecology, politics, and society in Indonesia, with particular attention to natural resource management, environmental justice, and sustainable development. This visualization is effective in identifying the dominant central themes and sub-themes in the research while also illustrating the interrelationships between the concepts presented in the literature. Next, Figure 7 shown a thematic map.

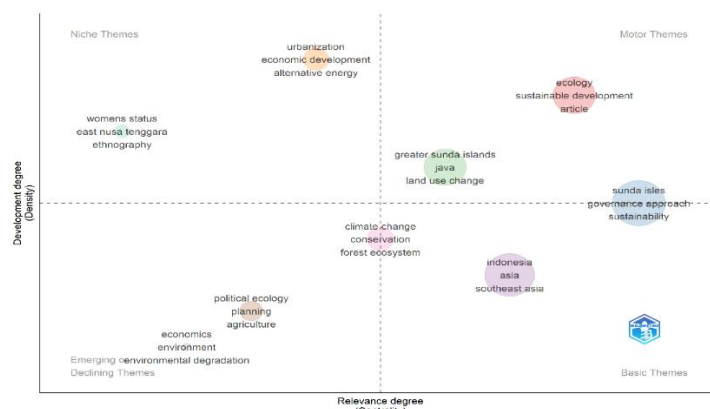


Figure 7. Thematic Map

(Source: R Studio, 2025)

This thematic map (Figure 7) illustrates the conceptual structure of political ecology literature in Indonesia based on Scopus data from 1962 to 2025. Research themes are divided into four main quadrants that reflect the level of development (density) and relevance (centrality) of each theme in the research network. The upper right quadrant is known as the motor themes, which represent the main themes with high development and relevance. In contrast, the lower left quadrant comprises emerging or declining themes, namely themes with low levels of development and relevance or those that are starting to change focus. These patterns suggest important future research agendas, particularly in strengthening studies on environmental justice, urban political ecology, and climate governance that remain relatively underexplored but increasingly relevant in Indonesia's socio-environmental context.

In the motor themes quadrant, themes such as "ecology" and "sustainable development" are seen as occupying a central and strong position in the development of political ecology research. This suggests that environmental issues and sustainable development have been the primary drivers and dominant research focus for the past 30 years. On the other hand, the niche themes quadrant in the upper left displays specific topics, such as urbanization, the status of women, and ethnographic studies in particular regions, including East Nusa Tenggara. These themes are well-developed but less widely connected to other themes, reflecting a narrower and more local research focus.

The bottom right quadrant, which consists of basic themes highly conceptually relevant, includes governance approaches, sustainability, and geographic regions such as the Sunda Isles and Southeast Asia. Although important and often the basis of the literature, these themes still require further development in order to produce more significant research contributions. Meanwhile, the bottom left quadrant, which includes emerging or declining themes, encompasses topics such as climate change, conservation, and forest ecosystems, currently at a relatively low level of development and relevance, indicating new research opportunities or a shift in focus in the field of political ecology.

Overall, this thematic map provides a strategic overview of the development of political ecology research in Indonesia. The main focus on environmental issues and sustainable development as the driving themes indicates a strong and sustainable research trend, while niche and basic themes open up opportunities for further exploration in social, economic, and governance aspects. Meanwhile, themes that are developing or declining are an indication of the changing dynamics of research, making them important areas for future study development in order to strengthen political ecology studies in Indonesia.

3.3. Discussions

This study further confirms that political ecology in Indonesia has deep relevance to local socio-ecological issues. The dominance of the keywords "Indonesia" and "political ecology" in the bibliometric analysis indicates that this study integrates various dimensions, encompassing not only environmental aspects but also social and political interactions that shape the management of natural resources. This study reflects the importance of a comprehensive approach to understanding the complex relationship between humans and nature. This pattern also reflects the increasing academic attention to Indonesia's complex socio-environmental dynamics, including land-use conflicts, forest governance debates, and the growing intersection between environmental policy and local political structures.

The presence of keywords such as "governance approach," "policy," and "stakeholder" in the cluster related to environmental management further underlines the main focus of political ecology studies in Indonesia. It becomes clear that natural resource and environmental management must involve various actors who have roles in inclusive and transparent policies (Berdej et al., 2019). Good governance plays a crucial role in achieving sustainable balance for ecosystems and communities (Ibrahim et al., 2023). This finding may also indicate that the discourse of political ecology in Indonesia is increasingly influenced by broader governance frameworks promoted in global environmental policy, where participatory governance and multi-stakeholder approaches have become central narratives in environmental management.

The issues of sustainability, climate change, and environmental justice are very relevant themes in this study. This is clearly reflected in the dominance of keywords such as "sustainability," "climate change," and "environmental justice." This finding shows that political ecology in Indonesia does not only focus on the ecological dimension but also on social justice, which is an integral element in formulating sustainable and fair public policies for all levels of society (Andrew et al., 2015; Brechin, 2003). The prominence of these themes may also reflect the growing influence of global environmental governance agendas such as the Sustainable Development Goals (SDGs) and climate change mitigation policies, which increasingly shape both academic research priorities and policy discussions in Indonesia.

One interesting finding is the emergence of clusters highlighting "feminist political ecology" and "gender." This theme demonstrates that studies on political ecology in Indonesia are becoming increasingly inclusive, with a focus on gender and social justice aspects in natural resource management. An intersectional approach that

connects ecology with issues of social inequality opens up new perspectives in more just and sustainable environmental management (Kuswardono et al., 2021; Pakasi et al., 2024). This shift also suggests a broader epistemic transformation in political ecology scholarship in Indonesia, where environmental issues are increasingly examined through intersectional perspectives that connect ecological governance with gender inequality and social vulnerability.

The shift in thematic focus seen in the overlay visualization shows that political ecology in Indonesia is undergoing dynamic changes. Initially, the focus of the study was primarily on conventional natural resource management; however, over time, more progressive issues, such as social vulnerability, urban planning, and environmental justice, have increasingly dominated. This indicates that the study is becoming increasingly responsive to the increasingly complex challenges in the social and ecological world. Such thematic evolution reflects how political ecology research increasingly responds to emerging socio-environmental challenges in Indonesia, including urban environmental pressures, climate vulnerability, and changing patterns of resource governance.

This study comprehensively examines the existence and development of the concept of environmental justice in the political ecology literature of Indonesia. Through overlay and density visualization analysis, environmental justice emerged as a significant new theme during the 2018–2020 period. This indicates a shift in the study's focus towards a more inclusive and critical approach to addressing social inequality in the context of environmental management. The dominance of this keyword also reinforces the argument that social justice has become a crucial component in contemporary political ecology studies. The persistence of these themes in the literature suggests that environmental conflicts remain a central empirical foundation of political ecology research in Indonesia, particularly in regions experiencing rapid expansion of extractive industries and plantation economies.

Additionally, resource conflicts are a recurring theme that consistently appears in the keyword clusters and main themes of Indonesian political ecology literature. Words such as "natural resources," "plantations," and "forest management" reveal that issues of struggle, exploitation, and control over natural resources are at the heart of tensions between the state, corporations, and communities (Devine & Baca, 2020; Henley, 2008; Lukas & Peluso, 2020). This study demonstrates that resource conflicts are not only perceived as environmental issues but also as manifestations of power imbalances and policies that frequently marginalize the interests of local communities. This also highlights the growing recognition within political ecology scholarship of the importance of indigenous knowledge and local community perspectives in shaping more inclusive environmental governance.

The role of indigenous peoples is also identified significantly in the thematic analysis. Although not always appearing in the form of explicit keywords such as "Indigenous," this study highlights areas such as Kalimantan (Gilbert, 2023; Großmann, 2017, 2021; Peluso, 1992), Sumatra (Gilbert, 2023; Minarchek, 2020) and Jambi (Merten et al., 2021) are locations of conflict and field studies closely related to indigenous communities. The presence of research based on ethnographic studies and feminist political ecology shows that there are efforts to record the voices of marginalized groups (Dunphy et al., 2024; Elmhirst et al., 2017; Großmann et al., 2017), including indigenous communities (Grossmann, 2021), in the discourse of environmental management. This reflects a direction of study that is more responsive to local contexts and complex social experiences.

The issue of resistance to extractive projects is also a significant aspect of the literature. This study highlights various forms of resistance carried out by communities against mining projects, large-scale plantations, and infrastructure development that have negative environmental impacts. Several publications reviewed in this bibliometrics analysis demonstrate that this resistance is not just a cultural expression but a political strategy to maintain living space, identity, and rights to resources (Gilbert, 2023; Muswar et al., 2019; Pichler, 2016; Thorburn & Kull, 2015). Thus, political ecology serves as an analytical tool for understanding the dynamics of local resistance to exploitative development agendas.

Overall, this study demonstrates that the political ecology literature in Indonesia has shifted towards a more progressive and critical direction, providing considerable space for issues such as environmental justice, resource conflicts, the role of indigenous communities, and resistance to extractive projects. The four concepts are not only discussed implicitly as topics but have also become integral to the main structure of thematic mapping and academic trends. These findings provide important contributions in formulating the direction of future environmental research and policy that are more just, inclusive, and contextual.

The sharp increase in the number of publications since 2010 confirms that political ecology in Indonesia is receiving greater attention from academics. This surge indicates that social-ecological issues are becoming increasingly relevant, with a growing number of researchers involved in discussing the major challenges facing Indonesia, such as sustainable natural resource management and the impacts of climate change.

The synergy between international and national authors in political ecology studies is increasingly visible in the existing bibliometric data. This collaboration enriches existing perspectives, opens up space for a broader exchange of ideas, and strengthens the relevance of research results at the global level. The involvement of researchers from various backgrounds makes a significant contribution to enriching this study.

Thematic maps analyzed using R Studio reveal the relationships between keywords, providing a clear picture of potential areas for further research, especially in issues such as urban political ecology and resilience to climate change. Connecting these studies to specific local contexts is crucial, particularly in areas that face unique environmental challenges and require more in-depth research. Such localized focus not only enriches the global discourse but also ensures that policy recommendations are both context-sensitive and practically implementable. These findings suggest that political ecology research in Indonesia is increasingly shaped by the intersection between environmental governance debates, social justice concerns, and the growing pressures of extractive development and climate change.

This research makes a significant contribution to the development of an understanding of political ecology in Indonesia. The findings not only illustrate the direction of the study's development but also provide insight into how environmental issues related to politics, economics, and society can be integrated into public policies that are more responsive to existing challenges. Moreover, this study highlights the importance of interdisciplinary collaboration in addressing ecological crises, especially in the face of extractive industries and rapid urbanization. By mapping thematic trends and research gaps, it lays the groundwork for future scholarship and evidence-based policymaking.

The results of this study also demonstrate that political ecology can significantly influence public policy in Indonesia. This thematic mapping and analysis provide a strong basis for policymakers to formulate more inclusive and sustainable environmental management policies, which accommodate community needs while maintaining the sustainability of natural resources.

As this study continues to evolve, it highlights the need for more practical research and provides relevant solutions. Utilizing robust data, this research presents opportunities to enhance Indonesia's standing in global studies. This is also evidence that Indonesia can make a significant contribution to addressing increasingly complex and interconnected environmental challenges worldwide.

Overall, these findings provide an in-depth picture of the development of political ecology in Indonesia. This research not only identifies dominant themes but also creates space for broader collaboration among academics, policymakers, and the community in formulating solutions to the growing social and environmental problems in Indonesia. It underscores the urgency of integrating local wisdom and community-based approaches into political ecological strategies to ensure more sustainable and inclusive outcomes.

4. Conclusion

This study provides a clear picture of the development of political ecology in Indonesia, which is increasingly relevant in responding to highly complex social and environmental challenges. Findings from bibliometric analysis using VOSviewer and R Studio show that political ecology focuses not only on environmental issues, but also on the social, political, and economic dynamics that shape natural resource management. The dominance of keywords such as "governance," "sustainability," and "climate change" indicates that this study leads to a more holistic and multidisciplinary approach. Issues of social and gender justice are also becoming an important concern, enriching the study with a more inclusive perspective. Overall, these findings indicate that political ecology in Indonesia is developing into a highly relevant discipline that is responsive to contemporary challenges in environmental management and sustainable development. This analysis also shows a thematic shift from the study of natural resource management to issues of environmental justice, gender, and more inclusive environmental governance, thereby contributing to mapping the knowledge structure and development of political ecology studies in Indonesia.

However, this study has limitations in terms of data coverage, which is limited to publications in the Scopus database and articles in English. This may limit a comprehensive understanding of political ecology in Indonesia, especially regarding studies published in Indonesian or non-Scopus sources. This study also cannot reveal deeper connections between various emerging themes, such as the relationship between climate change and urban planning issues. Therefore, future research should expand the scope of data by including more diverse literature sources. In addition, future research can focus more on issues of urban political ecology, environmental justice, and climate change governance, which are still relatively new in the study of political ecology in Indonesia.

Author Contributions

All authors contributed equally to the conception, design, analysis, and writing of this paper. Each author has reviewed and approved the final version of the manuscript, and collectively bear responsibility for its content and integrity.

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The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Data Availability

The datasets generated during and/ or analyzed during the current study are available from the corresponding author on reasonable request.

Declaration on AI Use

The authors declare that no artificial intelligence (AI) or AI-assisted tools were used in the preparation of this manuscript.

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