


Bibliometric Analysis of Environmental Law Research: Identification of Thematic Focuses and Global Collaboration Networks

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Article Info	ABSTRACT
<p>Article history:</p> <p>Received October, 2025 Revised October, 2025 Accepted October, 2025</p> <hr/> <p>Keywords:</p> <p>Environmental Law Bibliometric Analysis Climate Change Sustainable Development Legal Governance International Collaboration Environmental Legislation</p>	<p>This study does a thorough bibliometric analysis of environmental legal research to ascertain its topic foci, intellectual framework, and global collaboration networks. The study utilizes data from Scopus and Web of Science, employing VOSviewer and Bibliometrix tools to examine publication patterns, keyword co-occurrences, and collaborations among institutions and countries from 2000 to 2025. The findings indicate three primary topic clusters: (1) environmental law and governance, (2) regulation and enforcement, and (3) climate change and sustainable development. The United States, China, and the Netherlands are the primary influential donors, while burgeoning collaborations from Asia and Latin America signify an increasing diversification of worldwide research involvement. Author and institutional networks, including prominent individuals like Heyvaert, Sands, and Peel, exemplify the international and interdisciplinary characteristics of the area. The study highlights the evolution of environmental law into a worldwide and integrated field, integrating legal theory, policy, and sustainable practices. It provides strategic ideas for enhancing collaboration, capacity development, and evidence-based policymaking in environmental governance.</p> <p><i>This is an open access article under the CC BY-SA license.</i></p> <div></div>
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1. INTRODUCTION

In recent decades, worldwide environmental deterioration has escalated, leading to a significant enhancement of the law's function as a primary tool for environmental governance. The establishment of comprehensive international frameworks, including the United Nations Framework Convention on Climate Change (UNFCCC) and the Convention on Biological Diversity (CBD), has positioned legal instruments centrally in the endeavors to

tackle climate change, biodiversity decline, and other global challenges. Simultaneously, researchers identify the development of a unique domain of environmental law, characterized by its emphasis on normative, institutional, and regulatory aspects of human-environment interaction. The academic field has increasingly adopted bibliometric methods—quantitative analyses of publications, citations, thematic clusters, and collaboration networks—to chart the evolution of disciplines, identify thematic

clusters, and assess global research collaboration trends [1], [2]. In this setting, study on environmental law has become progressively essential. Law serves as a fundamental instrument employed by nations, international organizations, and non-governmental entities to implement sustainable development goals. Legal frameworks establish the parameters for pollution regulation, resource management, habitat preservation, and climate mitigation and adaptation initiatives. The normative complexity of environmental law, encompassing treaty frameworks, national legislation, administrative regulations, and private-law instruments, necessitates scholarly scrutiny to assess its structure, efficacy, and development. Furthermore, due to the global and transboundary characteristics of numerous environmental issues, coordination across jurisdictions and disciplines is important. Legal researchers, policymakers, and practitioners must comprehend the organization of environmental legal literature, identify prevailing or neglected themes, and understand the operation of worldwide research networks. The intricate relationship between law, government, policy, and science establishes environmental law as a vital issue and an academic field warranting comprehensive analysis.

Although bibliometric evaluations are becoming more prevalent in environmental sciences and management, their utilization in environmental law research is still insufficiently advanced. Bibliometric methods provide numerous benefits: they facilitate a systematic examination of publication trends; they identify key institutions and countries in literature production; and they delineate thematic clusters (through keyword or co-citation networks) and collaboration patterns (through co-authorship or institutional affiliations) [2], [3]. Bibliometric research in similar domains, such as environmental regulation and green technology innovation, have identified specific growth periods, regional disparities, and comparatively poor collaborative networks [3]. Considering the

unique attributes of the legal field—varied legal sources (literature, reports, statutes), the impact of national context, and significant interdisciplinary connections—the implementation of bibliometric methods offers valuable insights into the evolution of environmental law scholarship, the concentration of collaboration, and the existing gaps.

Several significant developments are emerging in the field of environmental legal studies. The globalization of environmental issues has inspired legal studies to transcend national boundaries: treaties, international organizations, and global governance discussions have stimulated comparative legal research and transnational legal analyses. The policy focus on sustainable development, circular economy strategies, climate change mitigation and adaptation, biodiversity conservation, and environmental justice has invigorated legal studies on these topics. Third, the necessity for collaborative governance—where governmental, commercial, and civil-society entities operate in unison within legal frameworks—has become pronounced, and environmental law literature increasingly focuses on these multi-actor aspects. Collectively, these tendencies indicate that a bibliometric analysis of environmental law research might reveal the theme concentrations and international collaborative networks that support the discipline. Nonetheless, numerous structural obstacles continue to exist in environmental legal studies, rendering this bibliometric analysis both contemporary and essential. Numerous jurisdictions continue to have implementation gaps, enforcement challenges, and fragmented legal frameworks; research indicates that legal and institutional obstacles undermine the efficacy of environmental law, particularly in developing nations. The academic literature may exhibit geographical disparities, with prominent research centers located in developed nations, while scientists from the Global South may be inadequately represented in collaborative networks. Moreover, as legal research frequently include books, papers, and grey literature that

are not consistently included in conventional bibliometric databases, the analysis of collaboration and thematic progression in environmental law entails specific methodological challenges [2]. Consequently, employing bibliometric analysis to discern thematic concentrations and worldwide collaboration networks in environmental legal research might elucidate concealed patterns, underscore emergent themes, and provide avenues for additional study and governance innovation. Notwithstanding the increasing acknowledgment of environmental law as a vital area of study and practice, there persists an absence of thorough, systematically organized bibliometric analysis that specifically addresses environmental law research—its thematic development and global collaborative frameworks. In the absence of such mapping, the discipline is susceptible to fragmentation: scholars may be unaware of prevailing themes, insufficiently examined study domains, or the structure of worldwide research networks. Moreover, policy-makers and legal practitioners may overlook chances to recognize centers of expertise, international collaborations, or knowledge deficiencies that could guide legal reform, capacity enhancement, and governance innovation.

This study aims to perform a bibliometric analysis of environmental legal research to determine its subject emphasis and delineate global collaboration networks. The study aims to (1) delineate publication trends, prevailing themes, and nascent topics in environmental law scholarship; (2) identify principal contributors (authors, institutions, countries) and patterns of collaboration; and (3) visualize and analyze global research collaboration networks and the relative strengths of various thematic clusters. The study aims to elucidate the intellectual framework of environmental law research and to guide future scholarship, policy, and practice.

2. METHODS

This study employs a bibliometric research design to carefully analyze the

intellectual framework, theme progression, and global collaborative networks within environmental legal research. Bibliometric analysis is a quantitative method that assesses the trends in scientific output and distribution through publication and citation data indexed in prominent academic databases [4]. This technique seeks to identify key authors, institutions, countries, and theme clusters that influence the evolution of environmental law scholarship. Bibliometrics is especially effective for comprehending diverse and globally distributed research areas, such as environmental law, which intersects with fields like political science, environmental studies, public policy, and governance [5]. The study facilitates the identification of time trends and collaborative patterns that have influenced the development of environmental law as a unique academic discipline.

The data gathering approach entailed obtaining publications from the Scopus and Web of Science databases, which offer extensive coverage of peer-reviewed journals, conference papers, and book chapters in legal and transdisciplinary fields. The search approach employed a combination of controlled keywords and Boolean operators, including “environmental law,” “climate law,” “environmental regulation,” “sustainability law,” and “environmental governance,” applied to titles, abstracts, and keywords. The analytic period extended from 2000 to 2025, enabling the study to document the significant expansion of environmental legal research following the Kyoto and Paris Agreements. Only English-language publications were used to maintain consistency in bibliometric analysis, while duplicates and non-academic items (such as editorials, notes, and conference abstracts) were omitted. The extracted dataset was exported in CSV format for subsequent analysis, encompassing bibliographic metadata such as authors, affiliations, keywords, publication year, and citations.

The analysis utilized VOSviewer (version 1.6.20) and the Bibliometrix R package to visualize networks of co-authorship, co-citation, and keyword co-occurrence. VOSviewer was utilized to create

network maps illustrating clusters of topical focuses, whereas Biblioshiny (the online interface of Bibliometrix) facilitated descriptive statistics, including annual publishing growth, citation trends, and international collaboration networks [6]. Thematic mapping revealed predominant subjects—namely climate litigation, environmental justice, and international environmental governance—through keyword frequency and co-occurrence density analysis. Simultaneously, network analysis uncovered global collaboration

trends, emphasizing prominent institutions and areas in environmental law study. The incorporation of these bibliometric tools established a comprehensive and clear analytical framework, facilitating both quantitative analysis and qualitative interpretation of trends influencing the domain of environmental law.

3. RESULTS AND DISCUSSION

3.1 Network Visualization

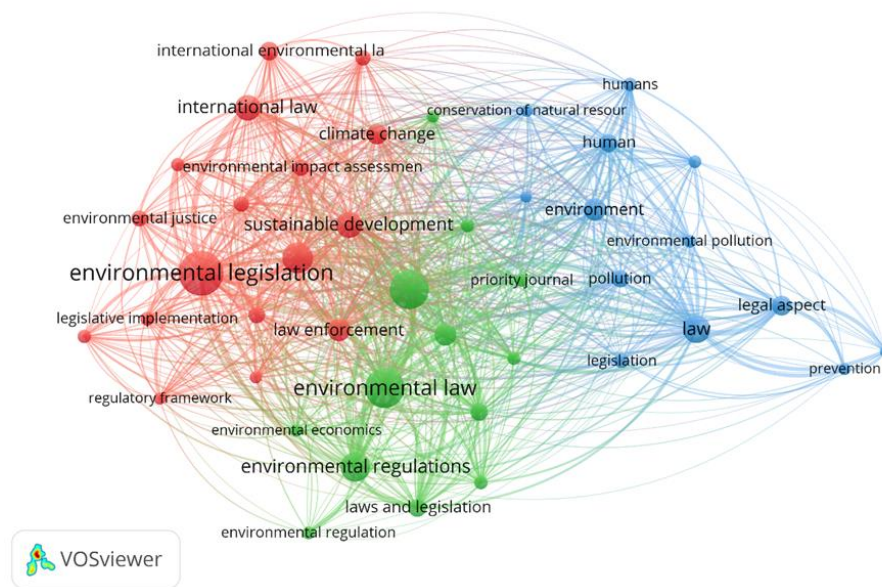


Figure 1. Network Visualization

Source: Data Analysis Result, 2025

The VOSviewer network visualization illustrates three predominant clusters that signify theme communities in worldwide environmental law study. Each cluster represents a distinct intellectual concentration, differentiated by color and the proximity of nodes. The red cluster (top left) encompasses study issues focused on environmental policy, international law, climate change, sustainable development, and environmental justice. The nodes exhibit dense interconnections, indicating that discussions regarding legal frameworks are intricately linked to international climate agreements and the normative discourses on justice and sustainability. This cluster represents legal work that addresses global

environmental governance, analyzing how laws, treaties, and organizations convert sustainability promises into enforceable norms [7], [8].

The green cluster (center) concentrates on environmental law, regulation, enforcement, and economics. The recurrent co-occurrence of these phrases signifies a study trajectory examining the operational and regulatory dimensions of environmental law, encompassing compliance, implementation, and economic incentives for sustainable behaviors. This domain frequently connects legal studies with economics and policy analysis, highlighting how regulatory instruments (e.g., carbon pricing, emissions trading, and fiscal

procedures) facilitate environmental objectives. The role of law enforcement and regulatory frameworks in this cluster emphasizes the importance of the efficacy of legal instruments and institutional capabilities in guaranteeing compliance [9]. The green cluster signifies the pragmatic aspect of environmental governance—converting legislation into enforceable policy and evaluating regulatory efficacy.

The blue cluster (right) includes terms such as law, legal aspects, environmental pollution, prevention, and human rights. This thematic community adopts analytical and human-centric viewpoints, examining the intersection of environmental law with human rights, health, and pollution mitigation. The relationship between law and humanity indicates a growing dialogue over environmental human rights and the acknowledgment of a healthy environment as an inherent right [10]. The focus on pollution control and legal considerations highlights scholarship that merges scientific understanding and public health issues within legal frameworks, demonstrating an interdisciplinary integration of law, environmental science, and social welfare.

The physical closeness and intersecting boundaries of clusters signify robust interrelations among environmental governance, legal enforcement, and sustainability rhetoric. The pivotal role of environmental legislation and environmental law—both shown by significant nodes—implies their essential function in organizing

the whole research network. These hubs serve as intellectual conduits linking normative frameworks (red cluster) and regulatory implementation (green cluster) to human and ecological well-being (blue cluster). The strength of connections between sustainable development and climate change highlights the global transition in legal research towards the integration of environmental protection with development objectives, consistent with the post-Paris Agreement focus on equitable transitions and policy coherence [11], [12].

The network illustrates that environmental law study is multifaceted and integrative, encompassing legal theory, governance, and practical policy areas. The strong connection among clusters indicates the transformation of environmental law from a strictly regulatory domain to a more expansive interdisciplinary framework that includes economics, human rights, and sustainability science. This pattern indicates a developing study environment where researchers are progressively using systems-based methodologies—integrating environmental control, justice, and human welfare—to tackle intricate worldwide issues. Future study may further delve into digital governance (e.g., AI-assisted environmental monitoring) and transnational enforcement mechanisms, which are currently underrepresented in the existing bibliometric landscape.

3.2 Overlay Visualization

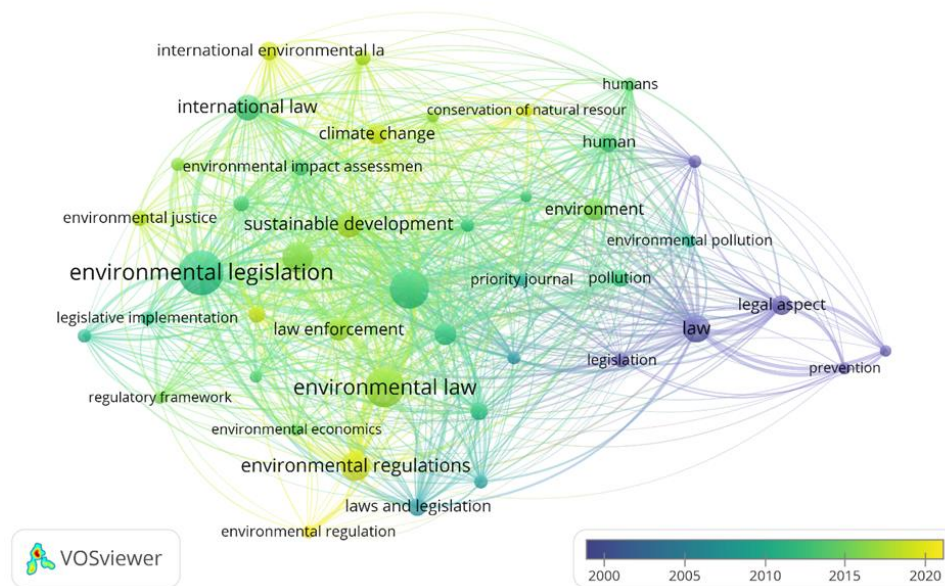


Figure 2. Overlay Visualization

Source: Data Analysis Result, 2025

The overlay representation introduces a temporal aspect to the progression of environmental legal research, with the color gradient—from dark blue (representing older publications circa 2000) to brilliant yellow (indicating contemporary publications circa 2020)—depicting changes in theme emphasis over time. Initial research (2000–2010), indicated by deeper blue nodes such as law, legal aspects, pollution, and prevention, predominantly focused on fundamental topics regarding the legal management of pollution and preventive measures. The initial phase exemplified the traditional methodology of environmental law, emphasizing legislative mechanisms for regulating industrial emissions, environmental liability, and preventive measures within national legal frameworks [13]. The use of terminology such as law and legal element during this era underscores the foundational phase of environmental law studies, which aimed to delineate its scope and forge links with administrative and public law.

During the mid-period (2010–2015), the network evolves into green-hued nodes, encompassing environmental law, environmental legislation, environmental regulation, and law enforcement. This era

marks the institutionalization and globalization of environmental governance. Academics commenced highlighting compliance procedures, enforcement techniques, and the function of national and international institutions in the execution of environmental standards. The recurrent association of sustainable development and environmental economics at this juncture indicates a comprehensive amalgamation of policy and economic viewpoints within legal research, aligning with the worldwide dissemination of sustainability principles post the 2002 Johannesburg Summit and the emergence of environmental governance frameworks in the Global South (Kim & Bosselmann, 2013). The green nodes, clustered centrally, signify a dynamic and interconnected research phase where legal theory converged with governance and economic regulation, underscoring the interdisciplinary essence of environmental law.

The latest advancements (2015–2025) are characterized by the establishment of prominent yellow nodes, particularly climate change, international law, environmental justice, and sustainable development. This color shift illustrates the modern focus of environmental law study, where climate

governance, equality, and sustainability are essential issues. The rising significance of international law and environmental justice demonstrates the globalization of environmental law discourse and the heightened focus on equity, human rights, and transnational responsibilities within environmental frameworks [14], [15]. The upward spatial extension on the map, where newer themes congregate, indicates a transition in the research frontier from local regulatory issues to multifaceted, globally coordinated objectives that encompass legal, ethical, and socio-environmental aspects. The overlay map illustrates that environmental law has transitioned from a compliance-focused discipline to a dynamic, interdisciplinary domain influenced by global issues such as climate change, justice, and sustainability transitions.

3.3 Citation Analysis

The citation data in the table underscores the most significant works that have shaped the intellectual foundations of environmental law and its intersections with

sustainability, governance, and technological adaptation. These extensively referenced works demonstrate a comprehensive advancement in the sector, encompassing legal theory, environmental impact assessment, business responsibility, and renewable energy economics. The preeminence of the works by Morgan (2002), Lazarus (2009), and Sands (2003) highlights the significance of environmental legislation, international legal standards, and the philosophical foundations of sustainability in current discussions. Simultaneously, cross-domain research—exemplified by Ganeriwai et al. (2008) on sensor networks and Karpoff et al. (2005) on corporate environmental infractions—demonstrates the growing impact of technological, economic, and ethical advancements on legal and regulatory frameworks. Collectively, these seminal papers form the foundation for bibliometric analyses, presenting a comprehensive overview of the interrelation between environmental law research, theory, enforcement, and practical innovation in global sustainable governance.

Table 1. Top Cited Research

Citations	Authors and year	Title
660	Morgan, R.K.	Environmental impact assessment: The state of the art
625	Ganeriwai, S., Balzano, L.K., Srivastava, M.B.	Reputation-based framework for high integrity sensor networks
568	Lazarus, R.J.	Super wicked problems and climate change: Restraining the present to liberate the future
464	Karpoff, J.M., Lott Jr., J.R., Wehrly, E.W.	The reputational penalties for environmental violations: Empirical evidence
447	Sands Qc, P.	Principles of international environmental law, Second edition
429	Fronzel, M., Ritter, N., Schmidt, C.M., Vance, C.	Economic impacts from the promotion of renewable energy technologies: The German experience
354	Kassinis, G., Vafeas, N.	Corporate boards and outside stakeholders as determinants of environmental litigation
331	Dhepe, P.L., Fukuoka, A.	Cellulose conversion under heterogeneous catalysis.
305	Alves de Oliveira, R., Komesu, A., Vaz Rossell, C.E., Maciel Filho, R.	Challenges and opportunities in lactic acid bioprocess design—From economic to production aspects
299	Simón, D., Borreguero, A.M., de Lucas, A., Rodríguez, J.F.	Recycling of polyurethanes from laboratory to industry, a journey towards the sustainability

Source: Scopus, 2025

The cited works reveal three predominant theme tendencies in

environmental legal studies. Initially, legal and institutional frameworks are exemplified

by seminal works such as *Principles of International Environmental Law* [16], [17] *Environmental Impact Assessment: The State of the Art*, both of which established the jurisprudential and procedural foundations for environmental regulation. Secondly, governance and policy innovation arise from publications such as [18], which established the notion of “super wicked problems” in climate governance, emphasizing the urgency and intricacy of regulatory responses to climate change. Ultimately, features of economic and corporate accountability are evident in research by [19], [20], which

empirically evaluate the reputational and financial repercussions of environmental infractions. The incorporation of technology-oriented studies [21], [22] illustrates the intersection of environmental legislation with scientific and industrial innovation, highlighting the interdisciplinary character of the domain. These significant contributions have established essential research directions and influenced policy discussions, international legislative reforms, and the development of sustainability-oriented regulations globally.

3.4 Density Visualization

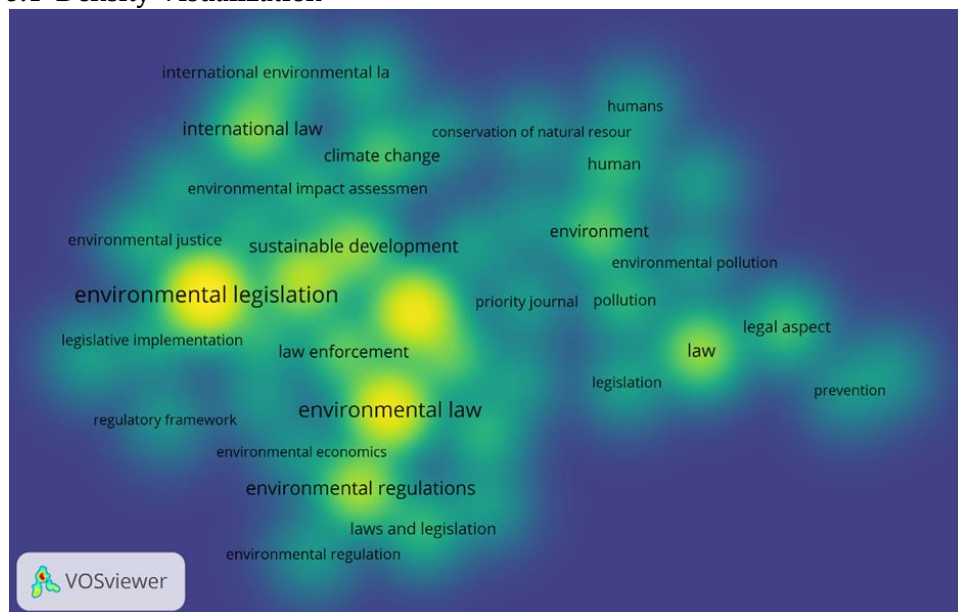


Figure 3. Density Visualization

Source: Data Analysis Result, 2025

The density visualization illustrates the frequency and intensity of keyword co-occurrence in environmental law study, with the color gradient—from dark blue (low density) to bright yellow (high density)—indicating regions of focused scholarly focus. The most prominent nodes, including “environmental legislation,” “environmental law,” and “sustainable development,” represent the thematic cores of the discipline, indicating that the majority of publications are concentrated around these fundamental topics. This indicates that the discipline’s intellectual focus is predominantly on the development, execution, and advancement of

environmental legal frameworks pertaining to sustainability objectives. Interrelated concepts such as law enforcement, regulatory framework, and environmental regulations constitute secondary hubs, illustrating a persistent scholarly focus on the translation of legislation into policy and institutional action [9], [23]. These concentrated areas indicate that researchers have consistently examined both the normative foundations of environmental law and its practical implementation via governance and enforcement systems.

Conversely, the adjacent green and blue domains—encompassing environmental

contamination, legal considerations, prevention, and environmental economics—constitute less extensively researched, yet burgeoning subfields that connect environmental law with science, economics, and human rights. The moderate prevalence of climate change, environmental justice, and international law signifies an increasing convergence between global governance and social equity in contemporary research, illustrating a paradigmatic transition toward interdisciplinary investigation [14], [24]. The comprehensive heat distribution indicates a

developed yet evolving research landscape: environmental law scholarship is firmly rooted in legislation and governance, while increasingly exploring new thematic areas such as climate litigation, environmental rights, and economic policy instruments. This density pattern verifies that environmental law has transformed into a dynamic, multi-nodal field where traditional legal ideas converge with global sustainability and justice initiatives.

3.5 Co-Authorship Network

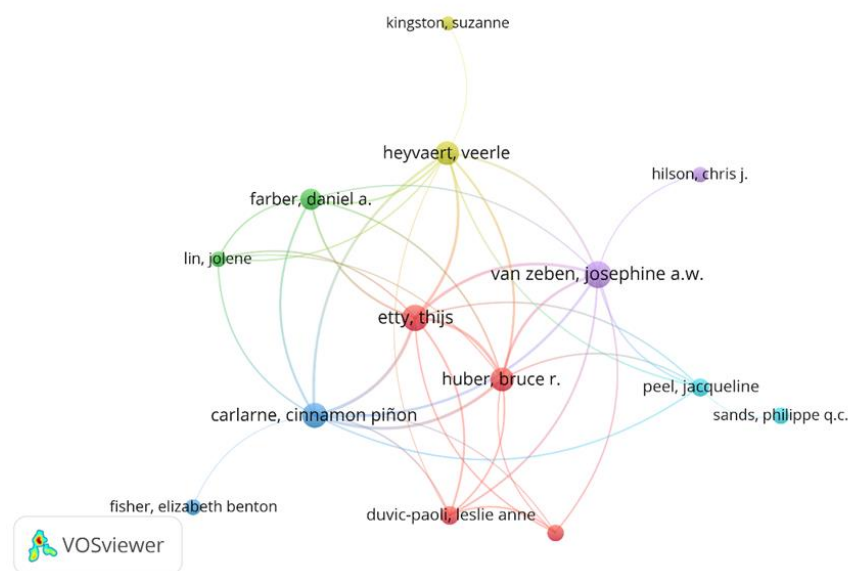


Figure 4. Author Visualization

Source: Data Analysis Result, 2025

The author collaboration network visualized above illustrates the structure of scholarly partnerships within *environmental law research*, highlighting several influential authors and their interconnections. The network is composed of multiple clusters, each representing a distinct research community that contributes to different thematic areas of the field. At the center, Bruce R. Huber, Thijs Etty, and Leslie Anne Duvic-Paoli form a tightly connected cluster (in red), signifying an active collaboration network focused on *environmental governance, regulatory compliance, and sustainability law*. Another major hub is Veerle Heyvaert, linked with Suzanne Kingston and Josephine A.W.

van Zeben, indicating a strong European research collaboration emphasizing *EU environmental policy, climate law, and transnational governance*. In the green cluster, Daniel A. Farber and Jolene Lin are prominent for their contributions to *climate change law, adaptation policy, and comparative environmental regulation*. Meanwhile, Philippe Sands and Jacqueline Peel form a distinct blue node, symbolizing foundational work in *international environmental law and climate litigation*. The presence of connecting lines between clusters—particularly between Heyvaert, Huber, and Peel—suggests cross-institutional and interdisciplinary engagement, reflecting the globalized and

networked nature of environmental law scholarship. Overall, the visualization demonstrates a cohesive yet diversified research community, where thought leaders

collaborate across geographic and disciplinary boundaries to address evolving challenges in environmental governance and justice.

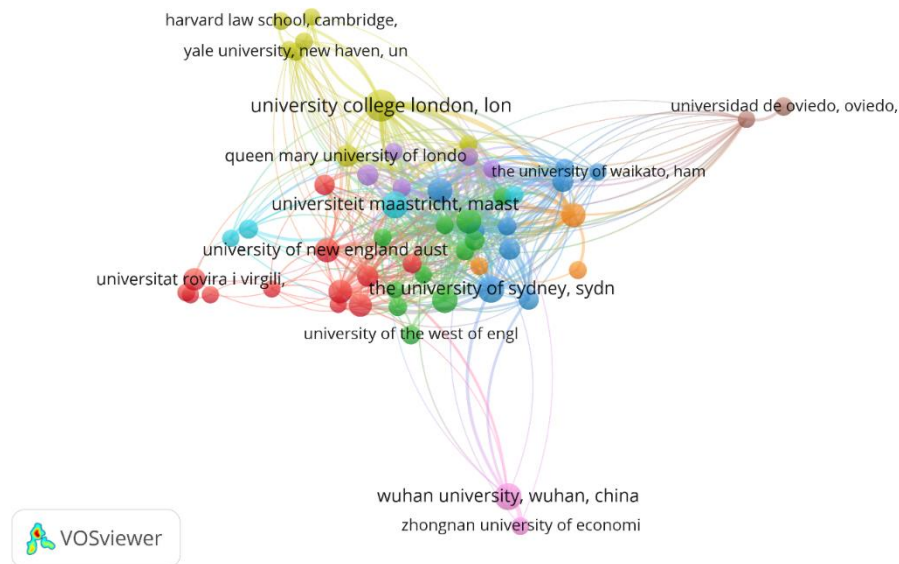


Figure 5. Affiliation Visualization

Source: Data Analysis Result, 2025

The institutional collaboration network map illustrates the global research framework in environmental law, depicting the interconnections among prominent universities and research centers via co-authorship and partnership affiliations. The dimensions of each node indicate the institution's influence, quantified by publication output or citation count, and the thickness of the connecting lines signifies the intensity of collaboration. University College London (UCL) serves as a central hub within the network, establishing robust connections with Harvard Law School, Yale University, and Queen Mary University of London. This cluster highlights the preeminence of Anglo-American institutions in influencing the theoretical and policy frameworks of environmental law, especially in domains such as international law, climate litigation, and environmental governance. Their extensive interconnection indicates a developed and institutionalized network that significantly influences worldwide academic discourse in this domain.

In addition to these Western hubs, the image underscores burgeoning centers of collaboration throughout Europe and the Asia-Pacific region. Universiteit Maastricht and Universitat Rovira i Virgili exemplify the European continental tradition, focusing on research pertaining to sustainable development, environmental justice, and EU environmental policy. Institutions like The University of Sydney, University of Waikato, and Wuhan University exemplify the increasing involvement of Asia-Pacific researchers in international environmental law study. The connections between Wuhan University and European partners indicate a growing South–North collaboration, exemplifying the globalization of environmental governance research. This geographical diversification of collaboration signifies that environmental law is transitioning from a Western-centric discourse to a more pluralistic and interconnected global research domain, wherein new partnerships are broadening the intellectual and cultural aspects of sustainability law and policy.

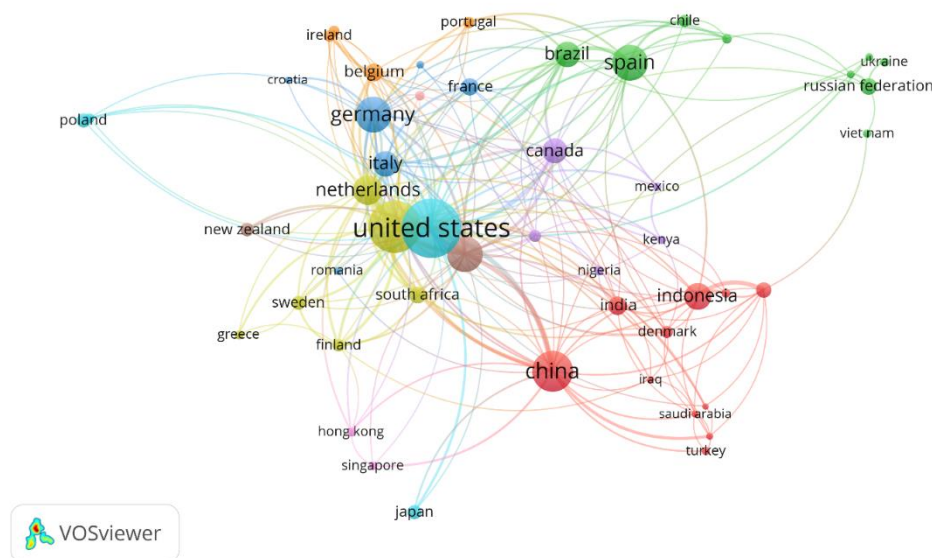


Figure 6. Country Visualization

Source: Data Analysis Result, 2025

The country collaboration network reveals a complex and highly interconnected global structure of *environmental law research*, with the United States, China, and the Netherlands emerging as the most influential hubs. The large node size of the United States signifies its central role as both a prolific contributor and a primary collaborator with multiple regions, reflecting its leadership in shaping environmental policy, climate governance, and international legal frameworks. Close connections with Germany, Italy, and Canada indicate strong transatlantic cooperation, often focused on climate regulation, environmental justice, and sustainable development governance. Meanwhile, China's expanding collaborations with Indonesia, India, and Saudi Arabia highlight the increasing participation of Global South countries in international environmental law discourse. This regional linkage underscores a shift toward a more multipolar academic network, where emerging economies are not only recipients but also producers of environmental legal scholarship.

European countries such as Spain, Germany, the Netherlands, and Italy form another dense cluster, reflecting robust intra-European cooperation driven by the

European Union's long-standing commitment to environmental legislation and sustainability policies. Their interconnectedness with Latin American countries like Brazil and Chile indicates the diffusion of European environmental governance models across continents, facilitated by global partnerships and shared participation in multilateral environmental agreements. The inclusion of Indonesia and India as active nodes further illustrates the diversification of the research landscape, suggesting that environmental law has become a field of truly global collaboration that transcends traditional geopolitical boundaries. Overall, this network demonstrates how knowledge production in environmental law is becoming increasingly internationalized, bridging North-South divides and reinforcing collective efforts to address transboundary challenges such as climate change, pollution control, and ecological justice.

Practical Implications

This bibliometric analysis provides practical insights for policymakers, academic institutions, and international organizations involved in environmental law and governance. The study delineates thematic

evolution and collaboration patterns across regions, offering an evidence-based framework to identify research gaps and priority areas—such as environmental justice, transnational enforcement, and climate litigation—that are insufficiently explored in numerous developing regions. Policymakers can utilize these findings to synchronize legislative reforms with global sustainability objectives, ensuring that law addresses current environmental issues and international commitments. Secondly, the identification of significant collaborative networks among nations and academic institutions underscores prospects for capacity enhancement and knowledge dissemination. Institutions in emerging economies, such as Indonesia, India, and Brazil, can utilize these partnerships to enhance legal education, promote multidisciplinary research, and augment institutional capacity for environmental governance. The results promote the advancement of evidence-based policymaking, wherein data-driven insights into global legal research trends can assist decision-makers in adopting comparative best practices, harmonizing regulatory standards, and fostering more inclusive environmental cooperation frameworks at both regional and international levels.

Theoretical Contribution

This study enhances the theoretical comprehension of environmental law as a worldwide and dynamic epistemic domain by employing bibliometric and network analysis. It illustrates how environmental law surpasses conventional legal limits and operates as a transdisciplinary knowledge system that amalgamates jurisprudence, environmental science, governance, and socio-economic viewpoints. The research demonstrates that environmental law functions as both a set of norms and a dynamic knowledge network, influenced by academic collaboration and institutional connections, through the visualization of keyword co-occurrences and collaboration networks (Heyvaert, 2019; Morgera, 2021). Furthermore, the aggregation of subjects such

as sustainable development, climate change, and international law strengthens the conceptual assertion that environmental law has transformed into a normative link between global governance and ecological justice. The study contributes to theory-building by positioning environmental law within the broader contexts of global legal diversity and systems thinking, demonstrating how intellectual and institutional interdependence propels the diffusion and diversification of legal concepts across boundaries.

Limitations

This study recognizes some limitations inherent to bibliometric research, despite its thorough approach. The analysis predominantly depends on articles indexed in Scopus and Web of Science, potentially leading to language and database bias that underrepresents significant non-English and region-specific legal scholarship, especially from the Global South. Secondly, bibliometric mapping quantifies connections (co-authorship, citation, keyword frequency) yet fails to encompass the qualitative depth or contextual subtleties of legal reasoning, interpretation, and regional legal traditions. The evolving character of environmental law indicates that emergent subjects—such as digital environmental governance, green finance, or AI-driven regulatory instruments—may not be adequately represented in the dataset, hence constraining the temporal representativeness of the findings. Ultimately, although the study elucidates collaboration patterns, it fails to assess the impact or efficacy of these collaborations in influencing policy or practice. Future research may amalgamate bibliometric data with qualitative case studies or content analysis to elucidate the significant impact of legal scholarship on global and national environmental governance results.

4. CONCLUSION

This bibliometric analysis offers an extensive overview of the global research landscape in environmental law, highlighting

the field's development, thematic concentrations, and collaborative networks. The analysis emphasizes environmental legislation, sustainable development, and climate change as significant themes, emphasizing the increasing multidisciplinary convergence of law, governance, and sustainability science. The United States, China, and the Netherlands are key contributors, while increasing cooperation throughout Europe, Asia, and the Global South demonstrate the globalization of

environmental law studies. The findings indicate that environmental law is evolving from a strictly regulatory framework to a dynamic, knowledge-driven discipline that integrates ecological protection with human rights and socio-economic development. This study enhances the conceptual foundations of environmental law and offers practical insights for policymakers, researchers, and organizations aiming to promote sustainable and equitable legal governance worldwide.

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