

What do we need to know about biodiversity in Economics and Business?

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Abstract

Purpose: The purpose of this study is to comprehensively review biodiversity-related research within the realms of business, economics, and management from 1993 to 2025. We assess the theoretical underpinnings, intellectual structure, and evolution of the field. It aims to pinpoint crucial theoretical shifts and identify persistent research gaps, focusing on the integration of stakeholder and legitimacy theories, and ecological economics within biodiversity research, while highlighting the shortcomings in addressing corporate accountability and the complexities of biodiversity financialisation.

Design/Methodology/Approach: The study utilises bibliometric mapping and systematic literature reviews to explore biodiversity research across business and economic disciplines. We extracted data from Scopus, incorporating articles, books, and conference papers that focus on biodiversity challenges from economic and business perspectives. Using VOSviewer and R for bibliometric analysis, we created visual networks of the intellectual structure and thematic clusters in the field, which allowed for a detailed examination of the evolution and impact of research over time, identifying both influential studies and prominent research gaps.

Findings: The findings reveal an increasing alignment of biodiversity research with ecological economics, legitimacy, and stakeholder theories. The research highlights a critical shift from firm-level strategies to systemic transformation needs within economic and financial frameworks, advocating for integrated approaches to biodiversity governance. However, challenges persist, notably in the areas of addressing power asymmetries and corporate greenwashing. Despite a growing emphasis on ecosystem services valuation, the market-based logic frequently overlooks crucial ecological interdependencies and socio-ecological complexities.

Originality/Value: The study contributes to the field by offering a structured, theory-driven agenda for future biodiversity research, emphasising the need for universal governance frameworks that transcend traditional firm-level approaches. It uniquely challenges the reductionist market-based logics prevalent in ecosystem services valuation. It calls for a rethinking of economic and financial paradigms to ensure the safeguarding of biodiversity as a core component of economic resilience and planetary stability. A comprehensive bibliometric approach and synthesis of theoretical advancements provide a novel perspective on integrating biodiversity considerations into broader economic and corporate frameworks.

Keywords: Biodiversity; Factorial Analysis; Bibliometric Analysis; Business and Economics; Corporate Sustainability

1. Introduction

Biodiversity loss, the rapid decline in species and ecosystems, has emerged as a critical issue for businesses and economies. In recent years, management and economics scholars have begun recognising that companies and markets depend on healthy ecosystems and that corporate activities often contribute to biodiversity decline (Almaghrabi et al., 2025). This growing awareness has spurred a body of research at the intersection of biodiversity and the fields of business, economics, and management. According to the World Economic Forum (2020), biodiversity risk ranks among society's top five global risks.

Despite the growing awareness of biodiversity, detailed research examining its material impact is still limited (Hassan et al., 2022). Perhaps the most fundamental contribution is establishing that biodiversity loss is not only an ethical or environmental concern but also a business risk and economic issue. Through case examples and research studies, scholars have illustrated how biodiversity underpins ecosystem services that businesses rely on (pollination, water purification, etc.) and how biodiversity loss can translate to supply chain risks, financial costs, and market disruptions (Salmi et al., 2023). The field has helped move biodiversity from the periphery of corporate sustainability to a more central spot on the corporate agenda alongside climate change. Consequently, integrating biodiversity considerations into corporate strategies, economic policies, and financial decision-making is no longer optional but imperative.

Biodiversity accounting research also sits within broader debates in social and environmental accounting on accountability, the role of calculative practices, and the extent to which sustainability reporting is substantive versus symbolic (e.g. Cho et al., 2012; Gray, 2010; Unerman, 2014). Against this background, biodiversity-focused studies extend these debates to nature-specific challenges such as measurement, irreversibility, and the visibility of impacts. Recent advancements in biodiversity accounting highlight the interaction between ecological valuation and organisational accountability. Seminal contributions by Boiral (2016) and Cuckston (2013, 2017) have provided theoretical scaffolding for understanding how organisations disclose, interpret, and manage biodiversity-related information. These works highlight the socially constructed nature of biodiversity accounting and the tensions between ecological integrity and economic rationality. Building on this literature, our study maps the evolution of biodiversity research within economics and business to identify whether and how these theoretical constructs have permeated the broader scholarly landscape.

In particular, this study systematically analyses the evolution of biodiversity research in business, economics, and management, tracing how scholarly attention to the topic has developed over time and identifying key intellectual contributions. It examines the dominant theoretical perspectives shaping the discourse and assesses their relevance to biodiversity-related business challenges. By synthesising emerging themes, methodologies, and research agendas, the study maps critical areas of inquiry (such as corporate biodiversity disclosure, biodiversity finance, natural capital valuation, and conservation business models) and identifies persistent gaps, including the limited integration of ecological science with business research, the scarcity of empirical assessments of corporate biodiversity initiatives, and the underdevelopment of biodiversity-focused financial instruments.

Methodologically, the study offers a diagnostic and structural contribution by integrating bibliometric mapping with a systematic review to trace the field's intellectual development. To enhance the interpretability of temporal dynamics, we use the Paris Agreement as a substantive benchmark marking the mainstreaming of climate governance and sustainability finance. The pre- and post-2015 comparison illustrates how interdisciplinary engagement with biodiversity has intensified, how thematic clusters and theoretical framings have shifted, and where gaps persist. Rather than advancing a normative evaluation, the study maps the intellectual architecture of the field to support more targeted, theory-driven research trajectories that reflect biodiversity's growing relevance as a corporate risk, disclosure imperative, and strategic concern.

The remainder of this paper is structured as follows. Section 2 explains the methodology employed. Section 3 discusses the bibliometric aspect and impactful research, providing recommendations on how to conduct impactful research. Section 4 presents the emerging themes, theoretical perspectives, conceptual foundations, and the research agenda. Finally, Section 5 concludes the paper and offers avenues for future studies.

2. Methodology

To systematically analyse the evolution of biodiversity research, this study employs bibliographic mapping, an established approach for reviewing a research field and identifying its most influential publications. Bibliographic mapping enables an objective assessment of how thought on a topic has developed over time, uncovering key theoretical foundations, citation relationships, and thematic clusters within the literature (Linnenluecke, 2017). The

core of this method involves constructing a bibliographic map to visualise the intellectual structure and development of biodiversity research in business and economics-related disciplines.

The first stage starts with extracting bibliographic data from Scopus, a reliable source widely used in bibliometric studies (Fink, 2019). Following the methodological framework outlined by Shahrour et al. (2023), the process begins with compiling a comprehensive dataset of relevant publications and their citation records, ensuring a broad representation of scholarly work on biodiversity in corporate and economic contexts. The dataset includes journal articles, books, book chapters, and conference papers, focusing on publications that examine biodiversity-related challenges from business and economic perspectives.

Next, citation data are systematically cleaned and standardised to ensure consistency and accuracy in the bibliometric analysis. The cleaned data are then imported into the VOSviewer 1.6.18 and R for data processing and content analysis. The VOSviewer software is an open-source tool widely used by researchers to create and analyse bibliometric networks, particularly through visual representations (Di Vaio et al., 2021). The resulting network of publications is visually represented to illustrate how research themes, theoretical perspectives, and scholarly contributions have evolved.

Such a bibliometric approach is complemented by a systematic literature review, critically examining the identified body of the work's theoretical frameworks, research methodologies, and key findings. This approach (integrating bibliometric mapping with qualitative synthesis) enables us to provide a rigorous and comprehensive overview of biodiversity research, enabling the identification of research gaps and future directions in this rapidly growing field.

Publications for inclusion in this study were identified in the Scopus database. We limit our research to “biodiversity” in the title, abstract, and keywords. The rationale is to capture as many studies as possible in the first phase. We restrict our screening to papers published in English in business (in its various disciplines) and economics-related journals. The final sample consists of 6,212 research papers.¹ Figure 1 illustrates the breakdown of our data collection approach, inclusion and exclusion criteria, and the choice of literature.

<Insert Figure 1>

¹ The complete list of references is available from authors upon request.

3. Bibliometric Aspect and Impactful Research

The quantitative analysis of the selected papers examines multiple dimensions, including the evolution of biodiversity research over time, the identification of impactful journals and papers, and keyword co-occurrence mapping to uncover key thematic areas. Additionally, we analyse influential studies in detail, highlighting the factors that make them unique to guide authors in producing high-impact research. Our study also assesses active researchers across pre- and post-Paris Agreement periods and explores research collaboration networks, offering insights into scholarly interactions and their role in shaping the field.

3.1. Research evolution

Figure 2 illustrates the steady growth of publications on biodiversity from 1993 to 2025, with a notable decline between 2013 and 2015, followed by an exponential rise.² This surge occurred around 2015 and coincided with a broader rise in sustainability and climate-related scholarship in business and economics (Shahrour et al., 2023, 2025). Before 2015, biodiversity received limited attention in business and economics research, primarily focusing on pollution and resource management. Conceptual frameworks such as the natural-resource-based view in strategy acknowledged the environment as strategic capital but did not explicitly address biodiversity. Post-2015, biodiversity gained recognition within environmental economics, particularly in evaluating ecosystem services, and became increasingly integrated into corporate sustainability discussions.

<Insert Figure 2>

Figure 3 illustrates the authors' productivity in biodiversity research through Lotka's Law, which describes the frequency distribution of scientific productivity. The steep decline at the beginning confirms that a small proportion of authors contribute to most publications, while most have only one or a few. The curve follows an inverse power law distribution, highlighting the high concentration of research output among a few prolific scholars. This aligns with bibliometric trends where a core group of experts drives knowledge production, while a long tail of less frequent contributors ensures diversity in perspectives and findings.

<Insert Figure 3>

² Our bibliometric analysis starts from, which reflects the earliest occurrence of publications meeting our combined search criteria, linking biodiversity with business, economics, and management, within the Scopus database. No relevant articles appeared before this period under our selection terms.

3.2. *Impactful journals and keywords co-occurrence*

To better understand the intellectual landscape of biodiversity-related research, we analysed journal-level contributions and thematic trends based on author keywords. Rather than relying solely on visual maps, we synthesised key insights directly in the text and tabular results. Table 1 presents the top 15 publishing journals based on total documents and citations. It also identifies the most influential article in each journal and provides both average citations per document (ACD) and average yearly citations (AYC). This dual lens helps disentangle long-term impact from recent influence. The Journal of Ecological Economics appears to be the leading journal on this topic (502 publications), with the work of Moberg & Folke (1999) being the most cited overall. In their work, the authors identify the ecological goods and services provided by coral reef ecosystems, further emphasising the economic valuation of these services and the threats posed by human activities, arguing for a universal, ecosystem-based management approach to sustain coral reefs.

<Insert Table 1>

In parallel, we examined author keywords across the dataset.³ The most frequent keywords include “biodiversity,” “sustainable development,” “ecosystem services,” “cost-benefit analysis,” “land use change,” and “forestry.” These terms reflect dominant research priorities. Although keywords such as “marine policy,” “stakeholder,” and “accountability” appear less frequently, they signal emerging areas of inquiry.

Unlike network visualisations, which emphasise structural associations, keyword frequency analysis enables clearer identification of salient topics. For example, terms linked to biodiversity finance, such as “valuation,” “impact investing,” or “conservation finance,” appear less prominently, aligning with our cluster analysis that classifies finance as a still-maturing, yet expanding thematic area, which we discuss in the forthcoming sections.

3.3. *Impactful papers*

A key aspect of bibliometric analysis is identifying the most influential papers in each field based on their impact. One common measure of this impact is the number of citations a study receives (Bornmann & Daniel, 2007). Table 2 reports and discusses the most influential papers.

<Insert Table 2>

³ To ensure relevance, we set a threshold of at least five occurrences per keyword, yielding 1,777 keywords.

The studies reported share a common goal of advancing our understanding of biodiversity within economic, environmental, and management contexts. Their influence stems from their ability to bridge multiple disciplines, integrate theoretical and empirical insights, and offer frameworks that inform policy and practice. A key unifying factor among these works is their commitment to holistic, systems-based perspectives, recognising that biodiversity cannot be analysed in isolation from ecological, social, and economic dynamics. These studies contribute to shaping biodiversity research by applying well-established theories, such as ecosystem services (Holmlund & Hammer, 1999; Moberg & Folke, 1999), resilience theory (Moberg & Folke, 1999), incentive theory (Pagiola, 2008), and total economic valuation (Turner et al., 2003), while also offering critical perspectives on mainstream environmental policies and corporate sustainability narratives (Banerjee, 2003).

What makes these studies particularly influential is their methodological rigour and interdisciplinary integration. Several papers employ economic valuation methods (Kotchen & Reiling, 2000; Pagiola, 2008; Turner et al., 2003) to quantify biodiversity worth and develop market-based conservation solutions. Others emphasise risk-based management frameworks (Bax et al., 2003), spatial and functional biodiversity assessments (Barrios, 2007), and life cycle approaches (von Blottnitz & Curran, 2007) to assess environmental trade-offs and ecosystem dependencies. Furthermore, some studies provide a critical lens on power dynamics and environmental governance (Banerjee, 2003), while others offer empirical models linking economic incentives to biodiversity loss (Angelsen & Kaimowitz, 1999). These studies set a precedent for future research by demonstrating the importance of biodiversity as an integral component of economic and business decision-making rather than a peripheral concern.

Three critical insights emerge for future researchers aiming to produce impactful work in this domain. First, research that connects biodiversity to economic and business realities, through valuation, governance, or incentive-based mechanisms, tends to have greater policy relevance and uptake. Second, the most cited and widely referenced studies often adopt a clear theoretical foundation while also questioning mainstream assumptions, whether in sustainability discourse (Banerjee, 2003) or conservation finance (Pagiola, 2008). Finally, studies that embrace interdisciplinary methods, combining economics, ecology, policy analysis, and management perspectives, tend to be more robust and widely applicable.

3.4. Author activity and collaborative patterns

While biodiversity research has long intersected with major environmental governance milestones such as the Convention on Biological Diversity (CBD), our analysis adopts the 2015 Paris Agreement as a temporal benchmark. This decision reflects its significance in climate governance and its role in accelerating policy and academic attention toward biodiversity, particularly in economics, finance, and corporate sustainability.

We examined author-level contributions to trace the intellectual development of the field over time. Before the Paris Agreement, the landscape was shaped by a smaller set of influential contributors focused primarily on ecosystem services valuation and conservation economics. Post-2015, the field expanded substantially, marked by a broader and more international set of scholars contributing to topics such as biodiversity finance, environmental disclosure, and sustainable business models. This shift underscores the institutionalisation of biodiversity within business and finance discourse.

<Insert Figure 4>

We also analysed patterns of scholarly collaboration.⁴ Co-authorship networks reveal both disciplinary convergence and thematic clustering. Researchers such as Perrings, Pascual, and Wang have emerged as central nodes, reflecting their consistent contributions across valuation, governance, and policy. Although distinct collaboration clusters exist, there is an increasing interconnection between researchers focused on ecological economics, corporate responsibility, and environmental policy. This convergence reflects the interdisciplinary nature of biodiversity research and highlights opportunities for more integrated approaches moving forward.

4. Emerging Themes, Theoretical Perspectives, Conceptual Foundations, and Research Agenda

4.1. Shifts in biodiversity research themes

Although still evolving, biodiversity research has converged around several recurring themes. To visualise the prominence of these topics, we employ a treemap of the most frequent author keywords across the selected corpus. This format offers a compact, area-based overview in

⁴ Unlike other bibliometric analyses that require at least three co-authored papers, we include all authors to capture the full spectrum of scholarly interaction.

which the size of each rectangle represents the relative frequency of a keyword, allowing for an intuitive grasp of topic prevalence.

Unlike network maps that emphasise relationships through co-occurrence, the treemap highlights the individual salience of terms and evolution of thematic emphases over the past 32 years, making it particularly useful for identifying dominant areas of scholarly attention. Keywords are colour-coded by thematic grouping to aid interpretation and reflect broad topical affiliations. A closer examination of the literature within this visual framework confirms the presence of five major clusters shaping the discourse on biodiversity.

<Insert Figure 5>

The first cluster is Natural Resource Management Research, which examines how firms use and manage natural resources and ecosystems (e.g. DeGeorges & Reilly, 2009; Reale et al., 2019; Salmi et al., 2023). This includes studies on sustainable sourcing, supply chain impacts on biodiversity, and corporate practices to mitigate resource-related biodiversity loss. Early work treated biodiversity as part of general environmental management, often focusing on conserving resources or habitat as a business consideration. This broad and foundational theme reflects a transversal concern with the responsible use of natural capital.

The Biodiversity Economic Evaluation cluster is centred on the economic valuation of biodiversity and ecosystem services (e.g. Hanley & Perrings, 2019; Naidoo & Adamowicz, 2005; Nijkamp et al., 2008; Pimentel et al., 1997; Yao et al., 2019). These studies often quantify the benefits of conservation or the costs of biodiversity loss in economic terms, aligning with the tradition of environmental and ecological economics. This stream provided methods for measuring biodiversity value to business and society, such as cost-benefit analyses of conservation, natural asset valuation, and ecosystem service assessments. While this was a significant theme in earlier years, recent analyses suggest it has become less central as attention shifts to corporate disclosure and strategy.

The third cluster, Natural Capital Accounting Research, develops accounting and reporting frameworks to incorporate biodiversity into organisational accounting (e.g. Atkins & Maroun, 2020; Jones, 2003; Samkin et al., 2014). This includes methods for companies to measure, account for, and report on biodiversity impacts and dependencies (often under the banner of natural capital). Studies here propose indicators for biodiversity performance, new accounting models, and integration of ecological data into financial reports. The rise of concepts like the Natural Capital Protocol and biodiversity footprint tools falls in this cluster.

The Biodiversity Accountability cluster emphasises firms' responsibility for biodiversity conservation and loss. This theme is often conceptual and normative, discussing corporate accountability, ethics, and governance regarding biodiversity (e.g. Barrett et al., 2006; Sampford, 2002; Tregidga, 2013). It covers how companies justify their impact on biodiversity and to whom they answer for those impacts. For example, some papers debate as to what extent firms should be held accountable for species extinctions and what accountability mechanisms (regulatory or voluntary) are effective. This theme overlaps with stakeholder pressures and questions of corporate legitimacy in the face of biodiversity loss.

The Biodiversity Disclosure and Reporting cluster is an increasingly prominent area focusing on how companies disclose information about biodiversity in sustainability reports, annual reports, or standalone biodiversity reports (e.g. Adler et al., 2018; Hassan et al., 2020; Maroun & Ecim, 2024; Rimmel & Jonäll, 2013). Research in this cluster analyses the content and quality of corporate biodiversity reporting, the prevalence of biodiversity indicators in ESG disclosures, and reporting as a form of impression management. This area has grown notably in the last decade, reflecting stakeholder demand for transparency. For instance, many studies find that corporate biodiversity reporting is still sparse and often qualitative, and they examine whether firms might be using reporting to legitimise their environmental impacts without substantive action.

The themes outlined above illustrate the breadth of the field, ranging from quantifying biodiversity in monetary terms to analysing corporate sustainability practices and accountability. Our clustering analysis reflects the intellectual convergence between biodiversity, sustainability reporting, and environmental management. Notably, the discussed clusters echo concerns raised in the biodiversity accounting literature (Boiral, 2016; Cuckston, 2013, 2017), especially regarding the framing of biodiversity as both a quantifiable asset and a socio-ecological construct.⁵ These clusters provide empirical support to the notion that normative debates about accountability, valuation, and transformative change increasingly shape biodiversity research in business.⁶

⁵ While some conceptual overlap exists between clusters, particularly “Natural Capital Accounting” and “Biodiversity Disclosure and Reporting”, this is an inherent feature of co-occurrence-based clustering in bibliometric mapping. Clusters reflect thematic concentrations, not strict boundaries, and each retains a distinct citation structure and focal emphasis.

⁶ Based on Díaz et al. (2019) IPES report, we refer to transformative change as “a fundamental, system-wide reorganisation across technological, economic, and social factors, including paradigms, goals, and values.”

In addition to the five core thematic clusters, the analysis reveals emerging but increasingly influential cross-cutting topics. Notably, biodiversity finance has gained substantial academic traction and now constitutes a distinct and prominent area of inquiry within the literature. This stream of research, positioned at the intersection of environmental sustainability and financial innovation, explores mechanisms for mobilising capital towards biodiversity conservation and nature-based solutions. Recent contributions (e.g. Flammer et al., 2025; Karolyi & Tobin-de la Puente, 2023; Nedopil, 2023) investigate novel financial instruments such as biodiversity credits, green bonds, and blended finance schemes aimed at de-risking conservation investments. Therefore, in this paper, we refer to biodiversity finance both as an emerging topic in the literature (focused on instruments and capital mobilisation) and as a governing logic that shapes how biodiversity is economised, measured, and managed through valuation and investment rationales.

Moreover, a complementary theme revolves around cross-sector collaborations, including public-private partnerships, international coalitions, and community-based governance models, which enable integrated approaches to biodiversity management. While not forming a standalone cluster, these topics exhibit strong factorial linkages across clusters, reinforcing their relevance as transversal pillars shaping the future of biodiversity research and policy.

Another observed trend is the recognition that biodiversity action often requires multi-stakeholder collaboration. Companies rarely tackle biodiversity issues alone; partnerships with NGOs, governments, local communities, and global initiatives are common. Indeed, studies note that biodiversity conservation efforts tend to be collaborative, often spanning global supply chains and stakeholder networks. This has led to calls for “biodiversity-respectful leadership” that is collective, involving actors from the United Nations and governments down to firms and local landowners. The literature increasingly explores how such collaborations can be managed and how stakeholder relationships influence biodiversity outcomes.

Overall, key trends can be summarised as follows: research initially concentrated on measurement and accounting for biodiversity (e.g. valuing natural capital, developing reporting metrics) and has gradually shifted toward strategic and financial considerations (integrating biodiversity into business strategy, investment, and risk management). However, much of the work still reflects an incremental approach, focusing on improving existing corporate practices (compliance, reporting, minor process adjustments) rather than transformative changes. Studies

have pointed out that most business responses remain shallow or piecemeal relative to the scale of the biodiversity crisis. Only a few works venture into more radical ideas (e.g. rethinking business models via concepts like degrowth or “doughnut economics” for biodiversity conservation). The dominant emphasis on incremental change is evident in the literature. In contrast, discussions of fundamental business transformation for biodiversity (e.g. redefining corporate purpose to prioritise ecosystem well-being) are still nascent. This gap between the incremental nature of current research and the potentially radical action needed is a recurring theme noted by scholars.

4.2. Theoretical perspectives and conceptual foundations

Given that the topic of biodiversity intersects environmental and organisational domains, scholars have drawn on classic management theories and bespoke environmental concepts. Key theories used include the following.

Legitimacy theory is one of the most applied, especially in corporate biodiversity reporting and accountability studies. It posits that companies disclose environmental information (like biodiversity impacts) to appear legitimate and maintain their social license to operate. For example, a systematic review found that legitimacy theory was the dominant framework in biodiversity accounting studies, used to explain why firms report on biodiversity and how reporting is aimed at legitimising their activities (Roberts et al., 2021). Researchers argue that when faced with public concern over biodiversity loss, firms seek legitimacy by showcasing conservation actions or metrics, though sometimes this is more about image than substantive change.

Given the stakeholder-intensive nature of biodiversity issues, stakeholder theory is widely invoked. This perspective suggests that firms manage biodiversity in response to pressures and expectations from various stakeholders, including regulators, NGOs, local communities, investors, and even the broader public, who value nature (Shahrour et al., 2024). In the 1990s, scholars expanded the notion of stakeholders to include the natural environment itself.⁷ Applying stakeholder theory, studies have examined how stakeholder demands drive corporate biodiversity initiatives and disclosures. For instance, evidence shows that stakeholder pressure can spur companies to report and mitigate their impacts on biodiversity (Maione et al., 2023). Companies that ignore these expectations risk stakeholder backlash and reputational

⁷ For instance, Starik (1995) argued that the non-human environment can be seen as a stakeholder.

damage. Thus, stakeholder theory provides a lens to understand corporate motivations for biodiversity conservation (as a response to stakeholder influence and the need to balance competing interests).

Institutional theory analyses how institutional pressures shape corporate biodiversity practices. Firms operate within a context of regulatory requirements (coercive pressure, such as laws protecting endangered species), normative expectations (industry norms or best practices for biodiversity management), and cognitive frameworks (widely held beliefs about corporate environmental responsibility). Institutional theory helps explain the diffusion of practices like biodiversity reporting or voluntary commitments (e.g. adoption of biodiversity action plans) as firms respond to pressures to conform to social and environmental norms. Researchers (e.g., Atupola & Gunarathne, 2023; Haque & Jones, 2020) have observed, for example, that companies in specific industries or countries adopt biodiversity measures due to mimetic behaviour (imitating peers) or to comply with growing regulations and/or emerging guidelines such as the Global Reporting Initiative's biodiversity indicators.

Natural-Resource-Based View (NRBV) is an extension of the resource-based view in strategic management. It proposes that environmental strategies can be sources of competitive advantage. Developed by Hart (1995), this framework includes pollution prevention, product stewardship, and sustainable development as strategic capabilities. As such, biodiversity fits within the NRBV as part of sustainable development and product stewardship. Companies that proactively protect ecosystems or develop biodiversity-friendly products may gain a reputational advantage, innovation opportunities, or secure resource supplies. While not all biodiversity studies explicitly cite NRBV, the idea that biodiversity management can create business value (or conversely, biodiversity loss is a business risk) is grounded in this theoretical view. Some recent works discuss concepts like “natural capital” and “ecosystem services” in line with NRBV, highlighting that conserving biodiversity can align with long-term firm performance (through risk reduction or new market opportunities in conservation finance, ecotourism, etc.).

The accounting literature includes frameworks like accountability theory and ecological accounting principles to guide analyses. These assert that companies have an ethical and social responsibility to account for their impacts on nature, and they explore how accounting practices need to change to reflect biodiversity (since traditional financial accounting ignores it). Concepts like full-cost accounting, natural capital accounting, and extinction accounting build

on these principles, expanding what organisations consider as “assets” and “liabilities” to include ecological values. Theoretical discussions often draw on the idea of extending accountability beyond shareholders to stakeholders (including future generations and other species), aligning with sustainability and stewardship theories. This has led to proposals for new accounting models that treat biodiversity loss as depreciation of natural assets and to use corporate accounts as a mechanism for conservation accountability (e.g. Jones & Solomon, 2013; Siddiqui, 2013).

Several studies bridging management and ecology (e.g. Davila et al., 2021; Maes et al., 2024; Torelli & Balluchi, 2023) use systems thinking to frame biodiversity issues. A systems theory perspective treats a business as embedded in a broader social-ecological system, emphasising interdependencies. Research adopting this lens might critique narrow economic approaches and argue for holistic thinking (for instance, one critique used a systems theory perspective to evaluate ecosystem service approaches in business (Roberts et al., 2021)). The idea is that biodiversity loss is a systemic risk, and companies must address it by understanding the complex interactions between ecological and economic systems (e.g. feedback loops, resilience, tipping points). This approach is less common than the stakeholder or legitimacy perspectives in business journals, but it is gaining traction as calls for integrating ecological science with management theory are on the rise.

Beyond the theories discussed above, several alternative frameworks emerge within specific contexts. For instance, the triple bottom line is often referenced as it includes “planet” (environment) alongside profit and people. Some authors (Klein et al., 2015; Watermeyer et al., 2021) explicitly consider biodiversity performance as part of the environmental bottom line in sustainability evaluations. Corporate social responsibility theories provide an overarching justification for why firms should care about biodiversity as part of their social responsibility to the planet. Upper echelons theory (which links top management/board characteristics to organisational outcomes) has been applied in at least one study (e.g. Carvajal et al., 2022) linking board diversity to biodiversity management outcomes (the finding that gender-diverse boards are associated with better biodiversity practices suggests that top leadership matters for biodiversity strategy). Additionally, emerging ideas form a conceptual backdrop in some forward-looking papers (e.g. Avar & Cive, 2024; Cook et al., 2025; Mace et al., 2014) that argue for reimagining economic models to operate within ecological limits (biodiversity being a key limit). While not traditional business theories, these concepts are invoked to frame the transformative changes needed for true sustainability.

Given the above backdrop, the theoretical landscape of biodiversity-business research is highly pluralistic, combining classic organisational theories (e.g. legitimacy, stakeholder, institutional, and resource-based view), adopted accounting frameworks, and novel environmental concepts. This mix reflects the interdisciplinary challenge of integrating ecological realities into socio-economic frameworks, prompting calls for new theory development that addresses long-term horizons, irreversibility, and the governance of public goods. Although we qualitatively highlight major conceptual foundations in the literature, systematically quantifying the frequency or distribution of specific theories across the full corpus of over 6,000 papers proved methodologically infeasible. We view this as a valuable avenue for future research, which could employ automated text-mining or machine-learning techniques to produce a more granular mapping of theoretical engagement.

4.3. Research agenda

The research directions and implications discussed below are grounded in the results of co-occurrence and factorial analyses, which revealed five dominant thematic clusters and shifts in the field's intellectual structure over time. Rather than proposing an abstract research agenda, we derived each thematic recommendation by carefully analysing how core concepts such as “climate change,” “ecosystem services,” and “sustainability” evolved in prominence and connectivity. This structured linkage ensures that our roadmap is not only forward-looking but also rooted in the evidence extracted from the bibliometric patterns.

4.3.1. Keyword treemap analysis

In the analyses above, we use the Paris Agreement as a temporal anchor to structure a pre- and post-2015 comparison, reflecting a marked expansion of research activity and themes in the later period. To track the emerging themes, we divided the sample into pre- and post-Paris Agreement periods and constructed a keyword treemap to visualise the distribution and prominence of key topics. Figure 6 presents this keyword mapping, showing how research priorities evolved.

<Insert Figure 6>

We can observe that while biodiversity remains the dominant keyword in both periods, post-Paris Agreement research exhibits a broader thematic scope, with the rise of new keywords such as climate change, ecosystem services, stakeholder engagement, governance, and marine conservation. Additionally, sustainability-related terms, including decision-

making, economic valuation, and conservation policy, gained traction, reflecting a shift toward interdisciplinary and policy-driven approaches. These findings suggest that biodiversity research has expanded beyond ecological assessments, increasingly integrating elements of socioeconomic impact, environmental governance, and corporate sustainability strategies.

4.3.2. Trend topics

Over time, the trend analysis of research topics reveals a significant expansion and diversification of themes in biodiversity-related studies. As shown in Figure 7, early research in the 1990s primarily focused on forestry, environmental economics, and conservation planning, reflecting an emphasis on ecosystem management and natural resource policies. Over the years, biodiversity research has integrated broader economic and policy dimensions, with increasing attention to climate change, ecosystem services, sustainable development, and environmental governance. The emergence of circular economy, green development, and innovation in recent years indicates a shift toward interdisciplinary approaches linking biodiversity to business strategy and economic resilience.

Additionally, methodological advancements, such as regression analysis, modelling approaches, and geographic information systems, have become more prominent, suggesting a growing reliance on data-driven and computational techniques in biodiversity research. This evolving landscape highlights a dynamic and expanding field, increasingly connecting biodiversity with economic valuation, trade policy, and industrial sustainability.

<Insert Figure 7>

4.3.3. Factorial analysis

In this section, we employ Multiple Correspondence Analysis (MCA) to construct a conceptual structure map, as shown in Figure 8. This factorial map provides a spatial representation of key biodiversity, business, and economics research themes, highlighting their co-occurrence and relative positioning within the scholarly literature.

<Insert Figure 8>

Figure 8 shows that the two principal dimensions (Dim 1 and Dim 2) explain a significant portion of the variance and capture the field's thematic structure.⁸ Dim 1 (64.04%) represents

⁸ The Dendrogram map explains how these dimensions and clusters have been grouped. The results are available from the authors upon request.

the primary axis of differentiation. It distinguishes research focused on ecosystem services, economic and social effects, and conservation strategies from studies emphasising environmental economics, cost-benefit analysis, and policy frameworks. Dim 2 (9.34%) captures secondary thematic distinctions, differentiating marine-focused research (marine environment, marine ecosystems, governance approaches) from broader biodiversity conservation and sustainability topics.

Clusters of closely positioned keywords suggest interconnected research themes, with marine biodiversity governance forming a distinct cluster in the upper corner. At the same time, ecosystem services and economic valuation dominate the right-hand side of the diagram. Central terms like biodiversity, environmental management, and climate change indicate cross-cutting themes that link multiple research areas. This factorial analysis identifies dominant intellectual structures and emerging research agendas, providing insights into the evolution of biodiversity research and its intersection with economic and policy frameworks.

Overall, the factorial map points to three prominent strands: valuation and ecosystem services, governance and policy, and a distinct marine-focused stream, linked by cross-cutting attention to environmental management and climate change. This provides a concise picture of where the literature is most concentrated and where thematic connections are still weak. We use these patterns, together with the systematic review, to frame the implications and future research directions in Section 5.

5. Conclusion

This study presents a comprehensive bibliometric review of biodiversity-related research in the fields of economics, business, and finance. Our analysis reveals that biodiversity is increasingly recognised not only as an ecological concern but also as a material issue for firms, investors, and policymakers. Over the past three decades, biodiversity research in these domains has expanded considerably, both in volume and thematic scope, reflecting growing awareness of biodiversity loss as a risk to business continuity, financial stability, and sustainable development.

The five identified clusters highlight the evolution of scholarly interest from traditional environmental economics towards more interdisciplinary approaches, including corporate biodiversity responsibility, biodiversity finance, and nature-related financial disclosures. In

particular, the rise of biodiversity finance signals a shift in the role of capital markets and private investment in advancing conservation objectives. However, this trend also raises important questions about effectiveness, accountability, and the potential misalignment between financial incentives and ecological outcomes. Accordingly, finance matters here not only as a growing research stream, but also as a lens that shapes how biodiversity is interpreted by decision-makers and translated into metrics and governance practices.

The above evidence comes from bibliometric mapping and a systematic literature review. We therefore present our findings as a map of how the field is structured and how its themes have developed, rather than as causal proof or an assessment of what works in practice. With this in mind, the discussion of financialisation, transformative change, and accountability reflects what literature highlights and where it leaves gaps, not a conclusion that can be drawn from bibliometrics alone. This distinction clarifies the scope of our claims while preserving their implications for future research and governance debates.

5.1. Societal and economic implications

The implications below are drawn from the bibliometric mapping and our systematic synthesis of recurring themes, rather than a detailed effectiveness assessment of individual studies or interventions.

The findings carry significant implications for both society and the economy. Biodiversity underpins critical ecosystem services such as food provision and climate resilience. As biodiversity continues to decline, the risks are not merely environmental but extend to public health, social equity, and economic productivity. These impacts are likely to be unevenly distributed, with vulnerable populations in biodiversity-dependent regions facing the greatest risks.

From an economic perspective, biodiversity loss presents growing challenges for industries that depend on natural assets, including agriculture, fisheries, tourism, and pharmaceuticals. Failure to internalise biodiversity-related risks may result in underpriced assets, misinformed investment decisions, and ultimately financial instability. In contrast, well-designed biodiversity finance instruments such as conservation bonds, biodiversity credits, and ESG-aligned funds offer new opportunities to mobilise capital for nature-positive outcomes. Their effectiveness is likely to depend on transparent, science-based frameworks that can be linked to demonstrable ecological outcomes and long-term resilience.

At the policy level, integrating biodiversity into national accounting systems, regulatory frameworks, and corporate reporting may help realign market incentives with broader sustainability goals. This integration is especially relevant in the context of the Kunming-Montreal Global Biodiversity Framework, which calls for mainstreaming biodiversity across all sectors of the economy.

These implications reflect the literature's main themes and gaps. Assessing the effectiveness of specific instruments and organisational practices is an important task for future empirical research.

5.2. Future research direction

Our analysis also points to several areas where further research is needed. First, there is a need for more conceptual clarity on the role of biodiversity within corporate strategy and financial decision-making. Studies should explore how firms internalise biodiversity risks and how these are reflected in capital allocation, supply chain management, and stakeholder engagement.

Second, methodological innovations are essential for improving the assessment of biodiversity impacts and dependencies. Combining emerging techniques such as machine learning, remote sensing, and scenario modelling can strengthen the evidence base and support more targeted interventions. At the same time, mixed-method approaches that incorporate local and indigenous knowledge can enrich the understanding of context-specific dynamics.

Third, future research should aim to bridge the gap between biodiversity science and business research. Closer collaboration between conservation scientists, ecological economists, and management scholars can support the development of practical tools and governance mechanisms that balance ecological integrity with economic viability. Furthermore, greater attention should be given to assessing the distributive effects of biodiversity policies and finance instruments, particularly in relation to equity and social inclusion.

Fourth, research should contribute to reshaping the narrative around biodiversity from one of compliance or reputational risk to one of strategic opportunity. Biodiversity must be positioned not only as a constraint but as a source of innovation, resilience, and long-term value creation for firms and societies alike.

Finally, future work should also examine biodiversity finance not only in terms of instrument design but also in terms of the implications of financialisation, including risks of commodification, weak additionality, and strategic greenwashing. More empirical evidence is

needed on whether corporate biodiversity initiatives and related reporting practices translate into measurable outcomes across supply chains and affected ecosystems.

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5. List of Figures and Tables

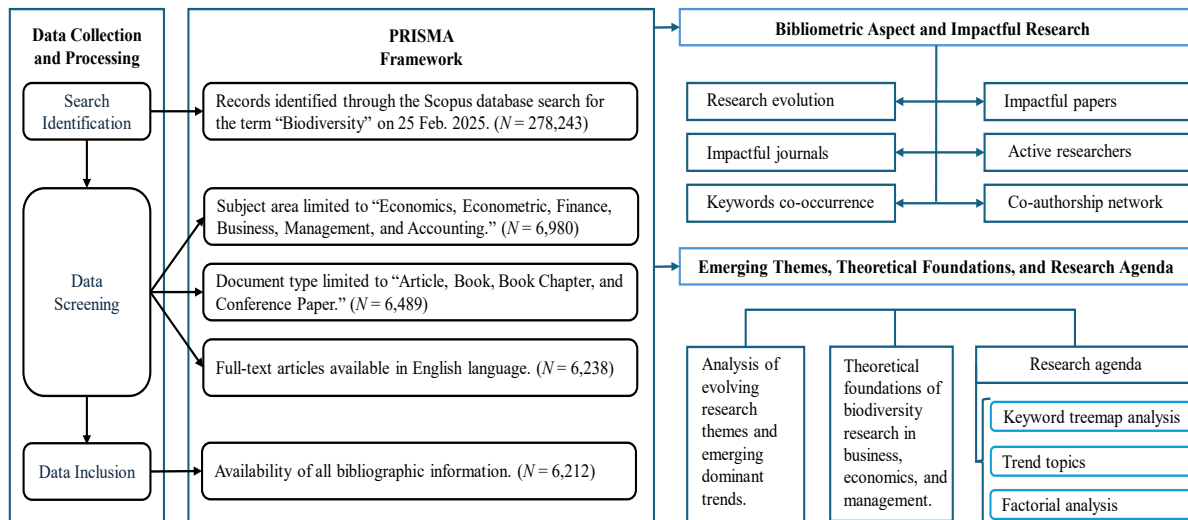


Figure 1. Sample breakdown and research design

Source: Created by authors

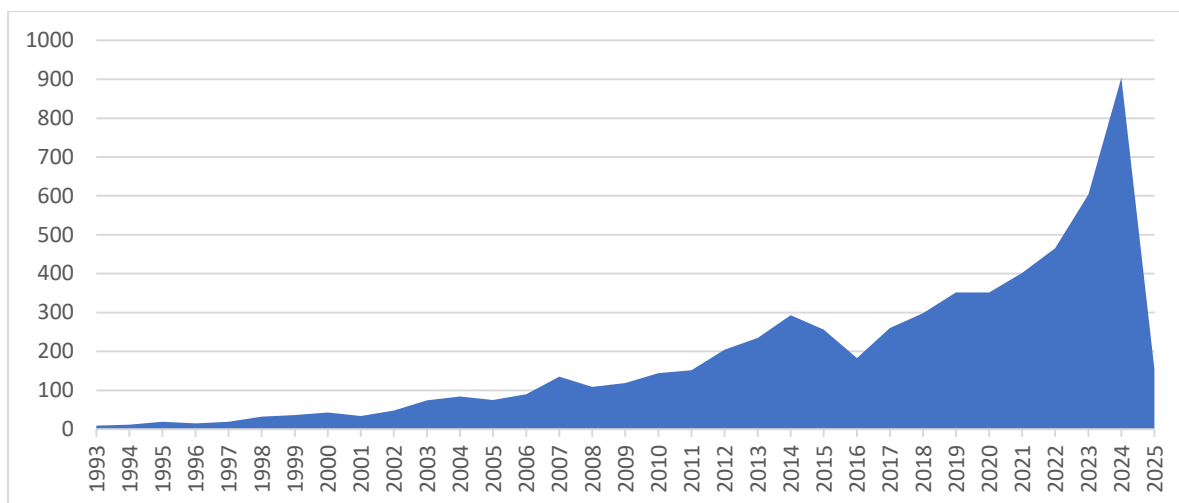


Figure 2. Published articles from 1993 to 2025

Source: Created by authors

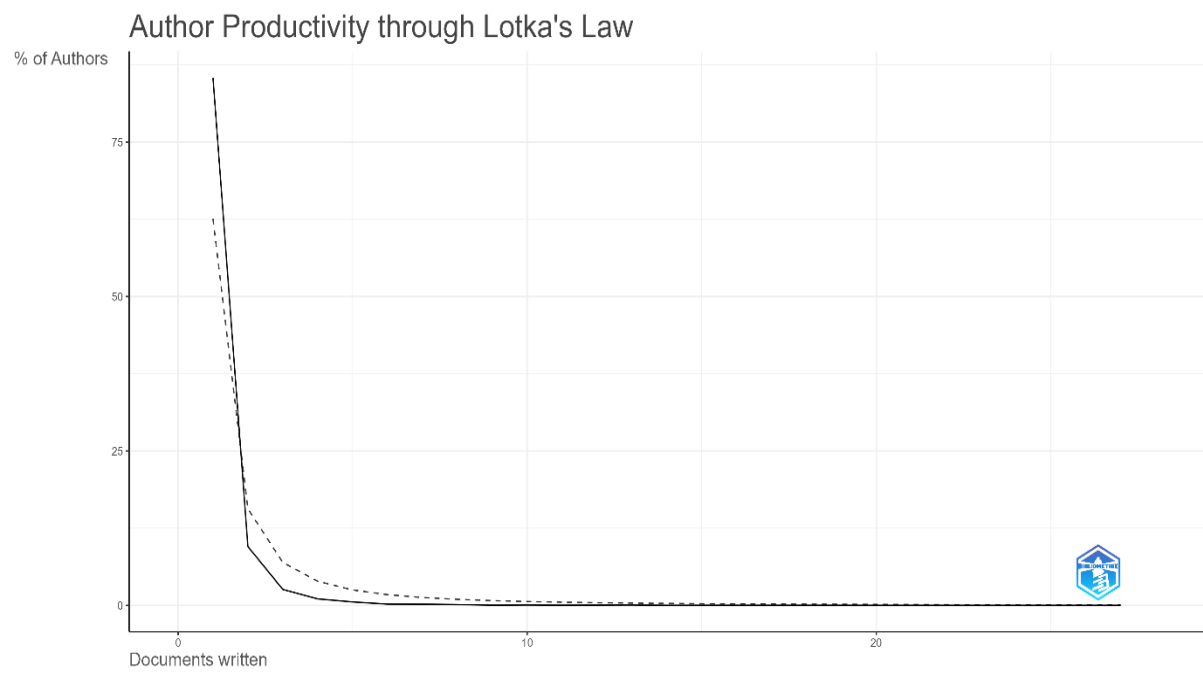
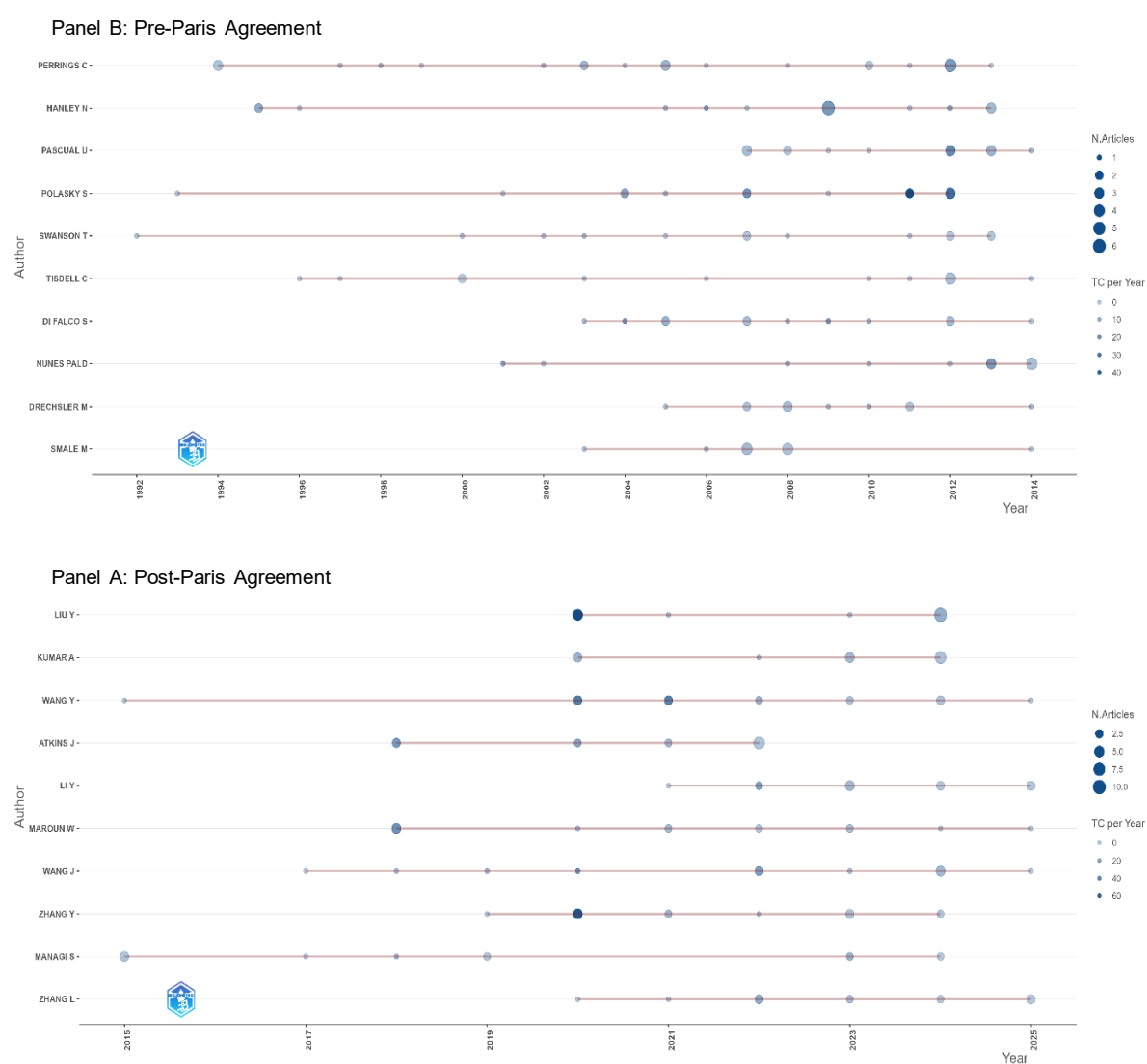


Figure 3. Lotka's Law

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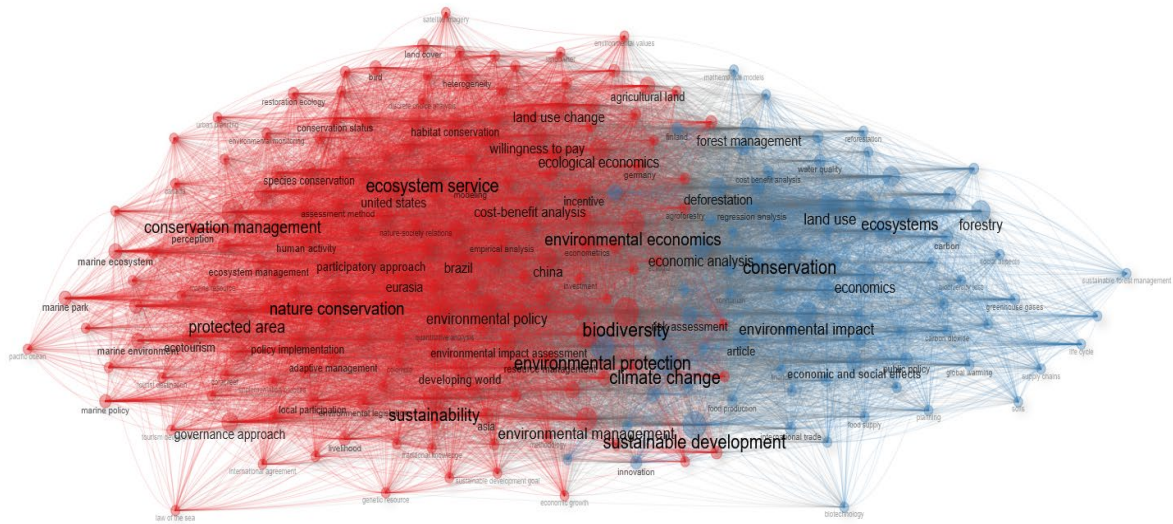


Figure 5. Thematic map

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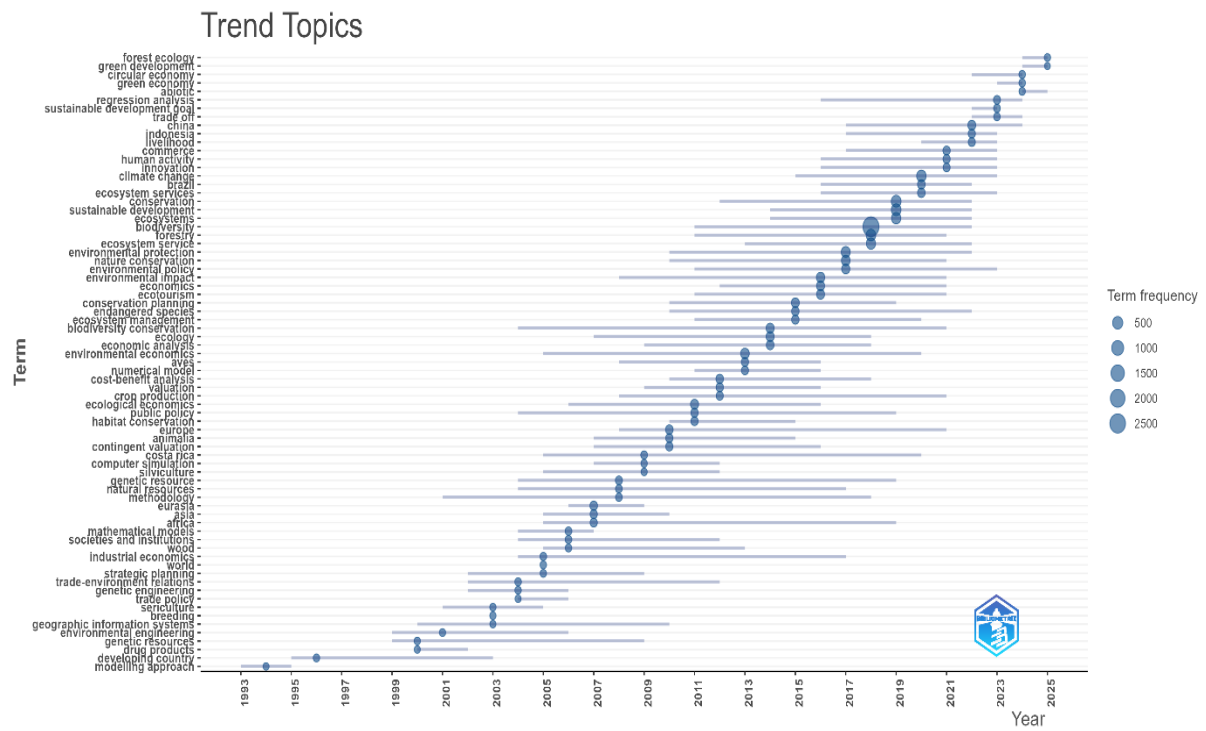


Figure 7. Trend topics per term over the past 32 years

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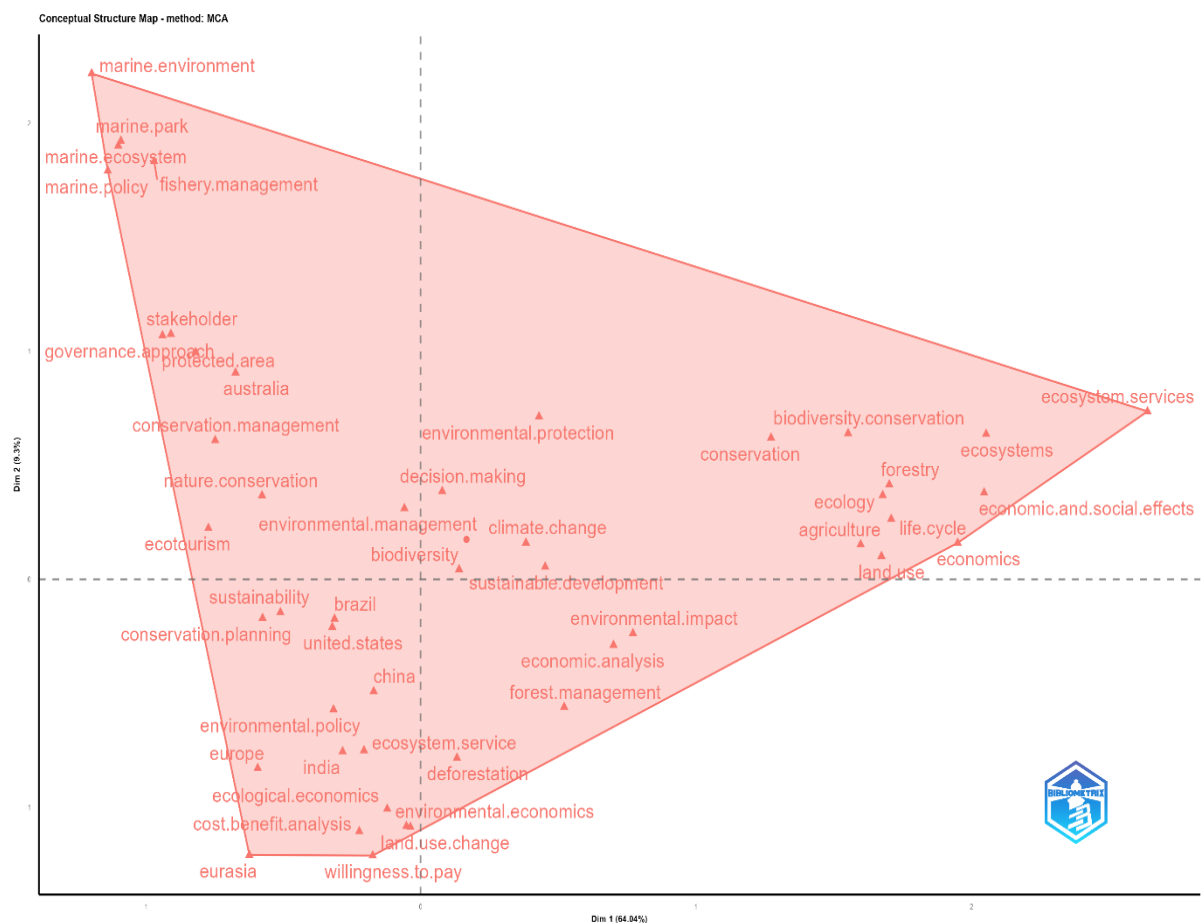


Figure 8. Factorial map

Source: Created by authors

Table 1: Top publishing journals and their most influential articles (by total and yearly citations)

Journal name	Total Documents	Citations	ACD	Most Influential Authors (Article)	Publication Year	Article Citations	AYC
Ecological Economics	502	32,953	65.64	Moberg & Folke	1999	1,312	53
Marine Policy	462	14,310	30.97	Bax et al.	2003	869	39
Journal of Cleaner Production	294	12,022	40.89	von Blottnitz & Curran	2007	614	32
Forest Policy and Economics	213	6,352	29.82	Arts & Buizer	2009	278	15
Applied Geography	135	5,136	38.04	Schulz et al.	2010	295	17
World Development	75	3,789	50.52	Brandon & Wells	1992	326	11
Environmental and Resource Economics	97	3,764	38.80	Polasky et al.	2011	641	42
Journal of Sustainable Tourism	44	2,702	61.41	Amelung & Viner	2006	245	14
Environment, Development and Sustainability	206	2,545	12.35	Fuchs	2008	188	10
Resources, Conservation and Recycling	45	1,850	41.11	Fernando & Hor	2017	228	29
Accounting, Auditing and Accountability Journal	29	1,685	58.10	Rimmel & Jonäll	2013	125	10
Journal of Environmental Econ. and Mgmt.	36	1,657	46.03	Newell et al.	2005	177	9.3
International Journal of Agricultural Sustainability	53	1,584	29.89	Koohafkan et al.	2012	232	16
Food Policy	16	1,326	82.88	Powlson et al.	2011	403	27
Tourism Management	11	1,230	111.82	Ballantyne et al.	2011	411	27

Source: Created by authors

Table 2: Most impactful papers in the literature

Author(s)	Title	Journal	Conceptual Framework
Moberg & Folke (1999)	Goods and services of coral reef ecosystems	Ecological Economics	Applying resilience theory and ecosystem services, this study classifies coral reef benefits into goods (e.g., fisheries) and services (e.g., coastal protection and nutrient cycling). It introduces the concept of reef resilience, emphasising how biodiversity loss leads to system shifts (e.g., coral-to-algae dominance). The study supports ecosystem-based management, advocating for integrated conservation strategies to sustain coral reef functions and services.
Bax et al. (2003)	Marine invasive alien species: a threat to global biodiversity	Marine Policy	This study frames marine invasive species as a global biodiversity risk, using pathway/vector analysis to track their spread through ballast water, aquaculture, and global trade. It applies risk management and invasion ecology concepts, advocating for preventative, ecosystem-based strategies and international policy coordination to mitigate bio-invasions' environmental and economic impacts.
Barrios (2007)	Soil biota, ecosystem services, and land productivity	Ecological Economics	Based on soil ecology and ecosystem services theory, Barrios links soil biodiversity to land productivity. It classifies soil organisms into functional groups (decomposers, engineers, microsymbionts) that sustain nutrient cycling, pest regulation, and soil health. It applies the biodiversity-ecosystem function paradigm, emphasising that maintaining soil biota is essential for agricultural sustainability and natural capital management.
Angelsen & Kaimowitz (1999)	Rethinking the causes of deforestation: lessons from economic models	The World Bank Research Observer	This study synthesises economic models of deforestation, linking land-use decisions to profit incentives, road expansion, agricultural prices, and policy signals. Using microeconomic land-use theory and von Thünen's land rent model, it distinguishes proximate (immediate) vs. underlying (systemic) causes of deforestation. The study highlights how market forces, governance, and rural employment policies shape forest loss, offering insights into biodiversity conservation.
Von Blottnitz & Curran (2007)	A review of assessments conducted on bio-ethanol as a transportation fuel from a net energy, greenhouse gas, and environmental life cycle perspective	Journal of Cleaner Production	This study uses Life Cycle Assessment (LCA) to evaluate bioethanol's sustainability by measuring net energy balance, greenhouse gas emissions, and environmental trade-offs. It emphasises cradle-to-grave analysis, showing that while bioethanol reduces fossil fuel reliance, its benefits vary based on feedstock, land use, and production efficiency. The study underscores the importance of holistic environmental assessment in business and policy decisions on biofuels.
Pagiola (2008)	Payments for environmental services in Costa Rica	Ecological Economics	Grounded in environmental economics and incentive theory, this study explains Payments for Environmental Services (PES) as a market-based tool to internalise biodiversity externalities. It applies Coasean bargaining and Pigouvian subsidy principles, where service beneficiaries compensate landowners for conservation. PES aligns private incentives with environmental benefits, making conservation financially viable. The study highlights Costa Rica's PES model, demonstrating its

			efficiency in promoting sustainable land-use practices.
Turner et al. (2003)	Valuing nature: lessons learned and future research directions	Ecological Economics	This study applies Total Economic Value (TEV) to ecosystem services, emphasising the marginal value of biodiversity loss and the interdependence of ecological functions. It critiques simplistic valuation models, arguing for an approach that accounts for system integrity and critical ecological thresholds. Integrating environmental economics with ecosystem complexity supports more comprehensive biodiversity valuation in policy and sustainability decision-making.
Banerjee (2003)	Who sustains whose development? Sustainable development and the reinvention of nature	Organization Studies	Using a critical, postcolonial discourse approach, Banerjee critiques corporate environmentalism and sustainable development as extensions of Western economic rationality and neo-colonialism. He argues that businesses co-opt sustainability rhetoric to maintain power structures rather than drive genuine ecological transformation. The study challenges the triple bottom line and corporate greening, highlighting how sustainability policies prioritise growth over biodiversity protection and Indigenous rights.
Holmlund & Hammer (1999)	Ecosystem services generated by fish populations	Ecological Economics	Based on the ecosystem services framework, the study distinguishes between fundamental (supporting resilience) and demand-derived services (direct human benefits). It highlights how fish biodiversity underpins ecosystem health through nutrient cycling, habitat structuring, and food web regulation, stressing an ecosystem-based approach to fisheries management. The study bridges ecology and ecological economics, advocating for biodiversity conservation as a natural capital strategy for long-term sustainability.

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