

Tourism and Environmental Impact: A Bibliometric Analysis of Two Decades of Research

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ABSTRACT

Research Objectives and Scope: This study systematically maps the intellectual structure, thematic evolution, and collaborative networks within tourism–environment–climate change research from 2000 to 2026. Data were extracted from the Scopus database, yielding a corpus of 706 documents across 265 sources, capturing key dimensions such as carbon footprint, climate change adaptation, sustainable tourism, and ecological degradation.

Methodology: A multi-method bibliometric framework was employed, integrating descriptive performance analysis — evaluating publication trends, leading authors, and journals — with advanced science mapping techniques including keyword co-occurrence network analysis, Callon-based strategic thematic mapping, Multiple Correspondence Analysis (MCA), and trend topic visualization, implemented via Bibliometrix.

Key Findings: The corpus of 706 documents demonstrates a robust annual growth rate of 13.18%, with an average of 44.19 citations per document, produced by 1,841 authors across 265 sources. Scientific output accelerated markedly after 2015, coinciding with the adoption of the Paris Agreement and the SDGs. China led in publication volume (75 documents, 10.6%), followed by Australia and the United States, while Canada exhibited the highest rate of international co-authorship (48.6%). Strategic thematic mapping identified "environmental degradation" and "tourism policy" as Motor Themes — intellectually mature and central to broader scholarly debates — while "carbon footprint" and "environmental impact assessment" occupy Niche status, reflecting methodological depth without full cross-disciplinary integration. "Climate change," "sustainable tourism," and "sustainability" function as Basic Themes — the shared conceptual vocabulary of the field — yet remain theoretically diffuse. MCA revealed a structural bifurcation between adaptation-focused, socio-ecological research and quantitatively oriented carbon-accounting approaches, with a cumulative explanatory variance of 62.94%. Temporal trend analysis delineated three evolutionary phases: a pre-2015 descriptive phase centered on foundational environmental impacts; a transitional phase (2015–2019) marked by rapid consolidation around climate change governance; and a post-2020 phase characterized by increasing methodological precision, carbon quantification, and policy-oriented discourse. Critically, structurally absent themes — including artificial intelligence, climate justice, degrowth, sustainable aviation fuel, and digital twin technologies — represent the field's most consequential knowledge gaps.

Implications: This study provides a comprehensive roadmap for researchers, policymakers, and practitioners, highlighting five strategic research priorities: integrating AI and machine learning into tourism climate monitoring; embedding climate justice and equity frameworks into carbon policy analysis; operationalizing Paris Agreement targets at the destination scale; addressing aviation decarbonization through demand-side governance and sustainable aviation fuel research; and legitimizing degrowth and alternative mobility paradigms as analytically necessary responses to the fundamental incompatibility between tourism's growth trajectory and Paris-aligned emission targets.

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1. INTRODUCTION

The global tourism industry has emerged as one of the most economically significant sectors of the twenty-first century [1][2], contributing trillions of dollars in output, generating hundreds of millions of jobs, and serving as a primary engine of cross-cultural exchange across both developed and developing economies [3]. Yet beneath this economic dynamism lies a fundamental and increasingly untenable contradiction: the very mechanisms that drive tourism's growth — high-carbon aviation, energy-intensive accommodation, and resource-heavy recreational infrastructure — are simultaneously accelerating the environmental crises that threaten the sector's long-term viability. The industry is estimated to account for between 5% and 8% of total global greenhouse gas (GHG) emissions [4], while also contributing to habitat destruction, excessive freshwater depletion, and escalating volumes of solid waste at destination sites worldwide.

This duality positions tourism within what scholars have termed a "climate paradox": the sector functions at once as a major *contributor* to climate change [4] and a primary *victim* of its consequences [5] [6]. Coastal destinations face mounting risks from sea-level rise and intensified storm activity; alpine and polar tourism economies confront accelerating snow cover loss; and biodiversity-dependent ecotourism corridors are increasingly disrupted by thermal stress and species displacement. The feedback between anthropogenic emissions — to which tourism materially contributes — and the ecological degradation of tourism assets is not merely an externality to be managed at the margins [1]. It represents a structural threat to the sector's future.

The urgency of this challenge has been amplified by the architecture of contemporary international climate governance. The Paris Agreement's commitment to limiting global average temperature increases [7], combined with the United Nations' 2030 Agenda for Sustainable Development — particularly SDG 7 (Affordable and Clean Energy), SDG 13 (Climate Action), and SDG 15 (Life on Land) — has generated unprecedented institutional pressure for measurable decarbonization across all major economic sectors, tourism included [8]. The post-COVID-19 recovery context has further sharpened this imperative: the pandemic-induced collapse of global travel created a rare structural discontinuity, opening a window for systemic reform rather than simple restoration of pre-pandemic trajectories.

Against this backdrop, the concept of sustainable tourism has evolved from a normative aspiration into an operational research agenda. Grounded in the broader discourse of sustainable development, sustainable tourism seeks to reconcile economic viability, social equity, and ecological integrity within a single analytical and policy framework [9]. Its theoretical development draws on several foundational paradigms. The Environmental Kuznets Curve (EKC) hypothesis, for instance, predicts that while early-stage tourism development may intensify environmental pressure, sustained economic maturity eventually induces greater ecological awareness and the adoption of cleaner technologies — a transition that policy can accelerate or delay [10]. More recently, the sector's decarbonization discourse has converged around the "net-zero" tourism model, which integrates renewable energy directly into hospitality and aviation supply chains through the deployment of solar, wind, and alternative fuel technologies [11].

Despite the growing body of scholarship at the intersection of tourism and environmental sustainability, the existing literature exhibits several structural limitations that collectively preclude a comprehensive and synoptic understanding of the field [12]. While individual empirical studies have proliferated across disciplines — spanning environmental economics, ecological science, and climate policy — systematic efforts to consolidate, map, and critically appraise this body of knowledge remain surprisingly scarce and methodologically constrained.

A first limitation concerns the thematic fragmentation of existing reviews. Prior bibliometric and systematic studies have tended to address environmental dimensions of tourism in isolation, examining either carbon emissions [13], ecological footprint [14], or climate adaptation [15] as discrete subfields, rather than as interconnected dimensions of a single environmental impact nexus. As Chen et al. (2024) [13] explicitly acknowledge, existing reviews "lack an in-depth analysis of the knowledge structure of tourism footprint research and the evolution of the research themes," a deficiency that forecloses any integrated understanding of how these dimensions interact and co-evolve over time. Furthermore, a dedicated analysis of tourism environmental impact assessments similarly identifies no fewer than five domains of analytical insufficiency — including the absence of dynamic interaction analysis and inadequate interdisciplinary cross-fertilization — underscoring that fragmentation is not merely thematic but also methodological [14].

A second limitation pertains to the absence of longitudinal and structural mapping of the field as a whole. De Bruyn et al. (2023) [16], in their comprehensive bibliometric analysis of tourism sustainability from 1990 to 2022, concede that "little attention has been dedicated to systematically analyzing scholarly production on the topic of tourism sustainability" and that "studies explicitly examining the progress and trends relating to research in sustainable tourism are limited." This observation is particularly consequential given the exponential growth of the field over the past decade and the corresponding risk that cumulative knowledge remains unorganized, redundant, and insufficiently actionable for policymakers.

A third — and perhaps most pressing — limitation relates to the misalignment between the existing review literature and the contemporary policy landscape. The global transition toward net-zero tourism models has generated a new generation of governance imperatives — encompassing carbon neutrality pathways, renewable energy integration in aviation and hospitality supply chains, and Environmental, Social, and Governance (ESG)

accountability frameworks — for which the academic review literature has yet to provide adequate analytical grounding. Scott and Gössling (2022) [15] explicitly contend that "the climate change imperative demands more of the tourism academy," signaling a recognized gap between the pace of policy transformation and the scholarly infrastructure available to support it. This gap is further compounded at the sectoral level: recent reviews confirm that research on carbon neutrality in tourism remains embryonic, with existing literature providing limited guidance on effective pathways toward decarbonization [17], while scholarship on ESG in the hospitality and tourism sector is characterized as underdeveloped, primarily focusing on financial outcomes while neglecting theoretical development [18].

Taken together, these limitations point to a single overarching lacuna: the absence of a comprehensive, multi-dimensional bibliometric study that integrates the full spectrum of tourism's environmental impacts — encompassing carbon footprint, climate change, and broader ecological degradation — within a unified analytical framework, applied to an extended temporal window, and drawing on a high-coverage scholarly database such as Scopus. Without such a study, the intellectual structure of the field, the dynamic evolution of its thematic clusters, and the degree of alignment between research output and policy demand remain fundamentally underexplored. The present study is designed to address this gap directly.

The present study is guided by four research questions. The first concerns the overall trajectory of scholarly output in this domain, specifically examining how publication volumes and growth patterns in tourism-environmental impact research have developed over the period from 2002 to 2026. The second addresses the bibliometric landscape of the field by identifying the most productive and influential authors, institutions, countries, and journals. The third investigates the conceptual landscape of the literature by mapping the predominant thematic clusters and knowledge networks that have emerged over time. The fourth explores the temporal evolution of research themes, with particular attention to identifying topics that have gained recent momentum and may warrant greater scholarly investment in the years ahead.

By employing a combined search strategy that integrates three interrelated environmental dimensions, namely carbon footprint, climate change, and ecological degradation, this study seeks to contribute to a more nuanced understanding of the environmental consequences of tourism development. This effort is particularly timely given that the global tourism industry is experiencing a robust post-pandemic recovery, a period during which the trajectory of the sector's environmental practices is especially consequential and amenable to policy intervention. The findings are intended to offer several practical implications for multiple stakeholders. For researchers, the study helps identify underexplored themes and emerging directions within the field. For policymakers, it provides a structured evidence base to inform the design of more effective environmental regulations. For tourism practitioners, it offers actionable insights to support the adoption of sustainable destination management practices during a critical window of sectoral transformation.

The remainder of this paper is structured as follows. Section 2 establishes the theoretical background. Section 3 details the bibliometric methodology, including data collection and analytical tools. Section 4 presents the results of the performance analysis and science mapping. Finally, Section 5 provides concluding remarks.

2. LITERATURE REVIEW

2.1 Tourism and Environmental Sustainability: Conceptual Foundations

The concept of sustainable tourism emerged from the broader sustainable development discourse, emphasizing the need to balance economic viability, social equity, and environmental protection. A key theoretical lens applied in this domain is the Environmental Kuznets Curve (EKC) hypothesis, which posits an inverted U-shaped relationship between economic growth (often driven by tourism) and environmental degradation [19]. While early stages of tourism development may harm the environment, subsequent economic maturity is hypothesized to lead to increased environmental awareness and the adoption of greener technologies.

A growing body of empirical literature lends credence to the Tourism-induced Environmental Kuznets Curve (T-EKC) hypothesis, which posits an inverted U-shaped relationship between tourism-driven economic growth and environmental degradation. The central premise is that, beyond a critical income threshold, the revenues and institutional maturity generated by tourism development incentivise investment in cleaner technologies, stronger environmental regulation, and heightened ecological awareness, thereby reversing initial patterns of environmental deterioration. De Vita et al. (2015) [20] provided influential early evidence within the T-EKC framework by demonstrating that, for the case of Turkey, inbound international tourism growth exerts a damaging effect on environmental quality at its early stages; however, once tourism reaches an exponential growth phase, its negative environmental impact begins to decay, a pattern consistent with the inverted U-shape predicted by the EKC hypothesis. This study is widely cited as foundational empirical support for the T-EKC in a developing-country context. The study of Paramati et al. [21], drawing on comparative panel modeling across European economies, empirically demonstrated that tourism development plays a meaningful role in reducing CO₂ emissions beyond a critical maturity threshold. Their findings corroborate the fundamental principles of the T-EKC relationship and underscore the importance of regional development variables, suggesting that the environmental gains of advanced tourism are highly conditional on the parallel transition toward cleaner energy and sustainable infrastructure. Most recently, Gallego et al. (2025) [22] contributed a novel dimension to the T-EKC debate by applying the EKC framework to water resources rather than carbon emissions alone. Using the Water Exploitation Index Plus (WEI+) as the dependent variable and a European panel dataset, the study found a non-linear yet diminishing effect of tourism volume—measured by international tourist overnights—on water

stress. The findings suggest that as tourism intensity rises, heightened pressure from both policymakers and consumers accelerates the adoption of water conservation practices by tourism enterprises. Countries with high tourism intensity were found to exhibit a lower EKC intercept, consistent with the hypothesis that sustained policy pressure at mature destinations attenuates resource consumption over time.

Besides, despite the theoretical appeal of the T-EKC hypothesis, a substantial strand of the empirical literature has produced conflicting or contradictory findings, casting doubt on its universality. Critics argue that tourism-led economic growth does not automatically generate environmental improvement, and that the shape of the growth–environment nexus is heavily contingent on a country's income level, institutional quality, energy structure, and geographic context. Dogan et al. (2016) [23] investigated the relationship between real GDP, tourism receipts, and carbon emissions across a panel of countries but found no statistically reliable evidence to support the EKC hypothesis. Their results indicate that economic and tourism growth persistently exacerbate environmental degradation without exhibiting the hypothesised turning point, suggesting that the inverted U-shape is not an inherent feature of tourism-driven development trajectories. Lee and Chen (2021) [24], employing a quantile regression framework with ecological footprint data from 123 countries (1992–2016), found evidence of a conventional U-shaped (rather than inverted U-shaped) relationship for several ecological footprint sub-components, including carbon land, cropland, and fishing grounds. Their findings imply that while early-stage tourism and income growth may initially alleviate certain environmental pressures, sustained high-intensity growth ultimately regenerates and amplifies ecological damage—a pattern consistent with the overtourism phenomenon observed in heavily visited destinations where carrying capacities are systematically exceeded. Işik et al. (2020) [25], in an analysis of G7 countries over the period 1995–2015, found that the T-EKC hypothesis was empirically valid in only one of the seven economies examined—France. In Italy, international tourism receipts were found to exert a statistically significant positive effect on CO₂ emissions, indicating that tourism-led prosperity in that country does not trigger the anticipated environmental improvement. The absence of a consistent EKC pattern across the G7—the world's most economically advanced nations—is particularly significant, as it undermines the assumption that economic maturity alone is sufficient to activate the self-correcting dynamics postulated by the EKC hypothesis. Furthermore, Mikayilov et al. (2019) [26], employing a time-varying coefficient (TVC) cointegration approach for Azerbaijan over 1996–2014, concluded that the EKC hypothesis does not hold for the relationship between tourism development and ecological footprint. Both conventional estimation methods and the TVC approach consistently indicated that the income elasticity of environmental degradation remained time-invariant, providing no evidence of a turning point in Azerbaijan's tourism–environment nexus. At the broadest theoretical level, Caviglia-Harris et al. (2009) [27] conducted a comprehensive cross-national assessment of the EKC hypothesis using ecological footprint as the environmental indicator and concluded that the supporting evidence is weak at best. Crucially, their analysis leads to the normative conclusion that economic growth, including tourism-driven growth, is insufficient as a standalone mechanism for achieving long-term environmental sustainability. They argue that direct ecological policy interventions are indispensable complements to growth, a finding with direct implications for sustainable tourism governance.

Additionally, the tourism-energy-environment nexus framework highlights the inextricable link between tourism growth, energy consumption patterns, and resulting ecological impacts. This nexus is deeply intertwined with the UN SDGs, particularly SDG 13 (Climate Action), SDG 7 (Affordable and Clean Energy), and SDG 15 (Life on Land), reinforcing the necessity for systemic transformations in how tourism is planned and operated.

2.2 Key Environmental Impact Dimensions of Tourism

The environmental consequences of tourism are neither monolithic nor confined to a single mechanism. Rather, they manifest across three interrelated dimensions that together constitute the sector's aggregate ecological footprint, encompassing greenhouse gas emissions, climate change vulnerability, and broader ecological degradation. A clear understanding of each dimension, alongside the mitigation strategies that have emerged in scholarly and policy responses, is essential for situating the present bibliometric analysis within its substantive empirical context.

The most extensively documented environmental dimension concerns the sector's contribution to global greenhouse gas emissions, driven predominantly by transportation and energy-intensive accommodation. Drawing on environmentally extended input-output modelling, Sun et al. (2024) [28] estimate that global tourism emissions grew at approximately 3.5% per annum between 2009 and 2019, ultimately reaching 5.2 GtCO₂-e and representing 8.8% of total global GHG emissions in 2019 — a rate of expansion double that of the broader world economy over the same period. The primary structural drivers of this trajectory are identified as persistently slow technological efficiency gains, averaging only 0.3% per annum, combined with sustained high growth in tourism demand. Equally concerning are the distributional dimensions of this footprint, with the twenty highest-emitting countries collectively accounting for approximately three-quarters of the global total, a pattern that significantly complicates the design of equitable multilateral mitigation frameworks.

Beyond its role as an emissions source, the tourism sector occupies a position of heightened sensitivity within global climate systems, functioning simultaneously as a contributor to anthropogenic warming and as an industry whose core productive assets are directly threatened by its consequences. Coastal infrastructure — including resorts, beaches, and airports — faces compounding risks from sea-level rise, intensified storm surges, and flooding events, while winter sports destinations confront accelerating snow cover loss and nature-based tourism corridors experience thermal stress and species displacement [15]. More recent empirical work further

establishes that freshwater shortages, particularly acute in island and arid-zone destinations, represent an increasingly binding operational constraint on tourism viability [29]. In response to these compounding pressures, the integration of vulnerability assessments, adaptation planning, and resilience frameworks has emerged as one of the most active and policy-relevant frontiers within the tourism-climate nexus.

The environmental footprint of tourism extends, however, considerably beyond its carbon dimension. Mass tourism has been associated with significant biodiversity loss, land-use alteration, excessive freshwater extraction, and substantial solid waste generation, collectively degrading the natural capital upon which the industry's long-term viability depends [30]. Evidence from coastal destinations further demonstrates that rapid tourism expansion exacerbates nutrient enrichment in marine habitats through inappropriate waste management and wastewater discharge, raising nitrogen and phosphorus concentrations to levels that sustain harmful algal blooms, oxygen depletion, and consequent biodiversity loss [31]. At the destination level, stakeholder analyses consistently corroborate that pollution impacts, landscape degradation, and harm to sensitive marine ecosystems rank among the most frequently reported environmental concerns across island and coastal tourism economies [32].

In recognition of these multifaceted pressures, the academic literature has increasingly directed its attention toward actionable mitigation frameworks and structural decarbonization pathways. Central among these is the integration of renewable energy sources, including solar, wind, and geothermal technologies, directly into hospitality operations and transportation supply chains, complemented by the development of green infrastructure at destination sites and the adoption of carbon footprint accounting tools to guide sectoral planning. Decomposition analyses of the EU tourism sector over the period 2008–2022 confirm that while technological efficiency gains and carbon intensity reductions have contributed measurably to emissions mitigation, the spatial concentration of tourist flows and continued infrastructure expansion continue to exert countervailing upward pressure, underscoring that effective decarbonization requires integrated strategies spanning technological innovation, spatial planning, and sustainable infrastructure development simultaneously [33]. At the destination level, post-pandemic analyses of urban tourism carbon footprints further reveal that transportation, accommodation, and food service sectors within the tourism supply chain remain the dominant emission nodes, with structural shifts in demand composition emerging as a key lever for carbon reduction [34]. The energy-tourism nexus has emerged as a particularly productive area of inquiry, underscoring the necessity of energy-conscious tourism models that align operational practice with the objectives of SDG 7 on Affordable and Clean Energy and SDG 13 on Climate Action. Panel data analyses conducted across emerging and high-income economies further confirm that renewable energy consumption exerts a statistically significant moderating effect on tourism-related CO₂ emissions, reinforcing clean energy transition as a viable and evidence-grounded lever for sectoral decarbonization [35]. Taken together, these four dimensions (emissions, climate vulnerability, ecological degradation, and mitigation) define the substantive landscape within which the present study's bibliometric mapping is anchored.

2.3 Bibliometric Analysis in Tourism Research

Bibliometric analysis has over the past two decades established itself as a rigorous and increasingly indispensable methodological approach for mapping the intellectual architecture of rapidly growing research domains. By systematically quantifying publication patterns, citation networks, collaborative relationships, and keyword co-occurrence structures, bibliometric methods offer a level of comprehensiveness and reproducibility that conventional narrative reviews are structurally unable to achieve. Within tourism studies, the application of these methods has expanded considerably since the early 2010s, driven by the exponential growth of the field's publication output and a growing scholarly recognition of the need to consolidate and critically appraise accumulated knowledge in a transparent and replicable manner.

Early applications of bibliometric methods in tourism research were largely descriptive, focusing on publication productivity, journal rankings, and authorship patterns within broadly defined subfields. Over time, the methodological repertoire deepened substantially to encompass co-citation analysis, bibliographic coupling, keyword co-occurrence mapping, and science mapping through platforms (such as VOSviewer, CiteSpace, and the R-based bibliometrix package) [36]. These tools have enabled researchers to move well beyond simple output metrics toward a more textured understanding of how knowledge clusters form, evolve, and diffuse across disciplinary boundaries. Among the most comprehensive applications to date, de Bruyn et al. (2023) conducted a bibliometric and systematic review of tourism sustainability drawing on 6,326 publications retrieved from the Scopus database, applying dual analyses of domain-level performance and knowledge structures, and demonstrating a remarkable evolution of scholarly output involving authors, sources, and thematic priorities [16].

Within the more narrowly defined domain of tourism's environmental impacts, bibliometric mapping has been applied selectively to individual impact dimensions, but without meaningful integration across the full spectrum of environmental concerns. For instance, Fang et al. [37] conducted a comprehensive bibliometric review of the tourism and climate change nexus. Their study mapped the intellectual structure of the field, identifying carbon emissions and energy consumption as dominant thematic clusters, yet their scope remained restricted primarily to the climatic dimension rather than a holistic environmental impact framework. Subsequently, Chen et al. (2024) [38] employed CiteSpace to map the knowledge structure of tourism footprint research, encompassing ecological, carbon, and water footprint dimensions, though their analysis remained confined to footprint typologies without extending to climate change vulnerability or the broader ecological degradation literature. In a parallel contribution, applying science mapping techniques to the tourism sustainability discourse, Garrigos-Simon et al.

(2018) [12] revealed that the research landscape is predominantly structured around two major clusters: the environmental impacts of tourism and its intersection with economic growth. Complementing these bibliometric findings, domain analyses corroborate that while the documentation of tourism's climate impacts has matured, targeted scholarship on systemic mitigation and decarbonization strategies remains critically underdeveloped [39] [7].

Bibliometric analyses of tourism's relationship with climate change more broadly have similarly advanced the field in important but partial ways. Qiu et al. (2023) [40] combined VOSviewer and SciMAT to analyze 1,274 Web of Science records from 1998 to 2021, developing co-authorship networks and strategic diagrams that revealed panel data analysis, ski tourism, outdoor recreation, and pro-environmental behavior as the current research priorities, while also identifying future thematic directions through strategic diagram mapping. In the domain of sustainable destination management, a parallel bibliometric tradition has documented the growing centrality of concepts such as community participation, environmental carrying capacity, and green infrastructure [41][12], reflecting the progressive institutionalization of sustainability concerns within destination planning frameworks [15].

Taken together, these prior contributions have advanced the field's collective self-understanding in meaningful ways. Nevertheless, they remain individually partial in their thematic scope, temporally bounded in ways that preclude engagement with the post-pandemic recovery period, and largely reliant on Web of Science as the sole retrieval database — a choice that may systematically underrepresent scholarship published outside the core English-language journals indexed by that platform. The present study builds upon and extends this bibliometric tradition by adopting a unified search strategy that simultaneously encompasses carbon footprint, climate change, and ecological degradation, drawing on Scopus for broader disciplinary coverage, and extending the analytical window through 2026 to capture the field's most recent trajectory. Table 1 summarizes representative bibliometric studies that have examined various environmental dimensions of tourism, encompassing ecological degradation [42], carbon emissions [43], climate change [40], broad sustainability [16], tourism footprint typologies [38], and the renewable energy-tourism nexus [44], collectively illustrating both the productive development and the persistent thematic fragmentation of the field to date.

Table 1: Overview of previous studie

Study	Analytical Scope	Temporal & Database Coverage	Analytical Tools	Principal Findings	Distinctive Contribution of the Present Study
Shahbaz et al. (2021) [42]	Tourism and ecological degradation nexus	1999-2020; Web of Science	Co-citation and keyword co-occurrence analysis	Degradation research is growing but geographically concentrated in China and high-income countries; policy-research alignment remains weak.	Broadens scope to encompass carbon footprint and climate change; employs Scopus for expanded and more inclusive coverage through 2026.
Mishra et al. (2022) [43]	Tourism and carbon emissions	1990-2021; Scopus	VOSviewer; co-citation and keyword mapping	Energy use, CO2 emissions, and carbon taxation are dominant thematic clusters; output geographically concentrated in high-income countries.	Extends temporal coverage to 2026; integrates ecological degradation and climate change alongside carbon within a single unified search strategy.
Qiu et al. (2023) [40]	Tourism and climate change	1998-2021; Web of Science	VOSviewer and SciMAT	Vulnerability, adaptation, and pro-environmental behavior are dominant themes; post-pandemic research dimensions are absent.	Captures the post-pandemic recovery period through 2026; combines climate change analysis with carbon footprint and ecological degradation.
de Bruyn et al. (2023) [16]	Tourism sustainability (broad scope)	1990-2022; Scopus	bibliometrix R-package; co-citation and co-authorship mapping	Remarkable growth in scholarly output; thematic dispersion persists; environmental	Narrows analytical focus specifically to environmental impacts; applies an integrated three-

Study	Analytical Scope	Temporal & Database Coverage	Analytical Tools	Principal Findings	Distinctive Contribution of the Present Study
				impact dimensions remain underrepresented relative to their policy significance.	dimensional search strategy (carbon footprint, climate change, degradation) unavailable in prior broad sustainability reviews.
Chen et al. (2024) [38]	Tourism footprint (ecological, carbon, and water dimensions)	Not specified; Web of Science	CiteSpace; keyword co-occurrence and burst detection	Knowledge structure fragmented across footprint typologies; carbon footprint most studied; water footprint significantly underexplored.	Adopts Scopus for broader disciplinary reach; incorporates climate vulnerability as a distinct analytical dimension alongside the three-footprint framework.
Puertas et al. (2024) [44]	Renewable energy and tourism nexus (bibliometric)	2008-2023; Scopus	VOSviewer; Power BI network analysis	Research on renewable energy and tourism growing at 0.1927 per year; China leads in output; mitigation-oriented and energy-conscious tourism scholarship confirmed as underexplored relative to demand.	Employs an integrated three-dimensional search strategy (carbon footprint, climate change, ecological degradation); extends analysis through 2026 to capture post-pandemic decarbonization policy context.

3. METHODOLOGY

While prior bibliometric research has provided valuable insights into the environmental externalities of tourism, these studies have predominantly investigated isolated dimensions—such as ecological degradation [21], carbon footprint dynamics [45], or climate change vulnerabilities [46]. Consequently, there remains a distinct scarcity of synthetic research integrating these interconnected environmental facets into a cohesive analytical framework.

Furthermore, the temporal scope of existing literature largely predates or only marginally captures the post-COVID-19 recovery phase—a critical juncture characterized by the rapid resurgence of travel and intensified ecological pressures [47]. To bridge these knowledge gaps, the present study adopts a multidimensional approach, simultaneously capturing a triad of environmental impacts and extending the analytical horizon through 2026.

Data retrieval was conducted using the Scopus database. Scopus was deliberately selected for its extensive indexing of high-impact, peer-reviewed literature and its demonstrably broader coverage of social sciences and tourism management compared to other databases [48] [49]. This ensures optimal compatibility with advanced science mapping software. To maximize topical precision and eliminate marginal studies, the search protocol was strictly confined to the TITLE field. The advanced Boolean query deployed was:

TITLE ("tourism" AND ("environmental impact" OR "carbon footprint" OR "climate change" OR "degradation")) AND PUBYEAR > 1999 AND PUBYEAR < 2027 AND (LIMIT-TO (SRCTYPE , "j")) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re")) AND (LIMIT-TO (LANGUAGE , "English"))

This rigorous filtering protocol intentionally omitted non-peer-reviewed materials (such as book chapters, editorials, and conference proceedings) as well as non-English documents, thereby guaranteeing the synthesis of a highly standardized and robust dataset.

The initial search identified 708 records. After removing 2 duplicate entries, a final dataset of 706 peer-reviewed articles published between 2000 and 2026 was retained, drawn from 265 sources. The dataset comprises detailed bibliographic information, including titles, abstracts, keywords, author details, affiliations, countries,

publication years, citation metrics, and complete reference lists.

The analysis was conducted using the bibliometrix R-package (via the Biblioshiny interface) for descriptive statistics, thematic mapping, and factorial analysis. VOSviewer was utilized to construct and visualize complex co-citation and keyword co-occurrence networks.

4. RESULTS

4.1 Overview of the Dataset

The final dataset consists of 706 documents (see Table 2) published across 265 diverse sources between 2000 and 2026. The corpus demonstrates a substantial academic footprint, with an average of 44.19 citations per document and an annual growth rate of 13.18%. The research was produced by 1,841 distinct authors, indicating a highly collaborative field, with an international co-authorship rate of 32.86% and an average of 3.38 co-authors per document. The dataset incorporates 68,280 references and includes 1,737 author keywords, complemented by 1,644 keywords plus.

Table 2: Main information

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	2000:2026
Sources (Journals, Books, etc)	265
Documents	706
Annual Growth Rate %	13,18
Document Average Age	7,54
Average citations per doc	44,19
References	68280
DOCUMENT CONTENTS	
Keywords Plus (ID)	1644
Author's Keywords (DE)	1737
AUTHORS	
Authors	1841
Authors of single-authored docs	91
AUTHORS COLLABORATION	
Single-authored docs	102
Co-Authors per Doc	3,38
International co-authorships %	32,86
DOCUMENT TYPES	
article	706

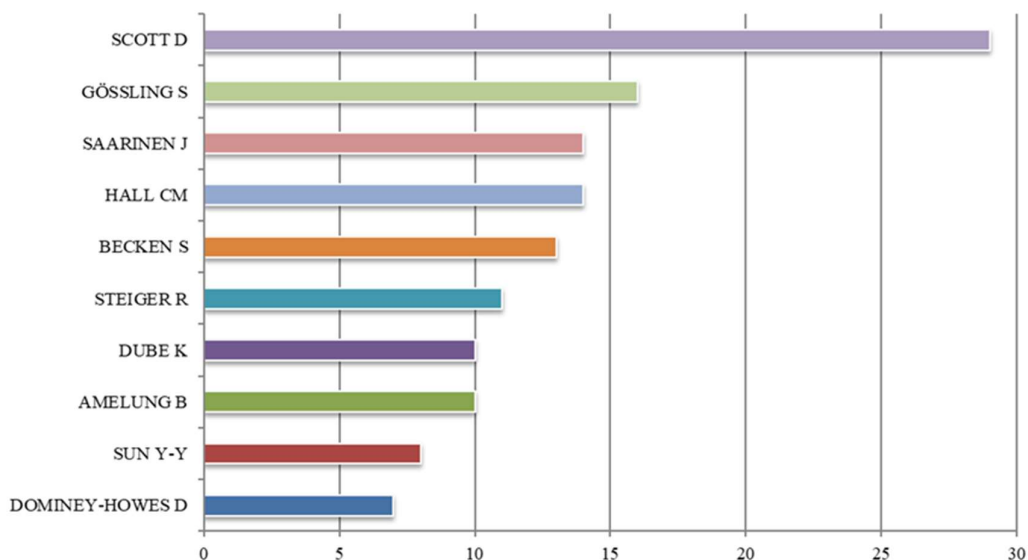
4.3 Research Productivity and Scholarly Contributions

Figure 1 illustrates the most productive authors within the research field based on the number of published articles. Among them, Scott D. stands out as the leading contributor with 29 publications, substantially surpassing the other scholars in the dataset. Gössling S. ranks second with 16 articles, followed by Hall C.M. and Saarinen J., each contributing 14 publications. Other notable contributors include Becken S., Steiger R., and Amelung B. and Dube K. with 10 publications each. The distribution of author productivity reflects a highly concentrated scholarly structure, where a relatively small group of researchers accounts for a significant proportion of the scientific output. This pattern is consistent with Lotka’s Law, which suggests that most authors contribute only a limited number of studies, while a few highly productive scholars dominate the literature. As shown in Figure 1, the leading authors have played a central role in shaping the intellectual development of the field, particularly in relation to topics associated with climate change, tourism sustainability, adaptation, and destination

resilience.

Figure 1: Most relevant authors

China recorded the highest research output with 75 publications (10.6%), followed by Australia (47



articles) and the United States (46 articles). Canada and Spain also demonstrated notable contributions, producing 37 and 36 publications, respectively. In terms of international collaboration, Canada exhibited the highest proportion of multiple-country publications (48.6%), indicating a strong level of cross-national research cooperation. Australia and the United Kingdom also showed relatively high rates of internationally co-authored publications, reflecting the increasingly collaborative and globalized nature of research within this field.

The distribution of the most relevant sources reveals that Journal of Sustainable Tourism emerges as the leading outlet, contributing the highest number of publications, followed by Sustainability (Switzerland), which also demonstrates a substantial research output. In contrast, traditionally influential journals such as Tourism Management show a comparatively moderate number of publications within the dataset. Other notable contributors, including Current Issues in Tourism, Environmental Science and Pollution Research, and Journal of Outdoor Recreation and Tourism, exhibit a more balanced but lower level of output. Overall, the pattern suggests that while established tourism journals remain important, sustainability-focused and interdisciplinary outlets have gained increasing prominence, reflecting the growing integration of environmental concerns into tourism research. Figure 2 reports the most relevant sources in the tourism–environment literature, highlighting leading journals based on their publication productivity.

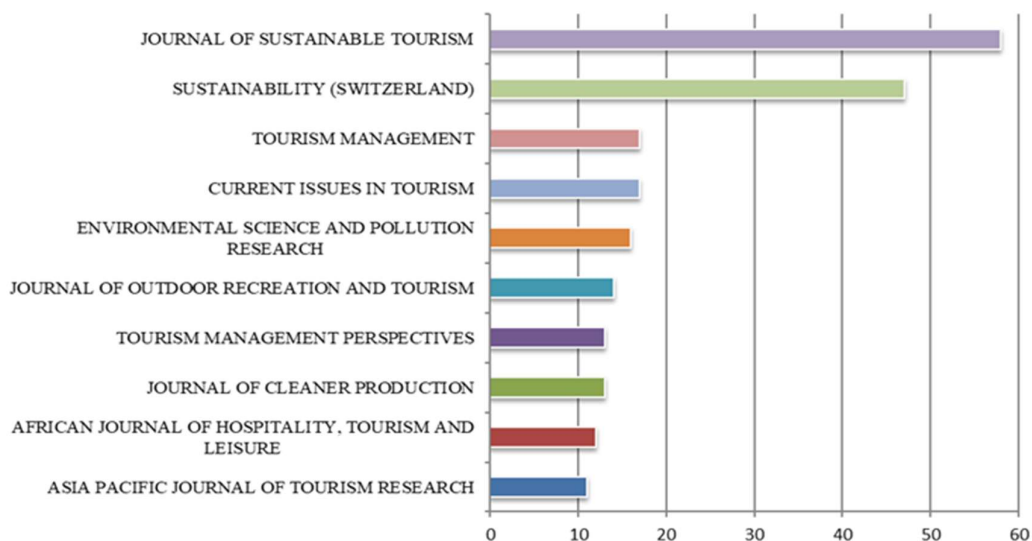


Figure 2: Most relevant sources

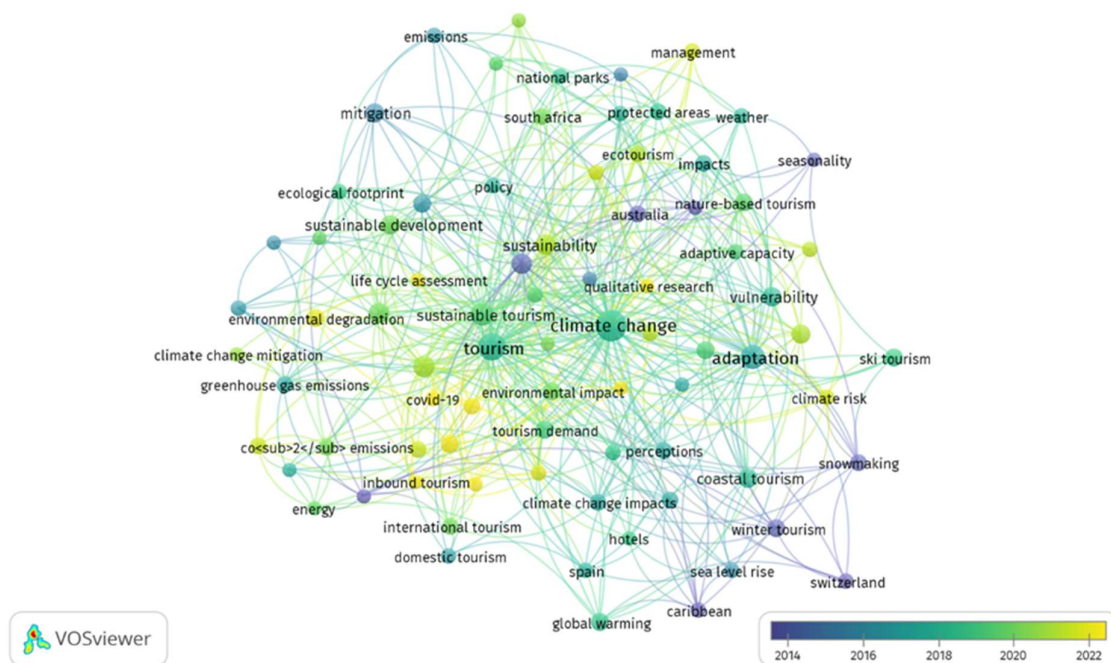
4.1. Co-occurrence Network Analysis

To visualize the interconnectedness of key research themes, a cooccurrence network was constructed (Figure 3). The network reveals a highly modular structure, with distinct clusters reflecting the specialized

subdomains within the tourism and environment nexus. The central nodes, such as "sustainable tourism" and "climate change", exhibit the highest degree of centrality, acting as the primary bridges connecting diverse research streams. The thickness of the connecting lines signifies the strength of thematic association, revealing that while emission focused keywords ("carbon footprint" and "GHG emissions") are densely clustered, they maintain strong links to governance and policy frameworks. This visualization confirms that the field is organized around a multidisciplinary core, where environmental quantification tools are increasingly integrated with socioeconomic and management focused research. Figure 3 illustrates the co-occurrence network, revealing the structural interconnectedness of the primary research themes identified within the corpus

4.4 Thematic Mapping: Strategic Diagram

To delineate the conceptual architecture of the research field at the intersection of tourism and climate change, a thematic map was constructed using co-word analysis grounded in Callon's centrality and density measures [50]. Following established bibliometric protocols [51], the strategic diagram positions keyword clusters in a two-dimensional space: the horizontal axis (centrality, or "relevance degree") captures the extent to which a theme interacts with other themes in the broader field, thereby reflecting its structural importance; the vertical axis (density, or "development degree") measures the internal cohesion of a thematic cluster, indicative of its scholarly maturation [52]. The thematic map presented in Figure 4 positions keyword clusters according to their levels of centrality (relevance degree) and density (development degree), allowing the intellectual structure of the field to



be systematically organized into four thematic categories: motor themes, niche themes, basic themes, and emerging or declining themes [53]. Bubble size reflects the frequency of keyword occurrence within the dataset [54].

Figure 3: Co-occurrence network of author keywords

Motor Themes, characterized by high centrality and high density, represent the intellectual backbone of a research domain — thematic clusters that are both internally well-developed and strongly connected to the wider scholarly conversation [52]. In the upper-right quadrant, the cluster anchored by “environmental degradation” emerges as the most prominent, featuring the largest node situated near the origin. This positioning indicates that environmental degradation serves as a foundational nexus, bridging various research trajectories to drive the field's overarching agenda. Adjacent to this is “tourism policy”, possessing a smaller footprint, which reflects the active scholarly integration of governance mechanisms to address ecological challenges. Notably, “carbon footprints” and “environmental impact assessment (EIA)” occupy distinct positions closer to the central relevance axis but demonstrate significantly higher density. This specific spatial configuration implies that these methodological frameworks have achieved robust internal cohesion, functioning as established analytical tools that propel empirical research in sustainable tourism [55].

Niche Themes exhibit high internal density but low centrality, indicating clusters that are intellectually well-developed yet remain peripheral to the broader field's central debates. Several themes populate this quadrant in the present map: "Mainstreaming" and "city tourism" appear at the uppermost position within this quadrant, suggesting that research on integrating climate considerations into urban tourism planning is theoretically coherent but operates largely in isolation from wider cross-disciplinary frameworks. "Geotourism" and "arctic ocean" also emerge here alongside "climate comfort", reflecting a concentration of geographically specialized scholarship —

particularly polar and geological tourism — that has developed a robust internal literature. Subsequent scholarship have highlighted the particular vulnerability of polar tourism to physical climate disruption, though this body of research remains somewhat insulated from mainstream sustainable tourism discourse [46].

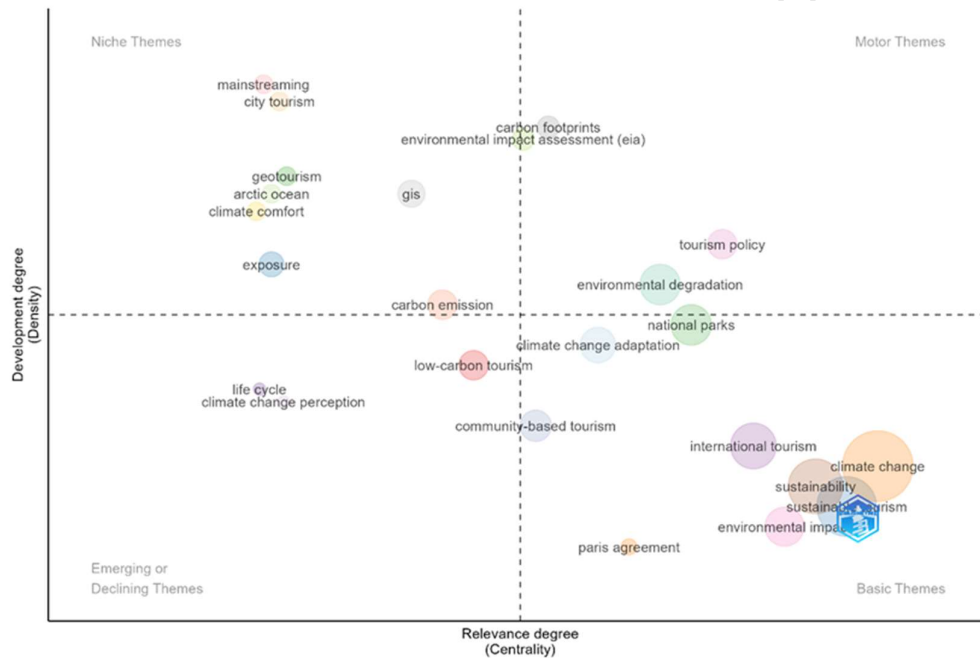


Figure 4: Thematic mapping

The cluster anchored by "carbon footprints" and "environmental impact assessment (EIA)" similarly occupies the Niche quadrant, indicating that methodological frameworks for measuring tourism's ecological burden are technically mature but have not yet been fully integrated as cross-cutting analytical tools across the field. This finding resonates with Scott and Gössling's (2022) [15] observation that three decades of tourism–climate research have generated considerable technical depth without sufficiently translating into sector-wide decarbonization action. The presence of "GIS" in this quadrant reflects comparable dynamics: spatial analysis methods are well-established in sub-disciplines of tourism but remain methodologically segmented from broader sustainability and climate adaptation discourses. "Exposure" appears as an isolated niche cluster, potentially denoting research on tourist exposure to climate hazards — a growing subdiscipline that, despite increasing policy relevance, has not yet achieved the centrality necessary to drive the field's broader agenda.

Basic Themes are characterized by high centrality and low density, signifying topics that function as transversal connectors across the research field — widely cited and cross-referenced, yet lacking the theoretical elaboration that would elevate them to Motor Theme status. This quadrant is the most heavily populated in the present map and encompasses the most consequential research clusters. "Climate change", "sustainability", "sustainable tourism", "international tourism", and "environmental impact" form a dense constellation in the lower-right quadrant, with notably large bubble sizes indicating high keyword frequency. This configuration confirms that these concepts serve as the shared conceptual vocabulary of the field, referenced extensively across diverse publication streams, yet insufficiently developed as tightly bounded theoretical frameworks in their own right. Geng et al. (2024) [55] similarly identified sustainability as the central but theoretically diffuse anchor of contemporary tourism scholarship. "Tourism policy" and "environmental degradation" occupy adjacent positions with moderate-to-high centrality, reflecting the growing — though still insufficiently cohesive — scholarly attention to governance mechanisms and environmental consequences of tourism activity. Shahbaz et al. (2021) [42] conducted a dedicated bibliometric study on the tourism–environmental degradation nexus, confirming that environmental impact scholarship is expanding rapidly but remains fragmented across disciplinary silos. "National parks" also appears in this quadrant, consistent with a growing body of work on protected area management under climate stress. As Jeong et al. (2021) [56] demonstrated, national parks serve as critical arenas for mediating the relationship between ecological conservation and visitor behavior — yet integration of this literature with broader climate change adaptation frameworks remains incomplete. The "Paris Agreement" cluster's position in the Basic Themes quadrant is particularly noteworthy. While the 2015 Paris Agreement has established the global decarbonization imperative [7], Scott et al. (2016) [57] cautioned that tourism's declared emission reduction ambitions remain broadly compatible with but inadequately calibrated to Paris targets. Forecasts indicate that the tourism sector will experience substantial expansion, with projected growth of nearly 130% between 2005 and 2035 [37]. This trajectory is likely to outpace improvements in energy efficiency, highlighting the pressing need to elevate the Paris Agreement cluster from a basic thematic reference to a motor theme capable of shaping concrete and cross-cutting research agendas.

Themes in the lower-left quadrant are characterized by both low centrality and low density, representing

change”, “environmental impacts”, and “greenhouse gas”. This central positioning underscores the role of the sustainability–climate–environment nexus as the dominant conceptual foundation of the field. The clustering of these terms indicates a shared scholarly orientation toward emission mitigation, environmental assessment, and sustainability transitions. However, the relatively diffuse spatial spread around this core suggests that, despite high centrality, these concepts function more as integrative reference points than as tightly consolidated theoretical frameworks, highlighting an ongoing gap between impact quantification and actionable decarbonization strategies [60].

Dimension 1 (47.59%) delineates the principal conceptual divide within the literature, extending from a left-hand cluster focused on vulnerability and adaptation to a right-hand cluster centered on carbon quantification and environmental economics. On the negative pole, keywords such as “resilience”, “vulnerability”, “adaptation”, “risk assessment”, “coastal tourism”, and “stakeholder” form a dense configuration, indicating a well-established body of research that conceptualizes tourism destinations—particularly climate-sensitive ones—as socio-ecological systems exposed to compounding risks [29]. In contrast, the positive pole is characterized by “carbon emissions”, “carbon footprint”, “environmental economics”, “economic development”, and “carbon dioxide”, representing a quantitatively oriented research stream grounded in economic modeling and environmental accounting [61]. This polarity reveals a structural bifurcation between qualitative, governance-oriented adaptation studies and quantitative, macroeconomic carbon analysis.

Dimension 2 (15.35%) introduces a secondary vertical differentiation between policy–sustainability framing (upper region) and economic–degradation outcomes (lower region). The upper quadrant includes terms such as “sustainable tourism”, “environmental impacts”, “environmental impact assessment”, and “carbon footprint”, reflecting a normative and policy-driven strand of research concerned with regulatory frameworks, measurement tools, and sustainability governance. Conversely, the lower region contains “economic growth”, “environmental degradation”, “renewable energy”, and “environmental economics”, which are associated with empirical analyses of growth–environment trade-offs and decarbonization pathways. This vertical separation reinforces the distinction between solution-oriented policy discourse and outcome-oriented economic analysis.

Beyond these dominant axes, peripheral zones of the map reveal emerging and structurally disconnected research frontiers. For instance, “nature-based tourism” appears on the left periphery, relatively isolated from the central vulnerability cluster, suggesting that ecological tourism research remains insufficiently integrated into mainstream climate adaptation frameworks [59]. Similarly, clusters related to “tourism behavior”, “decision making”, and “tourism demand” occupy semi-peripheral spaces, indicating underexplored opportunities to connect behavioral insights with broader sustainability and climate governance debates.

Taken together, the MCA results highlight a field characterized by a strong central conceptual core but marked by limited integration across its two dominant research traditions: adaptation-focused, socio-ecological studies and carbon-focused, economic modeling approaches. Bridging this divide through interdisciplinary frameworks that link governance, behavioral change, and carbon accounting will be essential for advancing both the theoretical coherence and practical relevance of tourism–climate research.

4.6. Thematic Evolution and Trend Topics

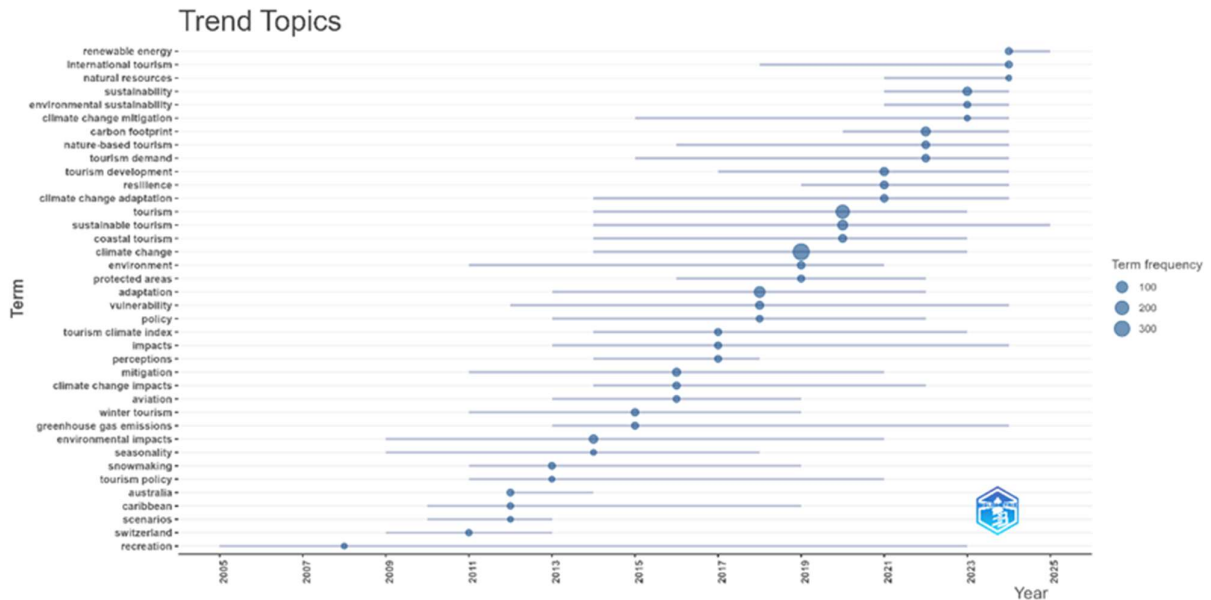
To analyze the temporal dynamics and trace the evolutionary trajectory of the research field, a Trend Topics analysis was conducted using the bibliometric framework. Figure 6 visualizes the frequency and active lifespan of prominent author keywords, effectively mapping the epistemic shifts within the tourism–environment nexus over the past two decades.

The evolutionary trajectory can be delineated into three distinct phases. In the early developmental period (pre-2015), the scholarly focus was predominantly anchored in foundational and descriptive concepts such as “geotourism,” “international tourism,” and “tourism development.” During this phase, environmental concerns were largely approached through the generalized lens of “environmental impacts,” reflecting a period where research was focused on identifying broader ecological consequences rather than deploying targeted, systemic

assessments. A critical transitional phase occurred between 2015 and 2019, catalyzed by global governance milestones such as the 2015 Paris Agreement and the Sustainable Development Goals (SDGs). The scholarly discourse rapidly consolidated around macro-paradigms, evidenced by the soaring frequency and central positioning of large nodes for "climate change," "sustainable tourism," and "vulnerability." This period marks the field's conceptual maturation, wherein climate change shifted from a peripheral environmental concern to the undisputed organizing master-concept of tourism scholarship [15].

Figure 6: Trend topics

The most recent phase (post-2020 to present) illustrates a definitive paradigm shift toward methodological precision, macroeconomic analysis, and actionable governance. Recent trend lines are dominated by specific, measurement-oriented terms such as "carbon footprint," "carbon emission," and "environmental degradation," alongside policy-driven concepts like "renewable energy" and "tourism policy." This contemporary clustering indicates that researchers are increasingly moving beyond normative sustainability debates to interrogate the



rigorous quantification of tourism's ecological burden and to explore tangible decarbonization pathways [60]. Furthermore, the prominent emergence of "economic growth" alongside these environmental metrics underscores an intensifying scholarly effort to resolve the inherent tension between tourism-led economic expansion and carbon-intensive trajectories [16].

Taken together, the temporal analysis reveals a field that has progressively matured: evolving from descriptive conceptualizations of nature-based tourism toward a highly technical, policy-oriented discipline focused on rigorous carbon accounting, energy transitions, and systemic climate resilience.

5. CONCLUSION

This study presents the first comprehensive bibliometric analysis of the tourism–environment–climate change nexus drawing on 706 Scopus-indexed documents published across 265 journals between 2000 and 2026. By integrating co-occurrence network analysis, strategic thematic mapping, Multiple Correspondence Analysis, and trend topic visualization within a unified analytical framework, the study offers a multi-layered account of the field's structural organization, conceptual evolution, and knowledge gaps.

Three principal contributions distinguish this work from prior reviews. First, the convergent application of Callon-based thematic mapping and MCA-based conceptual structure analysis enables both the macro-level identification of thematic quadrant positions and the micro-level resolution of intra-cluster conceptual distances — a methodological pairing that reveals the field's bifurcated epistemic architecture with greater precision than either technique achieves in isolation. Second, the temporal trend analysis documents a definitive three-phase developmental trajectory that reframes the field's evolution as a progression from environmental impact

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documentation, through governance framing, to quantitative decarbonization analysis — a trajectory that simultaneously creates intellectual momentum and exposes new conceptual lacunae. Third, the explicit identification of absent but structurally necessary research themes — including "artificial intelligence," "climate justice," "degrowth," "sustainable aviation fuel," and "digital twin" — provides a concrete and actionable frontier map for the field's next scholarly generation.

On the basis of the foregoing analysis, five interconnected strategic research directions are proposed to guide the field's next developmental phase. The first and most immediately urgent direction concerns the integration of artificial intelligence and machine learning into tourism climate research. Despite the demonstrated potential of AI for optimizing energy consumption at the destination scale, modeling nonlinear climate–demand interactions under multiple warming scenarios, and generating precision carbon accounting at the firm and sector levels [62], these methodologies remain virtually absent from the field's keyword landscape. Future studies should develop AI-assisted frameworks for real-time, destination-scale carbon monitoring that can be directly embedded into tourism governance systems, thereby bridging the longstanding gap between technical carbon accounting and operational destination management. The second direction addresses the field's most consequential equity deficit: the absence of climate justice and distributional frameworks. Tourism's carbon emissions are overwhelmingly generated in wealthy, high-consumption nations, yet the severest climate impacts are borne disproportionately by low-income, tourism-dependent communities in the Global South and Small Island Developing States (SIDS) — a structural injustice that the dominant bibliometric discourse has systematically failed to interrogate [63]. Future research must examine how policy instruments including carbon taxes, emission trading schemes, and sustainable aviation fuel mandates interact with the asymmetric vulnerabilities of destination communities, and must reposition equity and recognition-based justice as analytical first principles rather than peripheral considerations. The third direction concerns the operationalization of the Paris Agreement at the destination scale. While the Agreement constitutes the legally binding framework within which all sectoral decarbonization must be calibrated, the thematic map demonstrates that it has functioned in the literature as a normative reference point rather than a structuring variable for empirical research design. A concerted scholarly effort is needed to translate Paris-aligned emission budgets into measurable, destination-specific decarbonization pathways that integrate multi-stakeholder governance models with quantitative carbon neutrality frameworks [17]. Critically, this must include the formal embedding of environmental impact assessment (EIA) and carbon footprint methodologies into statutory destination management planning — moving these tools from the Niche quadrant of the thematic map toward the field's operational core. The fourth direction targets the most carbon-intensive and policy-active dimension of tourism's ecological footprint: aviation decarbonization and demand-side governance. Aviation represents one of the largest sources of emissions in the tourism sector, while sustainable aviation fuel (SAF) is widely regarded as a key pathway toward achieving long-term aviation decarbonization and net-zero emission goals [17]. Yet SAF, carbon taxation of aviation consumption, and related regulatory instruments such as the EU's ReFuelEU Aviation mandate are entirely absent from the tourism–climate keyword landscape [64]. Future research should examine the behavioral, economic, and competitive dynamics through which SAF mandates, carbon taxes, and socially driven demand-reduction movements (such as "flight shame") reshape tourist mobility patterns and destination attractiveness — generating the applied, policy-calibrated knowledge that the sector's decarbonization governance urgently requires. The fifth and most structurally challenging direction concerns the scholarly legitimization of degrowth, post-growth, and alternative mobility paradigms. The evidence now firmly establishes that tourism's carbon intensity grew approximately 2.3 times faster than the global economy between 2009 and 2019, and that incremental technological efficiency improvements are systemically insufficient to reconcile the sector's growth trajectory with Paris-aligned targets [28]. This fundamental incompatibility demands that future research move beyond the techno-optimist premises that have dominated the field's mitigation discourse and engage seriously with governance mechanisms, behavioral frameworks, and political economy conditions under which degrowth-oriented tourism policy could be designed and implemented without disproportionately harming the tourism-dependent economies of the Global South [65]. Complementing this direction, emerging modalities such as virtual and digitally mediated tourism — which have the potential to decouple cultural and experiential value from high-carbon physical mobility — represent an underexplored frontier that warrants systematic empirical and ethical scrutiny [66]. Taken together, these five directions define a coherent and mutually reinforcing research agenda. Progress across them will require the formation of genuinely interdisciplinary research teams capable of bridging ecological economics, behavioral science, governance studies, computer science, and development studies — and an explicit commitment to producing knowledge that is not only analytically rigorous but also equitable in its distributional assumptions and actionable in its policy implications.

Several limitations attend the present study. The exclusive use of the Scopus database, while methodologically defensible, may underrepresent grey literature, book chapters, and publications in non-English languages that constitute a meaningful proportion of knowledge production in the Global South. The bibliometric approach, by design, captures documented scholarly discourse rather than practitioner knowledge or policy intelligence — modes of knowing that are increasingly recognized as essential for co-producing climate-resilient tourism futures. Additionally, keyword-based analysis is subject to terminological inconsistency across publications, as conceptually related themes may be indexed under divergent terms, potentially underestimating thematic connections. Future research should complement bibliometric mapping with systematic qualitative review and practitioner stakeholder analysis to triangulate the knowledge gaps identified here.

The tourism–climate change research field stands at a consequential inflection point. Twenty-six years of cumulative scholarship have established a robust conceptual vocabulary and identified the field's principal thematic axes. Yet the structural bifurcation between adaptation-focused governance research and carbon-focused economic analysis, combined with the conspicuous absence of artificial intelligence, climate justice, degrowth, and aviation-specific decarbonization discourses, signals that the field's theoretical architecture has not kept pace with the scale and urgency of the crisis it seeks to address. Bridging this gap — through interdisciplinary synthesis, equity-sensitive frameworks, and the integration of emerging technological and policy instruments — is not merely an academic exercise; it is a prerequisite for producing the actionable knowledge that tourism stakeholders, destination managers, and policymakers urgently require to navigate the transition to a climate-compatible tourism economy.

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