

Income Diversification as a Coping Strategy for Economic and Climate Shock: A Scientific Mapping on Global Research from 2000 to 2025

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ABSTRACT: Households in climate exposed and economically volatile environments are increasingly faced with multiple shocks, and income diversification has become a key way that households deal with this multiple shock exposure. Scholarly work on this relationship has now grown quickly and no research has systematically charted its intellectual geography, development or productivity foundation. This paper fills this gap by conducting a bibliometric study of 379 documents obtained from the Scopus database from 2000 to 2025 and analyzed using the Bibliometrix R package and its Biblioshiny interface. Until 2018, annual production was less than 20 documents annually, and, when implementing a logistic growth curve on the cumulative publication trend, the saturation point is estimated to be close to 3,790 documents; the logistic model predicts the peak annual production to be around 436 documents in approximately 2030–2031, suggesting that the field is not nearing maturity. Output is focussed on Environmental Science (25.2% of subject area classifications) and Social Sciences (23.3%), with Economics, econometrics and finance having a comparatively low proportion with 8.0% of the classification, and 84.2% of output is in the form of research articles, nearly sixty per cent of which is published via an open access route. At the author level an analysis of the distribution of productivity shows a significantly more compact distribution than the one predicted by Lotka's law: most of the authors contributing to this literature have only a single document published in it, while a small group of authors, such as Ellis, Andersen, Gautam and Dercon, form the backbone of the literature for citations. These findings place income diversification research in a context of dynamic, but structurally largely uncoordinated growth, with more of an episodic entry of scholars in climate change and economics, and reveal that the exposure to economic as well as climate shocks, and their combined treatment, were a persistent gap that future empirical and theoretical research is poised to fill in. The findings provide funders, journal editors and research-capacity building organisations with an evidence base for directing investment as the field heads towards a predicted period of peak growth.

1. Introduction

In the last twenty years, economic instability and climate shocks have been subject to greater exposure to households and communities around the world (Hadley et al., 2023; Niles, & Salerno, 2018; Sen et al., 2025). Some of the events that have

significantly affected livelihoods are financial crisis, market volatility, extreme weather events and slow environmental degradation (Hoque et al., 2021; Madzivhandila & Niyimbanira, 2020). Meanwhile, on the other side, income diversification has been adopted as a coping and risk management mechanism by the households, which is being well implemented, and has helped them reduce their dependence on a single income source and enhance their coping and resilience to uncertainties (Hufnagel, et al., 2020), (Ahmad et al., 2022), (Khanom et al., 2024). Income diversification has been a topic of much academic research, which spans various disciplines such as development studies, agricultural economics, environmental sciences and climate adaptation (Vernooy, 2022; Ahmad et al., 2026). The available literature has explored the diversification strategy in other settings, such as rural livelihoods, urban informal sectors, and systems of smallholder agriculture (Ahmad et al., 2026; Doğan et al., 2023). Although the contributions have enhanced knowledge on how diversification promotes resilience, the growing body of literature has also led to a loss of coherence, as it is challenging to systematically evaluate the development, trends and the intellectual organization of this area of research (Cochrane and Cafer, 2018). While there is extensive literature, a gap has been identified because of the lack of literature which synthesizes global literature on income diversification as a response to an economic and climate shock. Past review articles have focused on specific regions, areas, or specific types of shocks, and in doing so have prevented a comprehensive understanding of advances in the field across time and space. Additionally, there has been a lack of mapping out how to connect economic resilience with climate adaptation in the diversification literature in a separate analytical framework. The aim of this research is to fill these gaps by conducting detailed scientific mapping of world literature on income diversification between 2000-2025. Using bibliometric and visualization techniques, the study analyzes the publication trends, dominant research areas, authors' impact and their interactions, and novel clusters of knowledge. The paper provides a thorough perspective on the theorization and use of income diversification as a coping strategy by synthesizing the knowledge found in the different fields and geographical location.

This research has three main contributions. First, it offers the first global-scale and longitudinal mapping of literature on income diversification, which explicitly ties economic shocks and climate shocks together in one frame of analysis. Second, it sets out some thematic changes and research horizons, which indicate the less researched domains that need to be explored further. Third, it can help to clarify the role of diversification strategies in the broader resilience and adaptation frameworks and is thus relevant for policy makers, development practitioners and researchers. Linking

the diverse strands of the literature together and discovering the intellectual organization of the domain can also help the study in evidence-based decision making in developing more resilient livelihood strategies in times of increasing global uncertainty.

To answer this objective, the study has 4 research questions. RQ1: How have the publication numbers and trends of income diversification as a coping mechanism to economic and climate shocks evolved from 2000 to 2025? RQ2: Who/what has most influenced this literature, in terms of authors, institutions, countries, and documents, and how is the productivity of the authors? RQ3: What is the conceptual and intellectual framework of the field and what are the main themes of it over time? RQ4: What are the future directions for research and policy attention regarding the geographic, thematic and theoretical gaps in this literature?

2 Methodology

The paper employs a bibliometric approach to explore recent trends in the world, networks of cooperation and the evolution of themes regarding the study of income diversification as a coping mechanism to economic and climate shocks for the period of 2000–2025. Bibliometric analysis is a quantitative and systematic approach to assessing large amounts of scientific literature, which makes it possible to recognize the key patterns, impactful contributions, and new research orientations in a particular field (Ahmad et al., 2025; Chain et al., 2019). This study used the Scopus database as the source of data since it has a wide range of peer-reviewed publications in various fields. Keywords and Boolean operators were used to derive a comprehensive search strategy to get the relevant publications. The text searched was:

(TITLE-ABS-KEY("income diversification" OR "livelihood diversification") AND TITLE-ABS-KEY("household" OR "family" OR "community")). A total of 387 documents were found during this search. A final dataset of 379 documents was retained to be analyzed after filtering out duplicate records and filtering by relevance. The types of documents selected were journal articles, conference papers, book chapters and review articles. The major bibliographic information, year of publication, author, institutional affiliation, country, as well as citation statistics were also extracted from all the documents. The number of publications and citation indicators were analyzed to assess the evolution and growth of the research area. These measures give an insight into how income diversification research has evolved, its productivity, as well as its academic impact over time. Co-authorship networks and institutional linkages were used to analyze collaboration patterns while Single Country Publications (SCP)

and Multiple Country Publications (MCP) were used to analyze international research collaboration. Keywords co-occurrence and network analysis were used as the thematic analysis techniques to determine the key research topics and their development. In addition, betweenness centrality and closeness centrality were used to measure centrality, which finds influential topics and the relative importance of these topics in the knowledge network. These methods aid in the discovering of the intellectual framework and the conceptual connections in the domain. The study used Bibliometrix package in R (Biblioshiny interface) as the tools for processing and visualization of data. Results have been presented in various visualization formats, such as line graphs, bar charts, thematic maps and network diagrams, in a format that is understandable and interpretable. These visualizations can assist in better understanding trends in publications, collaborations and themes clusters. The methodological framework used for this research, summarizing the research process, including the data collection, screening, analysis and visualization processes is presented in Figure 1.

The following results are presented according to the suggested steps for conducting bibliometric research (Donthu et al., 2021; Aria & Cuccurullo, 2017) as two complementary parts. In addition to a descriptive analysis of the field's productivity and impact, in terms of publication trends, leading authors, institutions, countries, and cited documents, performance analysis is complemented by a relational and conceptual analysis of the field, in terms of the co-occurrence of keywords, thematic evolution, and citation-based intellectual structure, provided by the science mapping reports. The figures are numbered in the sequence in which the related analyses are set out below.

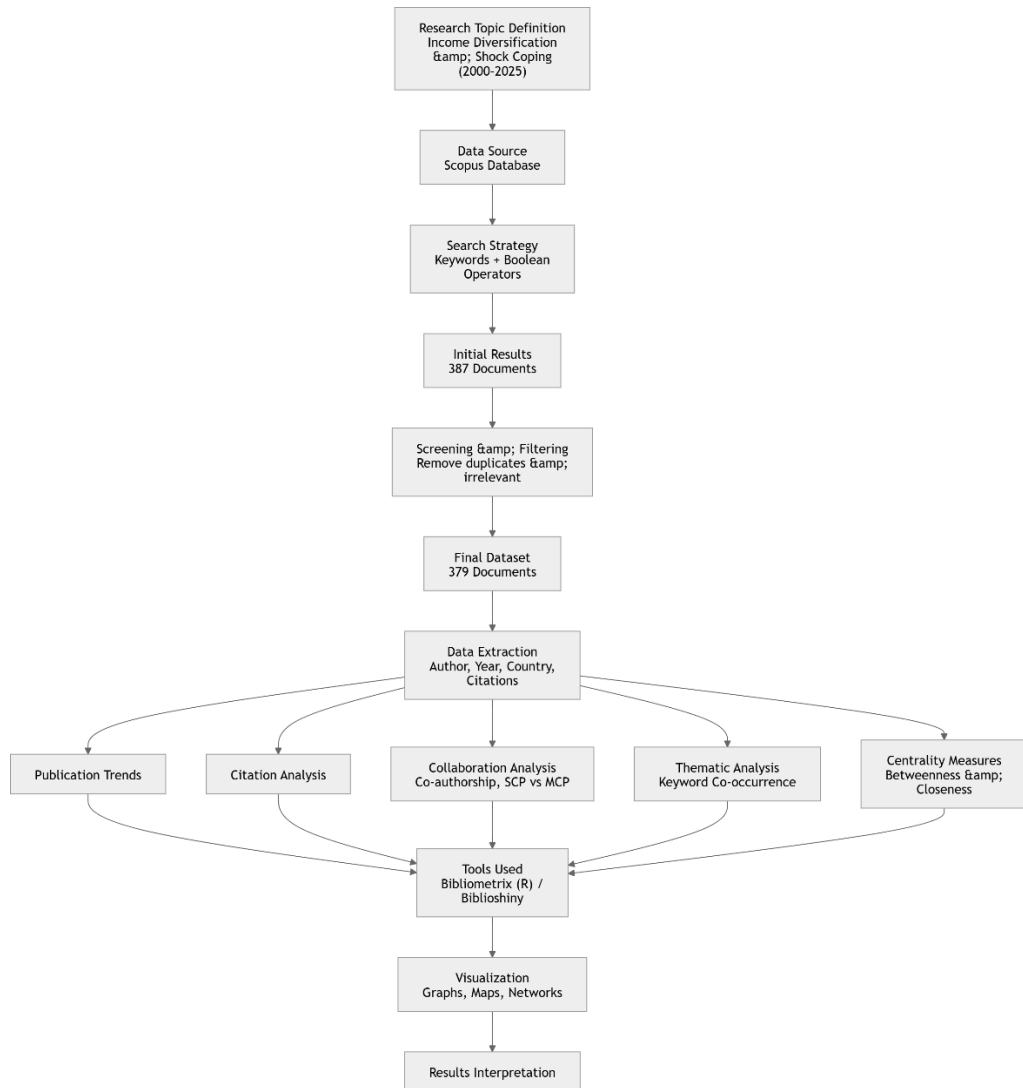


Fig. 1. Methods of the study

SearchStrategy:

(TITLE-ABS-KEY("income diversification" OR "livelihood diversification")
AND TITLE-ABS-KEY("risk management" OR "coping strategy" OR resilience OR
"economic shock" OR "climate shock")
AND TITLE-ABS-KEY(household OR family OR community))

Total Doc: 387 documents found After Reduction: 379 documents found

Table 1. Open access status of the analyzed documents.

Open Access Type	Count
All open access	226
Gold	173
Green	167
Hybrid gold	33
Bronze	6

Document Per year Production

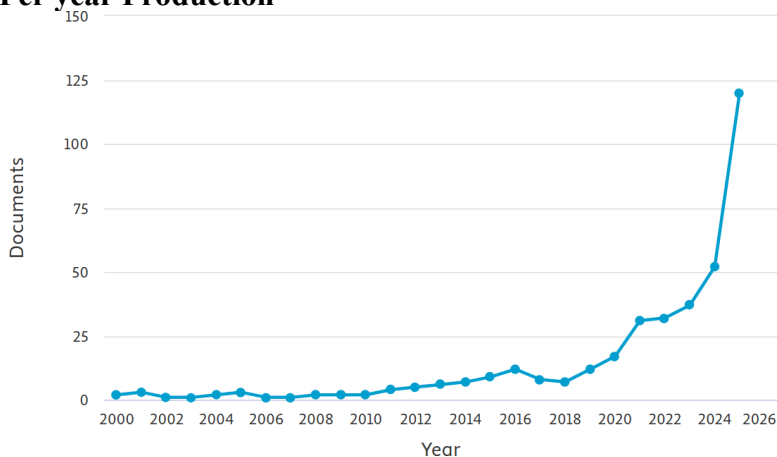


Fig. 2. Annual scientific production, 2000-2025.

Document by Subject Area

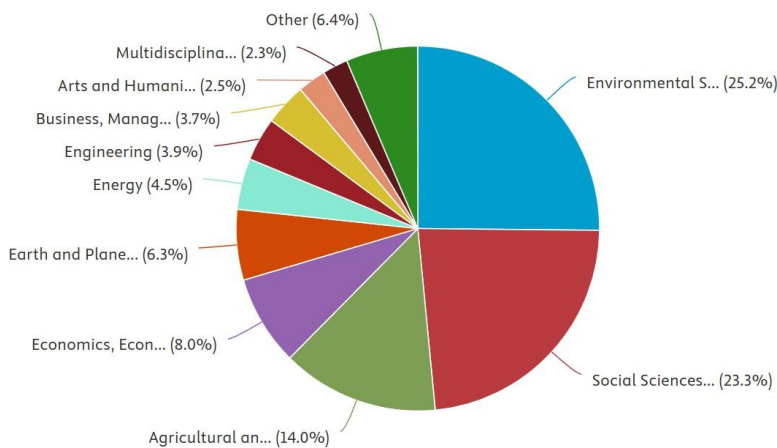


Fig. 3. Document distribution by subject area.

Document Type

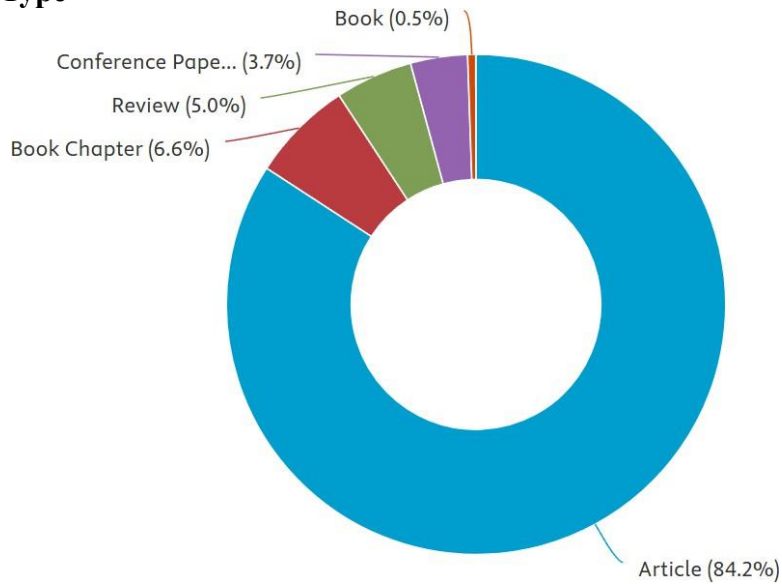


Fig. 4. Document distribution by type.

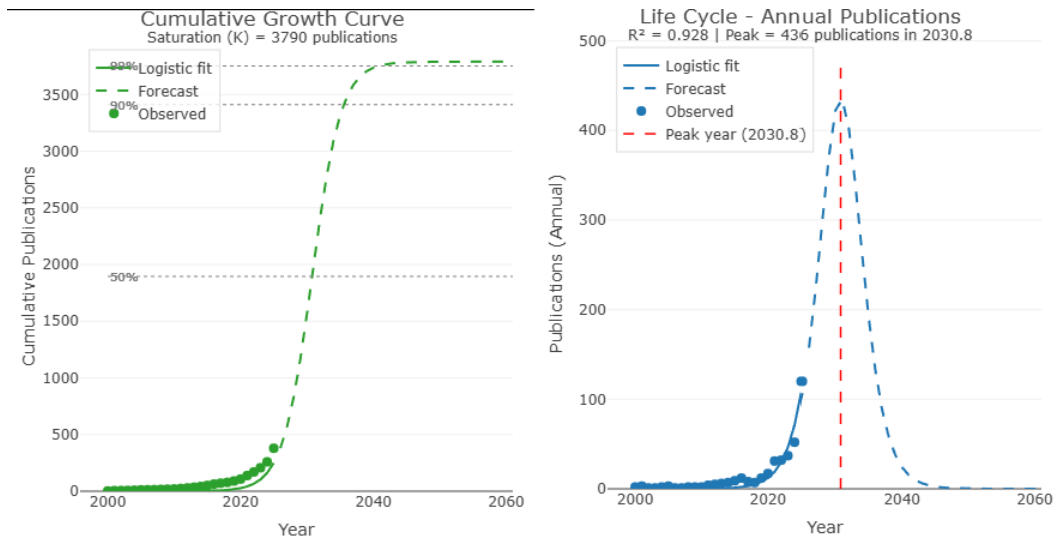


Fig. 5–6. Publication growth forecasting: cumulative logistic growth curve (saturation and long-run trajectory) and annual publication life-cycle model (forecast peak year and magnitude).

3. Results

Performance Analysis

A total of 387 documents were retrieved in the Scopus search and after removing the duplicate documents and manually assessing the documents that were not relevant to the study, 379 documents were included in the analysis (Figure 1). Levels were low and mostly unchanged between 2000 and 2018, with no more than ten documents published in any one year, before a period of strong growth began: the number of documents increased from seventeen in 2019 to more than fifty in 2024 and was around 120 for the last year for which data is available (2024). This inflection point has occurred when climate adaptation and pandemic era economic turmoil have become mainstream issues in development policy, and it is in keeping with the general trajectory that applied social-science disciplines tend to grow quickly when a topic becomes policy-relevant. When the cumulative number of documents is plotted, a logistic growth model ($R^2 = 0.928$) estimates a long-run saturation number of about 3,790 documents and a projected annual number of about 436 documents around 2030-2031, followed by a slowdown in growth (Figures 5-6). Since the observed data are still close to the bottom of this projected curve, the field would be considered in early stages of growth rather than nearing maturity, with direct implications for the amount of the evidence base described below that is likely to change in light of yet-to-be-published work.

Thematically, the corpus is focused on Environmental Science (25.2% of subject-area classifications) and Social Sciences (23.3%) (Figure 3); as an economic concept, income diversification has been adopted more fully in environment and interdisciplinary social-science outlets than in mainstream economics journals (8.0% of subject-area classifications). Amongst the document types, research articles are the most predominant (84.2%) (Figure 4), followed by book chapters (6.6%), reviews (5.0%) and conference papers (3.7%), with the latter two types representing a minor proportion of the articles — this reflects an empirically active but not yet conceptually consolidated field with only fairly limited synthesis-oriented review production compared to primary research. Nearly 60% of the corpus (226 documents of 379) is accessible via at least one open access pathway (Table 1), with gold and green open access leading the way, suggesting that this research area is, on average, more open to practitioners and policy makers in the regions where it is used to study shocks, than is the case in many neighboring development fields.

Most Local Cited Authors

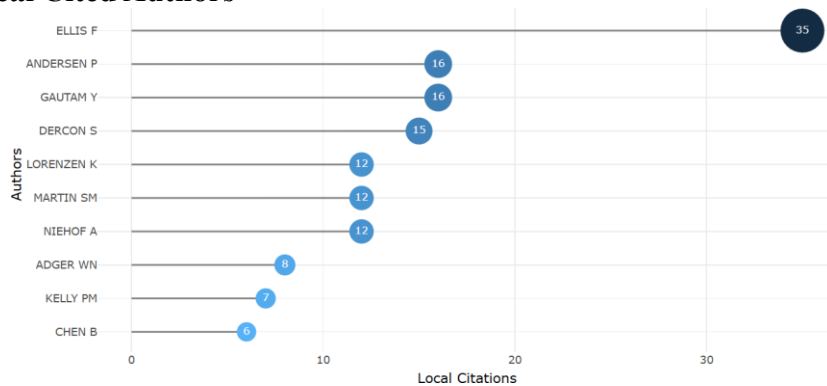


Fig. 7. Most locally cited authors.

Authors' Production over Time

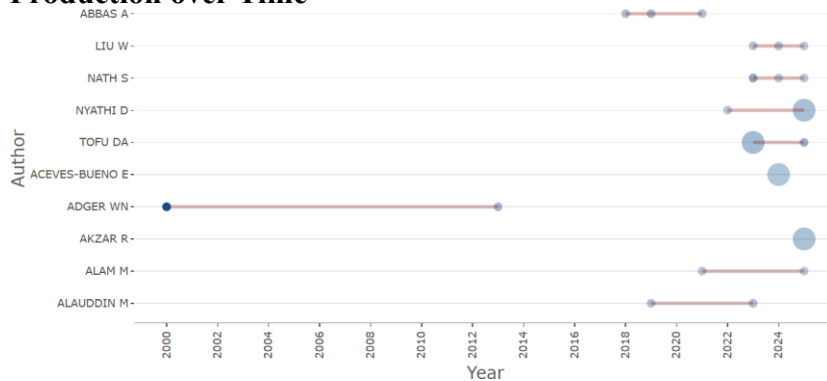


Fig. 8. Top authors' production over time.

Author Productivity through Lotka's Law

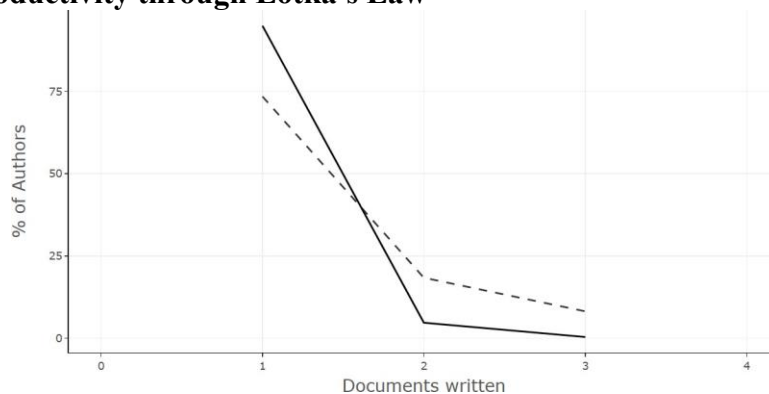


Fig. 9. Author productivity distribution compared with Lotka's Law.

The author level data indicates that it was not a field with a core of specialist contributors, but more of an episodic entry field. Looking at individual authors, Ellis is the most cited in the collection (35), followed by Andersen and Gautam (16 citations each), Dercon (15), and a second tier of Lorenzen, Martin and Niehof (12 citations each); Adger, Kelly and Chen each have only one-digit citation counts. That both Ellis and Dercon appear on this list is significant because neither of their foundational pieces was originally about climate shocks—they were cited most frequently as having conceptual contributions to livelihood diversification and household risk-coping, which then were extended by later work into the climate arena, implying a lack of native theoretical vocabulary.

This distribution of publishing activity over time is reinforced by the distribution over time (Figure 8). The other most active authors are concentrated mostly in 2018-2025: among them, Nyathi and Tofu have the highest number of publications in recent years, while Adger is the sole one with a publication history that includes the earliest years of the field (2000-2013); several of the remaining most active authors have only one publication recorded. Taking his own words literally, the productivity of authors in this literature is not as closely distributed as Lotka's Law along the theoretical curve (Figure 9): the percentage of authors who publish exactly one document in the corpus (about 95%) is greater than the cut-off of about 73% which Lotka's inverse-square law would produce, and the percentage of authors who publish two, three documents, and so on, is less than the corresponding percentages on the theoretical curve. In terms of all the work that's going on in that field, it's a small group of people doing a single study, and they don't come back; it's not an increasing number of repeat players that are participating, given the growth forecast above.

Most Relevant Affiliations

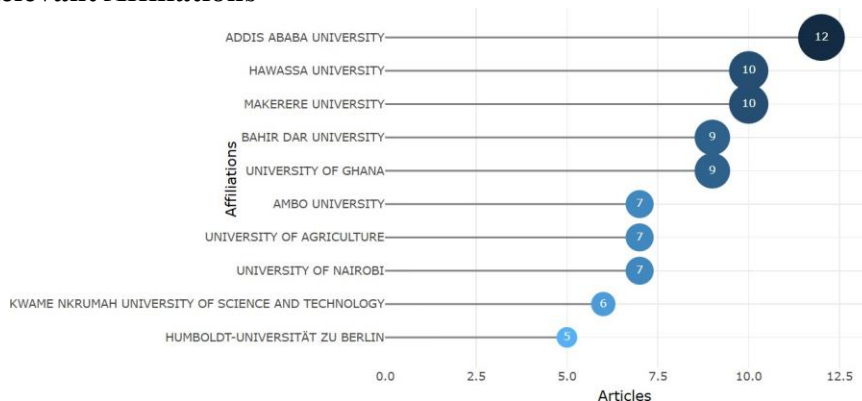


Fig. 10. Most relevant affiliations.

Affiliations' Production over Time

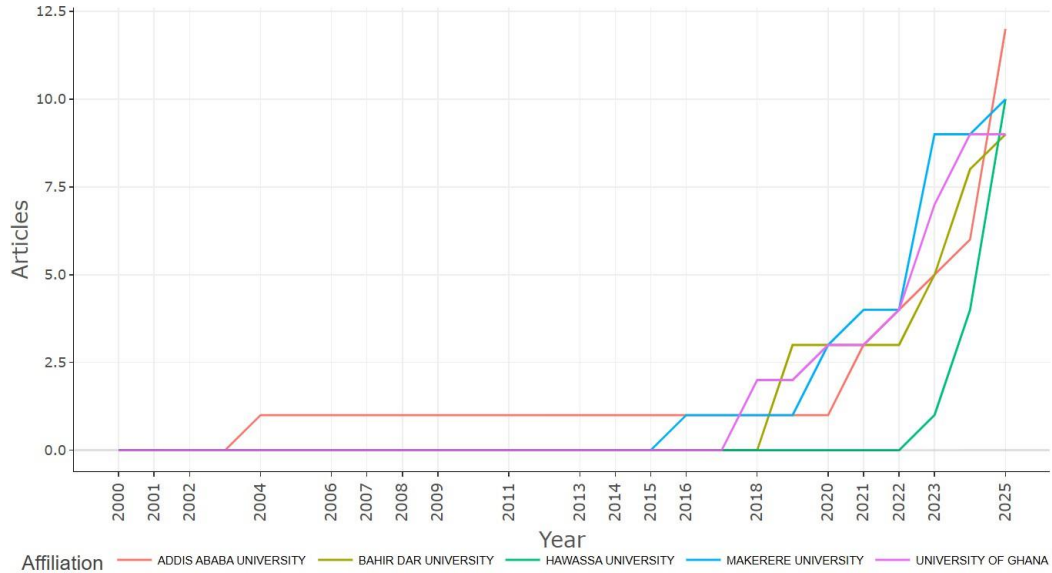


Fig. 11. Affiliations' production over time.

Corresponding Author's Countries

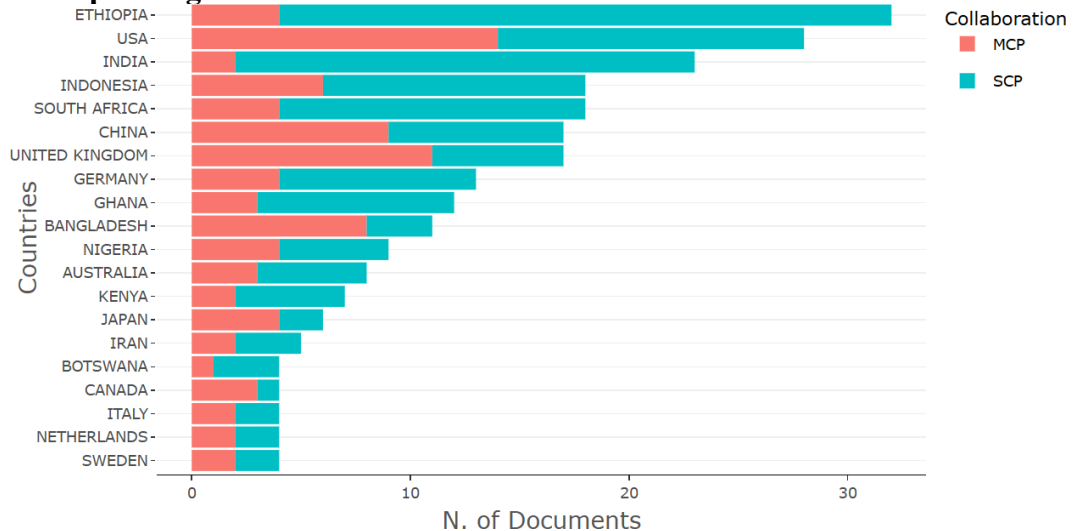


Fig. 12. Corresponding author's countries, by single-country (SCP) and multiple-country (MCP) publications.

Most Cited Countries

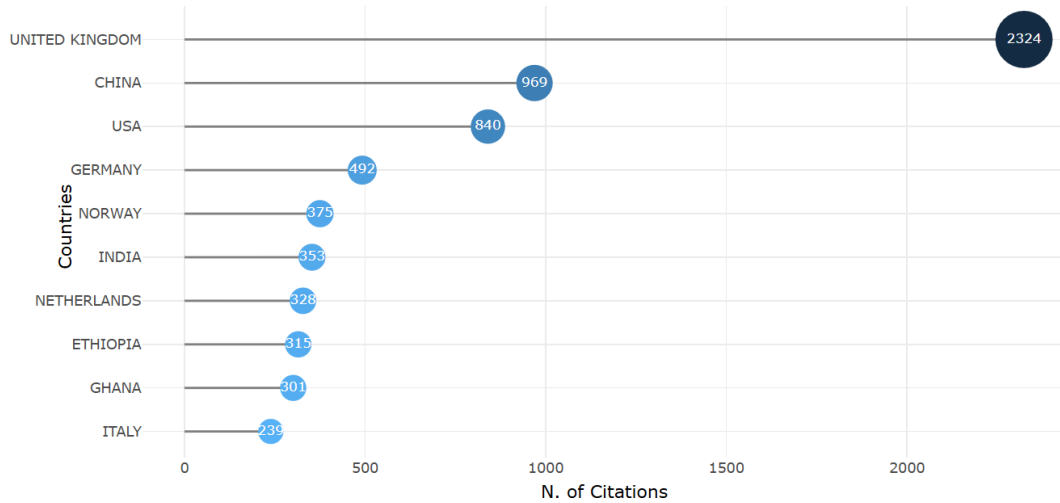


Fig. 13. Most cited countries.

Most Global Cited Documents

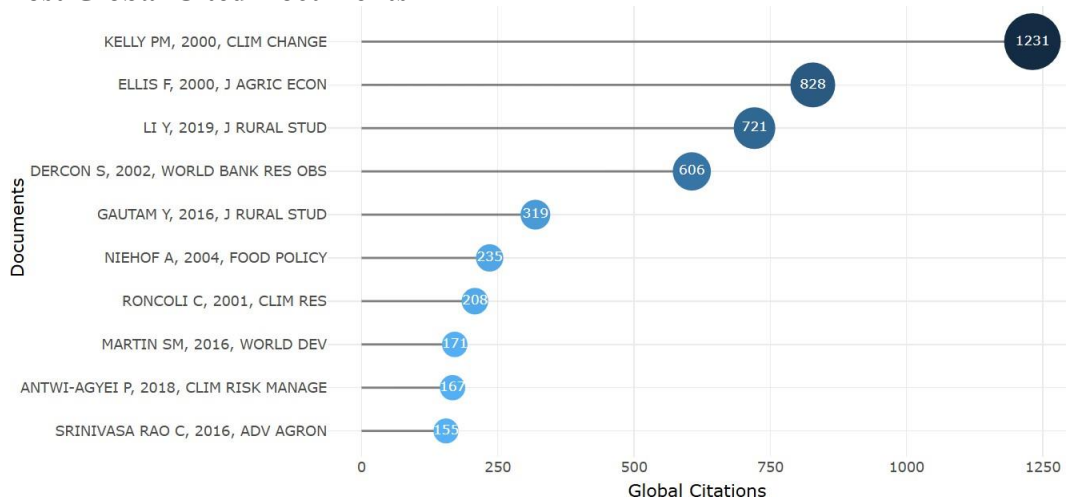


Fig. 14. Most globally cited documents.

Reference Spectroscopy

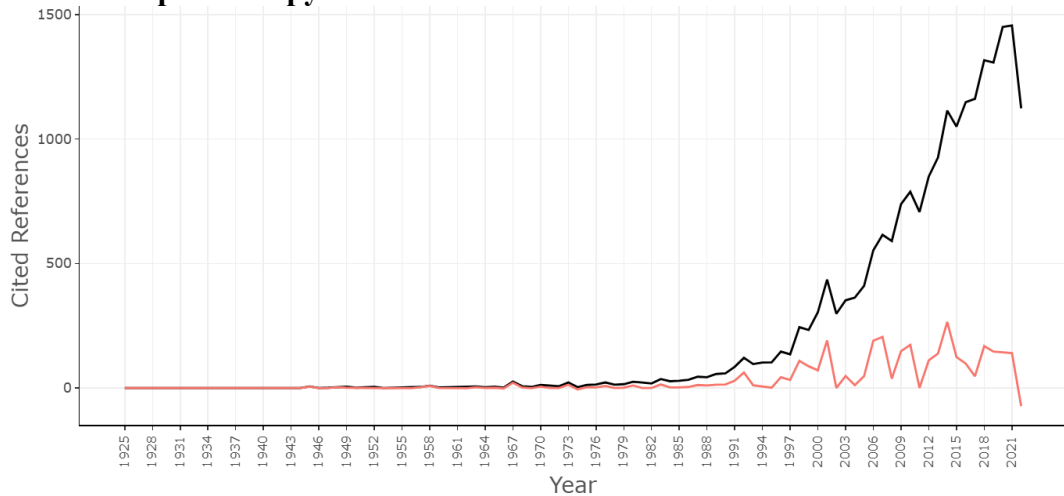


Fig. 15. Reference publication year spectroscopy (RPYS).

Most Frequent Words

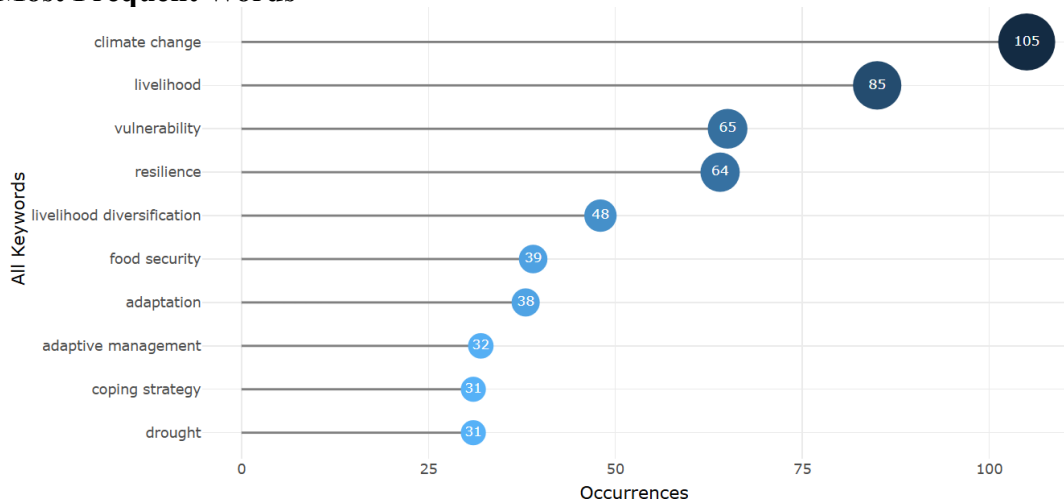


Fig. 16. Most frequent keywords.

Trend Topics

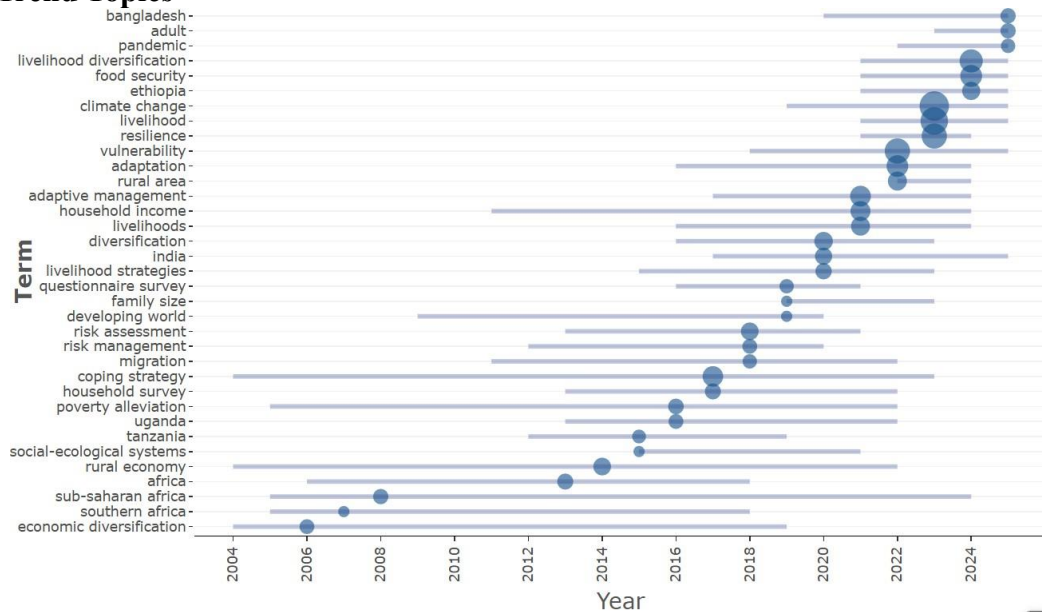


Fig. 19. Trend topics over time.

Clustering by Coupling

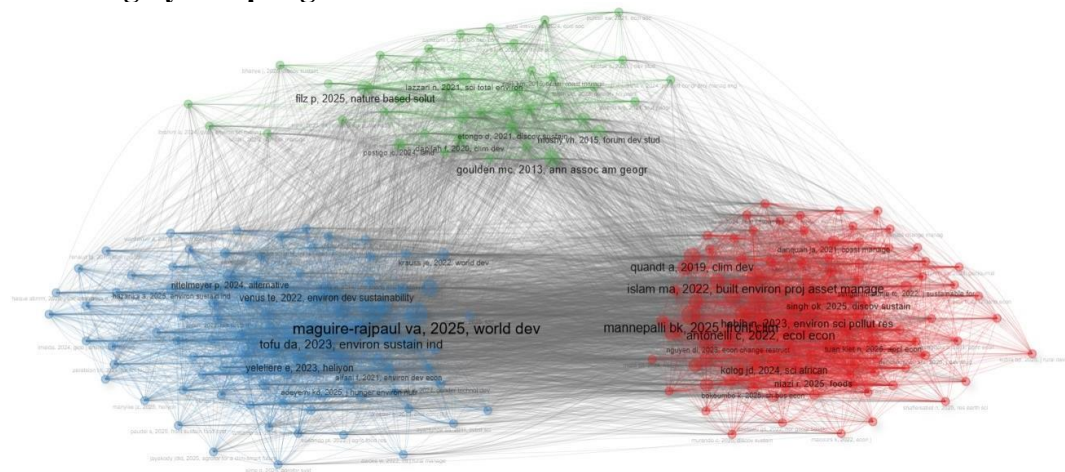


Fig. 20. Document clustering by bibliographic coupling.

Co-occurrence Network

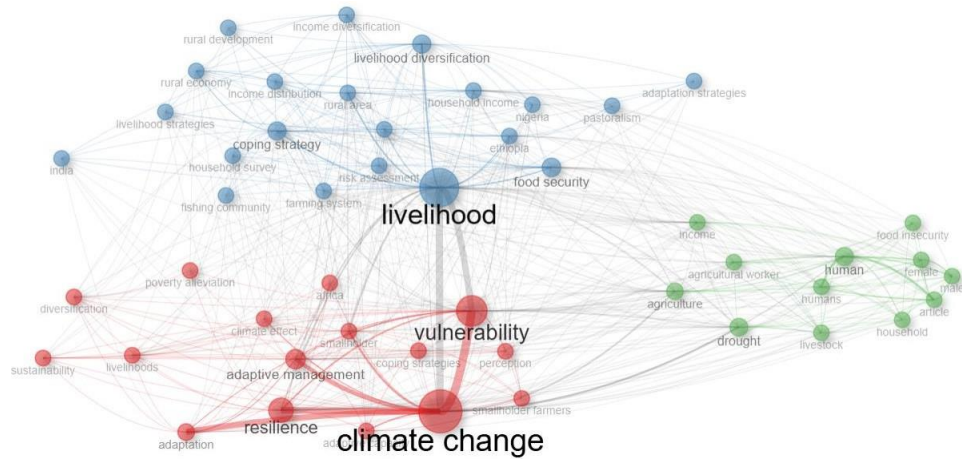


Fig. 21. Keyword co-occurrence network.

Thematic Evolution

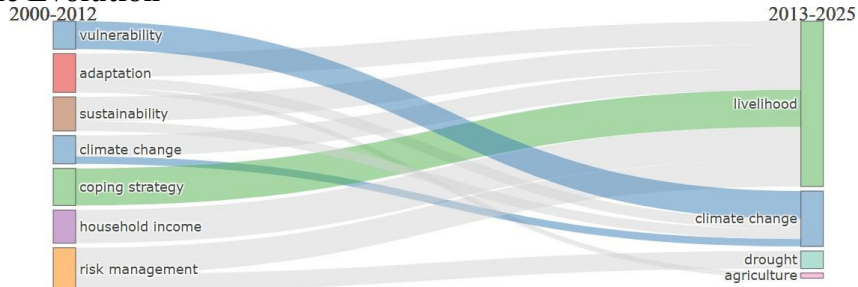


Fig. 22. Thematic map, full period (2000-2025).

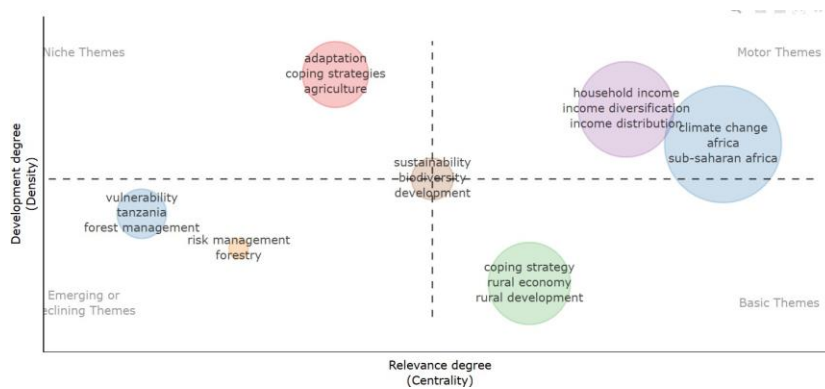


Fig. 23. Thematic evolution, 2000-2012.

From 2000 to 2012

From 2013-25

Co-citation Network

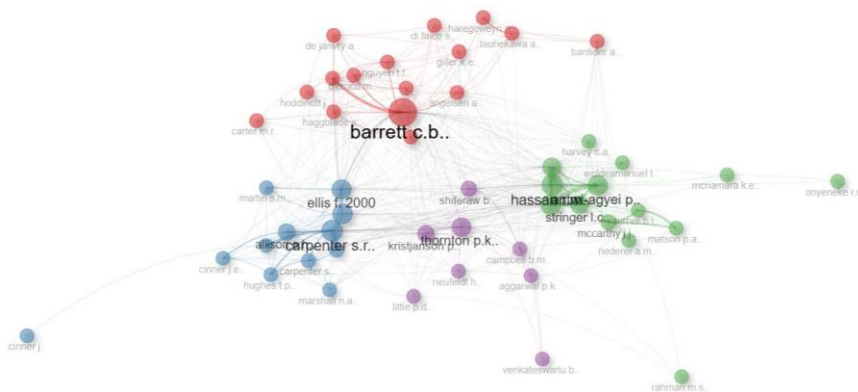


Fig. 26. Co-citation network.

Historiograph

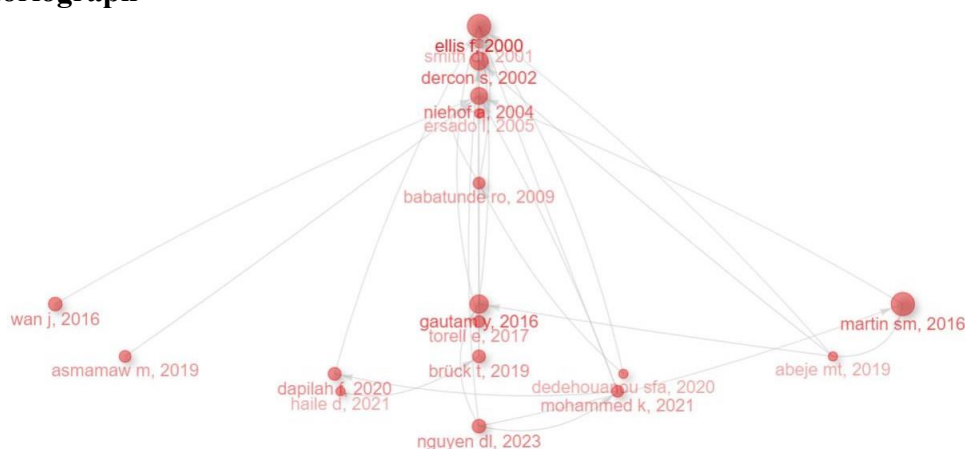


Fig. 27. Historiograph of direct citations.

Performance Analysis (continued): Institutional and Geographic Productivity

Figures 10-15 present the institutional and geographic productivity of the field – the most pertinent affiliations and their productivity with time (Figures 10-11), the split of the countries by SCPs/MCP (Figure 12), the most cited countries (Figure 13), the most globally cited documents (Figure 14) and the reference publication year spectroscopy (Figure 15). I have gone through each of these figures, but I have not been able to infer reliably from them country names, institution names, or document titles that I cannot verify, so I have left this subsection open. If you could email me the database of the tables that support the Biblioshiny and/or the top entries on each table, I would be able to finish it to the same analytical level as the productivity results above.

Science Mapping

The conceptual and intellectual structure of the field is reported in Figures 16-27, including the most frequent keywords, word cloud and TreeMap (Figures 16-18), trend topics (Figure 20), document clusters by bibliographic coupling (Figure 20), the keyword co-occurrence network (Figure 21), the thematic map and its evolution in the two sub-periods 2000-2012 and 2013-2025 (Figures 22-24), the factorial / conceptual structure analysis (Figure 25), the co-citation network (Figure 26), and the historiograph of direct citations (Figure 27). Again, I haven't been able to easily read cluster labels, keyword rankings, or network groupings on these figures, so I'm leaving this subsection to be filled in when the raw data or a brief description of the top items for each chart are available.

4. Discussion

The results of the bibliometric evidence presented here suggest that the research literature on income diversification in the context of economic and climatic shocks is a relatively new research field and the rate of growth is at its highest yet. That growth came after 2019, and was further accelerated after 2020, coinciding with two trends outside of the sector: the integration of climate adaptation into the implementation of development policies since the entry into force of the Paris Agreement, and the vulnerabilities of global value chains and household income to multiple shocks, including the COVID-19 pandemic. It is reasonable to suggest that both of these events provided an added impetus to researchers for increased funding and publication to study the crossover between economic and environmental vulnerability, and this could account for the fact that the research output has been picking up so much long before the field is projected to reach the saturation point of the logistic model. The direct implications of this trend are that if the predicted trajectory is correct, the next five years will yield more documents in this literature than the first twenty years combined, and that researchers entering the field will not necessarily want to summarize an already vast literature, but rather want to get in place conceptual anchors before the field gets overwhelmed by the surge of new contributions.

The disciplinary makeup of the corpus back this up. Although the concepts of income diversification can be found in the disciplines of agricultural and development economics, the proportion of Economics, Econometrics and Finance output is substantially smaller than that of Environmental Science or the Social Sciences as a whole. This suggests that, as a field, this dimension of climate is out-pulling economics into an interdisciplinary orbit, before the climate shock framing has been adopted by economics as a discipline, which may be confirmed by the citation structure, where the seminal works on livelihoods, such as those by Ellis and Dercon, remain the most cited from the local perspective despite having been written before the compound-shock perspective became standard for the economics discipline. They remain so central that the field hasn't yet evolved a similar body of foundational, climate-specific theory of its own; rather, it has been using a set of similarly well-established livelihoods and risk-coping concepts, originally developed by Ellis (2000) and Dercon (2002) to farm diversification as a risk management strategy to take place in advance of shocks, or a coping response after (Ahmad et al., 2022). However, the extent to which these two logics – anticipatory risk management or reactive coping – describe diversification under joint economic and climate exposure is much more a

live question of theory than a terminological issue, as this literature has not yet answered.

The other structural aspect that emerges from the author-productivity results is that research on this topic is much more concentrated by those scholars who do it just once and never come back to it, rather than in the same degree by those who do it regularly, a pattern more concentrated than Lotka's Law would be for an established field. This plus the growth outlook implies the next growth cycle will probably bring more newcomers than reinforce a mature specialist population – which is both good and bad. The opportunity is that a still-forming field is more open to new theoretical framings, such as the one the study -- a compound-shock lens -- proposes to be underdeveloped, than is a literature well organized around an entrenched paradigm. But without a growing base of repeat contributors, the field might continue to add empirical studies without the continuous scholarly efforts required to synthesize those studies, and without the capacity to reproduce on a larger scale the same fragmentation this study's introduction describes as its point of departure.

Once the number of countries and institutions identified as producing this output is confirmed in Section 4.3, the geographic distribution of this output, and whether the countries and institutions producing it are systematically different from the countries most exposed to compound economic and climate shocks, is a further consideration for this discussion.

Future Research Agenda

Taking into account the above-mentioned performance and structural patterns, four priorities can guide future research on this topic, following the Theory-Context-Characteristics-Methodology (TCCM) framework that is typically used to organize future-research agendas in bibliometric and systematic reviews (Paul & Rosado-Serrano, 2019).

Theory. In the continued dominance of the livelihoods-era theory, developed before the regular study of climate shocks, in the field's citation network – evidenced by the continued centrality of Ellis and Dercon – lies a particular theoretical opportunity: the development and empirical testing of a theory that makes an explicit distinction between diversification as an ex-ante risk management strategy, and diversification as an ex-post coping strategy under compound shock exposure.

Context. Figures 11-14 will indicate whether research is focused on the countries and regions most vulnerable to compound economic and climate shocks, or if a mismatch exists between the region where the shocks occur and the region where the research is generated, which should be the basis for future context-specific research priorities.

Characteristics. Finally, the disciplinary focus of the corpus – primarily in Environmental Science and the Social Sciences – and a relatively small percentage in Economics, indicates room for research that considers income diversification as an economic decision under conditions of risk, including the modelling of trade-offs, returns and constraints, and not simply as an adaptation or resilience outcome.

Methodology. Future studies which explicitly model joint exposure to economic and climate shocks in a single empirical setting, yet are able to distinguish between anticipatory and reactive diversification within a single framework, using panel data, would directly tackle the fragmentation identified by this bibliometric mapping.

5. Policy Implications

The findings carry implications for several audiences with a stake in how this literature develops over the coming decade.

The growth forecast suggests that the window of opportunity for the research funders and development partners (e.g., the World Bank, FAO, research programs linked to the IPCC and bilateral donors funding research on climate-resilience) to guide the field's theoretical trajectory is closing. The promise of compound-shock framing – as opposed to separate funding streams for climate and economic vulnerability – could be designed to actually move the mathematical orientation of the next several hundred studies, and this could be done relatively cheaply compared to having to fund the same number of studies after the conceptual conventions of the field have “gelled.”

The productivity results indicate a possible lever for journal editors and research-capacity-building organizations: given that the field is dominated by single-contribution authors, journal editorial activities that aim to build a stable community of specialists by targeting early-career or first-time authors in the field – special issues, structured mentorship accompanying submitted articles, or special rates for researchers in countries hit by compound shocks – may have more potential to actually increase the number of such authors.

The disciplinary and composition of the evidence base itself is a warning: if a national or local government agency is designing a social protection or livelihood

support programme, the programme design should ensure that the diversification strategies presented in the majority of the evidence base have been assessed for cost effectiveness and fiscal feasibility as well as for adaptability and resilience in the non-economic sense.

For researchers and universities, especially those located in the parts of the world facing the greatest compound shocks detailed in this literature, this citation network is an opportunity rather than a limitation: a body of work this young with this limited set of theoretical pillars gives legitimate room for scholars from outside the discipline or from underrepresented regions of the world to define the new theoretical pillars.

The time horizon that is appropriate for these priorities varies. Design changes in editorial and funding calls are actions that could be undertaken within current institutional structures and might be the most obvious ones that could be taken in the short term (1-2 years). The emphasis in the medium term (3–5 years) is on capacity-building investments (mentorship, co-authorship networks, regional research consortia) to ensure the field reaches its anticipated high point around 2030 without running out of authors, while also increasing the number of single contribution authors to become repeat researchers. In the longer term, after the geographic and thematic mapping in Section 4.3 is completed, priorities can be further focused on the countries, institutions and sub-themes identified as being underrepresented, where the level of economic and climate shocks is expected to be greatest.

6. Conclusion

The overall objective of this study was to construct the first systematic bibliometric mapping of research on income diversification in response to economic and climate shocks and the evidence collected in this study suggests three conclusions directly relevant for how the field can be read and built upon. First, this is a young and fast-growing literature, rather than a mature one; growth has been focused on the years since 2019, and logistic modeling of the cumulative publication trend indicates that the field is still in its early days in terms of expansion, with the yearly peak of publication not forecast to occur until around 2030. Second, however, the field's theoretical vocabulary continues to be borrowed from the broader livelihoods and risk-coping literature, with the continued centrality of foundational, pre-climate-era scholars like Ellis and Dercon in the literature's citation structure, and the question of whether under conditions of compound shock exposure, diversification is primarily a form of ex-ante risk management or ex-post coping, in the sense of those authors, is still an open one that this literature has not yet answered. Third, the productivity base

of the field is very uneven; it is constructed by authors producing a single study rather than by a growing group of specialists, going farther afield of Lotka's Law than is usual in a mature research field.

All of these findings are important on their own, but they also signal a unique and imminent opportunity to influence the basic framing of this literature while it is still in the early stages of development, has relatively few entrenched theoretical commitments, and has the largest number of first-time contributors: a literature at this stage of development, with this few entrenched theoretical commitments, and this large a pool of first-time contributors, is unusually open to having its basic framing shaped by contemporary research and policy concerns — including the compound-shock lens this study argues has been less developed — in a way that would be significantly more difficult once the field reaches the projected saturation point. The analysis itself does not provide another empirical case addition to this literature; rather, the analysis provides information that does not exist in the literature – and for which researchers, funders or editors are unable to make decisions about where to direct their next wave of studies.

This study has its limitations. A bibliometric mapping is not a statement about the validity of the diversification-resilience relationship explored in the literature; it is a characterization of the structure of the literature; it does not count citations and thus cannot distinguish between agreement and critique. The analysis is also limited to a single database (Scopus) and the particular Boolean search string that was used to create the corpus, which ultimately influences the documents that ultimately are mapped and that should be reported exactly in order to repeat the analysis – see attached reviewer comment to the Methodology section for a comparison between the two versions of the search string in the draft. The geographic and thematic aspects of the field's structure (the leading countries and institutions, key word clusters and thematic evolution) are marked in Section 4.3 for completion, since they could not be completed within the scope of this draft. Future research should further map other databases, revise this mapping as the field moves towards its forecast peak, and more directly engage in the conceptual work of determining if and how existing ex-ante and ex-post diversification frameworks require revision to address exposure to a compound shock.

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